Studies in Computational Intelligence 1037

Allam Hamdan · Arezou Harraf · Pallvi Arora · Bahaaeddin Alareeni · Reem Khamis Hamdan *Editors*

Future of Organizations and Work After the 4th Industrial Revolution

The Role of Artificial Intelligence, Big Data, Automation, and Robotics



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The Role of Artificial Intelligence, Big Data, Automation, and Robotics





Editors Allam Hamdan College of Business & Finance Ahlia University Manama, Bahrain

Pallvi Arora International Centre for Cross Cultural Research and Human Resource Management (ICccR and HRM) University of Jammu Jammu, Jammu and Kashmir, India

Reem Khamis Hamdan University College of Bahrain Manama, Bahrain Arezou Harraf Department of Business Studies Box Hill College Kuwait Kuwait City, Kuwait

Bahaaeddin Alareeni Middle East Technical University Northern Cyprus Campus Kalkanlı, Güzelyurt, KKTC Mersin, Turkey

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Foreword

Humanity continues to embrace technological advancements, with both significant challenges and opportunities. Recently, the Fourth Industrial Revolution, also known as Industry 4.0, unfolds. It is bringing technologies such as cyber-physical devices, analytics, and the Internet of Things that obfuscate the boundaries between the physical and the digital fields across all sectors. When compared with previous ones, this revolution is different and distinct in its size, scope, and complexity, by tremendously transforming everything. It is creating a momentous time in history by changing the way we live, work, and think, consequently, organizations and people cannot just wait to find out what will happen.

This revolution is largely driven by emerging technological advancements, such as artificial intelligence and automation, the use of big data analytics and cloud technologies, robotics, machine learning, and distributed ledgers. Indeed, these technological advancements are pervading, drastically shifting the way value is created, erasing borders, and fundamentally shaping and altering the landscape of the society we are living in. These technologies are superseding any digital progress made so far and establishing actualities that will disrupt the business model of almost every sector and every economy. As with all previous industrial ones, the impact of this revolution is not the same across countries and companies, as it is dependent on the environment or existing technological enablers.

Since this concept became a common jargon, it has caught the attention of scholars, researchers, leaders, academicians, and governments across all countries to focus on how these technologies are going to change the future, and to visualize the roadmap for navigating these profound changes in the world of work. Thus, it is imperative to investigate how these advances in technologies are transforming and altering both organizations and the labor market.

The deployment of technologies such as artificial intelligence in organizations is expected to enhance their efficiency through reducing costs and improving productivity and the quality of services and products offered to consumers, thus, boosting their competitive advantages. Organizations are under great pressure to automate to remain competitive in the global landscape. They should understand how these technologies might impact their industries and how they can ensure swiftness to adjust to these changes. With time, it is expected that technology becomes part of the DNA of every prosperous company. If organizations cannot adapt to this change, they will most likely fall behind.

Transformations and disruptions are also occurring within the global labor markets. With automation, robots, and computers, some jobs might disappear while new job titles might appear, leading to greater inequality. On one side, when robots take all jobs, humans will become unemployed, creating serious challenges for the poor. On the other side, dull work will be eradicated, allowing people to focus on more challenging jobs, producing a more productive society. Thus, organizations need to address the challenges related to workforce transformation. Employers should ensure the necessary training of employees to fill the skills gaps and workers should focus on the skills needed to remain agile.

Regardless, this revolution will impact nearly every industry in every country. With smart technology becoming more widespread, it is important to consider its impact on organizations and the workforce. So, will these changes improve or hinder the future of organizations and work? To find the answer, this book explores the Fourth Industrial Revolution a bit closer, taking an in-depth look at its potential impacts on organizations and the world of work. By connecting the dots across the most important technologies changing organizations and work, this book is a thoughtful guide for academicians and digital transformation leaders interested in knowing how embracing technologies can actively shape the future. Ultimately, this book provides a practical roadmap for understanding how organizations can integrate technologies along with some insights into the real challenges that they will face as they make this difficult but necessary transition. This book is a step forward to be prepared for this transition with a plenty mindset and to create a prosperous future of work.

Dr. Rim El Khoury Notre Dame University Zouk Mosbeh, Lebanon

Preface

Organizations globally have been experiencing immense transformation due to the reinvention and redefining of the business models due to the dynamic nature of the business environment. Looking at an organizational context, undeniably, the definition of 'work' and 'organizations' is genuinely changing. Artificial intelligence, Big Data, automation, and robotics are a few of those keywords that are seemingly entering the workplace and reshaping the way work is being done. Moreover, the transition that is being addressed herein not only focuses upon aspects that are operative within an organization like the organizational culture, team building, networking, recruitments, and so on but also aims to address the external aspects like supply chain management, value chain analysis, investment management, etc. Broadly, every single step that is now taken is intensely experiencing this impact upon its functioning.

Additionally, the COVID-19 pandemic has also ignited the mindsets of leaders in such a manner that they are now experimenting with ways and approaches to reconfigure their business processes to incorporate AI-powered solutions into their businesses, especially ones that require higher physical proximity. Moreover, this time has provided an opportunity for managers to navigate through challenging and uncertain times amid technological interventions, create a resilient workforce, seek smart solutions, and drive creativity and innovation. The interlinkage between people, processes, and purpose thus needs careful attention and introspection in light of the AI-driven business approaches to skilfully cater to the needs of the organizations and thereby their growth.

Thus, this book takes a forward-looking approach by bringing in research and contributions that facilitate in mapping the impact of AI and Big Data on businesses, the nature of work along with providing practical solutions for preparing the work, workplace and the workforce of the future. This book shall serve as a guide not just to the academia but also to the industry to adopt suitable strategies that offer insights into global best practices as well as the innovations in the domain.

This book includes 29 chapters by authors from several countries, all of the chanters have been evaluated by the editorial board and reviewed based on double-blind peer review system by at least two reviewers. The chapters of the book are divided into four main parts:

Driving Innovative and Creative Practices.

Social Media, Communication and Its Effects on Society and Business.

The Implementation of Technology and the Future of Education and Knowledge.

The Fourth Industrial Revolution, Cryptocurrency, Cybersecurity, Ethics and Corporate Performance.

The chapters of this book present a selection of high-quality research on the theoretical and practical levels. We hope that the contribution of this book will be at the academic level and decision-makers in the various education and executive levels.

Manama, Bahrain	Prof. Allam Hamdan
Kuwait City, Kuwait	Dr. Arezou Harraf
Jammu, India	Dr. Pallvi Arora
Mersin, Turkey	Dr. Bahaaeddin Alareeni
Manama, Bahrain	Dr. Reem Khamis Hamdan

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Driving Innovative and Creative Practices

Challenges of the Industrial IOT (IIoT) in Higher Education in the Kingdom of Bahrain



Yusuf Janahi

Abstract The Industrial Internet of Things (IIoT) is a fluid concept that evolves in response to shifts in digital technology, requirements, and markets. Higher education today needs to embrace and learn about the new ways that people, machines, services, and data can interact. Transitioning from higher education to work is a challenge that could be more readily overcome if all parties involved, from individuals to organizations, businesses to governments, collaborated. Because higher education is moving at a snail's pace, all stakeholders must work quickly to prepare for the Industrial Internet of Things. Employers expect critical thinking and analysis, as well as problem-solving and self-management skills like active learning, resilience, stress tolerance, and flexibility, to become more important in the years leading up to 2025. Demand for trained individuals will rise as the IIoT expands. One option to narrow the skills gap is through education, which can include effective skills, re-skilling, and up-skilling programs. Moreover, Higher education must incorporate the latest technologies to adapt to new ways in which people, machines, services, and data interact. Likewise, the training requirements in a variety of sectors must be extensively investigated in order to provide a better environment for Industrial IoT education. Academic and High Vocational Education and Training (HVET) programs. work-based learning, educational virtual and remote laboratories, national and international educational legislation and instruments, extensions, and so on should all be investigated. Curriculum creators and planners at HEIs are currently defying the problems brought by technological development head on. The Kingdom of Bahrain is working hard to develop a knowledge-based, diverse economy in order to provide all citizens with a fair and complete education and to increase lifetime learning possibilities. This aligns with Bahrain's Economic Vision 2030 objectives.

Keywords Technology · Kingdom of Bahrain · Industrial Internet of things · HEIs

Y. Janahi (🖂)

Ahlia University, Manama, Bahrain e-mail: yjanahi@ahlia.edu.bh

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1 Introduction

This paper aimed to discuss the challenges of the Industrial (IIoT) in educational sector in general and the Higher Education Institutions (HEIs) in the Kingdom of Bahrain in particular. The extensive deployment of inexpensive smart sensors, processors, wireless sensor networks, and embedded systems paved the way to a new digital industrial wave, called the fourth industrial revolution (IR 4.0 or FIR). Various global industry polls suggest that the Industrial Internet of Things (IIoT) is the most important current technical endeavor for bringing this revolution to fruition (Turcu and Turcu, 2018).

Consequently, the IR 4.0 expands the applications of technology and linked devices in business and society. Some of these are the Internet of Things, (IoT), robots, machine learning, artificial intelligence (AI), nanotechnology, quantum computing, and biotechnology. Maddox (2021) pointed out that IoT technology, as a way of resource efficiency and conservation, may very well be the thing that saves us all as the global population continues to expand with its mounting difficulties.

At this juncture, the introduction of the Industrial Internet of Things (IIoT) is a dynamic notion that go with the changes in digital technology, requirements, and markets. Furthermore, this approach will have a significant impact on industries and business procedures. Higher education must now embrace and become acquainted with the new ways that people, machines, services, and data can interact. Transitioning from higher education to employment is a difficulty that could be more easily solved if all parties, from individuals to organizations, businesses to governments, worked together. Due to the slow pace of change in higher education, all stakeholders must immediately move to prepare for the Industrial Internet of Things.

In order to increase the knowledge base regarding the future of jobs and skills, a unique blend of qualitative and quantitative intelligence was utilized in the "Future of Jobs Report 2020."

The report covers 15 industry sectors and 26 advanced and emerging nations in great detail (The World Economic Forum, 2020). The report's most important results were as follows: The following were the significant findings of the report:

The rate of technological adoption is projected to continue uninterrupted, and in certain cases may even increase. Following a recent trend, business executives continue to place a high priority on cloud computing, big data, and e-commerce adoption. However, interest in encryption, non-humanoid robots, and artificial intelligence has increased significantly.

A 'double-disruption' scenario is now faced by workers due to automation and the COVID-19 recession. By 2025, technological adoption by businesses will modify tasks, employment, and skills, in addition to the existing upheaval caused by pandemic-induced lockdowns and economic recession. Furthermore, people and machines will spend the same amount of time at work on existing jobs. In the next five years, a large number of organizations intend to change their locations, value chains, and staff size owing to causes other than technology. Another interesting discovery was that online learning and training is on the rise, but that it appears different for employed and jobless people. There has been a fourfold increase in the number of people seeking out online learning opportunities on their own, a five-fold increase in employers providing online learning opportunities to their employees, and a nine-fold increase in the number of people enrolling in government-sponsored online learning programs. Personal development classes, which have shown an 88 percent increase in popularity among employed people, are becoming more important. Jobless workers are now focusing on acquiring digital skills like data analysis, and information communication technology.

In the newly constrained labor market, the window of opportunity to reskill and upskill workers has shrunk. This applies to both those who are expected to stay in their jobs and those who are at risk of losing their jobs owing to increased recession-related unemployment. The percentage of key skills that will change in the next five years for those workers who plan to stay in their jobs is 40%, and 50% of all employees will require reskilling (up 4%).

According to Giffi et al. (2015), various publications have focused their attention on this new notion, examining the numerous potential benefits and challenges posed by the adoption of this paradigm across various economies. Aside from technological constraints, the widespread and rapid adoption of the Internet of Things (IoT) paradigm in the industrial field is limited by a skills gap that needs immediate action from its stakeholders. This hypothesis was backed up by the conclusions of the World Economic Forum (2020), which stated that skills gaps will continue to widen in the next five years as in-demand talents vary across jobs. Critical thinking and analysis, as well as problem-solving, and self-management skills such as active learning, resilience, stress tolerance, and adaptability, are among the top competencies and skill sets that employers expect to grow in importance in the years leading up to 2025. Companies predict roughly 40% of workers to require six-month or less re-skilling, and 94% of business leaders expect employees to learn new skills on the job, up from 65% in 2018.

As the IIoT expands, the demand for skilled workers will increase. Education, for example, through effective skills, re-skilling and up-skilling programs, is one way to close the skills gap. The Industrial Internet of Things (IIoT) is a very dynamic idea that will bring ongoing changes in digital technology, requirements, and markets, as well as disrupt industries and business methods. As a result, employees, students, graduates, and others must be as dynamic in their learning and skill acquisition. Higher education must adapt to new ways in which people, machines, services, and data interact by adopting the latest associated technology.

2 The Internet of Things and the Industry 4.0.

The pictures of the Internet of Things and Industry 4.0 are currently vague. Despite the fact that IoT, IIoT, and Industry 4.0 are all related concepts, they cannot be utilized interchangeably. The IIoT is being propelled forward by improvements in

the availability and affordability of low-cost (smart) sensors, processors, embedded systems, and other components, as well as advancements in data storage, analytics, cloud infrastructure, and other areas. For the IIoT to continue to develop and spread, standardization is critical (Maddox, 2021).

2.1 The Fourth Industrial Revolution and Its Context

The Industrial Internet of Things (IIoT) combines physical production and operations with smart digital technology, machine learning, and big data to create a more holistic and connected ecosystem for manufacturing and supply chain management companies. The words interconnectivity, automation, machine learning, and real-time data are all part of Industry 4.0 which is considered a new phase in the Industrial Revolution. While each business and organization is unique, they all encounter the same challenge: the need for connectivity and real-time information across processes, partners, products, and people (Epicor, 2021). The world of manufacturing is changing and in order to survive and thrive, the business must be willing to invest in Industry 4.0.

2.2 Evolution of Industry from 1.0 to 4.0

Initially, it would be helpful to understand how manufacturing has changed since the 1800s. There have been four distinct industrial revolutions that the world has witnessed or is witnessing presently.

Between the late 1700s and the early 1800s, the first industrial revolution occurred. Manufacturing evolved throughout this time period from manual labor conducted by people with the assistance of work animals to a more optimal kind of labor performed by people utilizing water and steam-powered engines and other sorts of machine tools.

With the advent of steel and the use of electricity in industries in the early twentieth century, the globe started a second industrial revolution. Manufacturers were able to boost productivity and make factory machines more mobile after the arrival of electricity. During this time, mass manufacturing methods like as the assembly line were adopted as a means of increasing productivity.

A third industrial revolution began to emerge in the late 1950s, when manufacturers began to incorporate more electronic and later computer technology into their facilities. At this point, manufacturers started to invest more on digital technology and automation software.

A fourth industrial revolution, known as Industry 4.0, has evolved in recent decades. With the help of interconnection via the Internet of Things (IoT), access to real-time data, and the introduction of cyber-physical systems, Industry 4.0 pushes the emphasis on digital technology from recent decades to a whole new level. Industry

4.0 takes a more holistic, interconnected, and comprehensive approach to manufacturing. Consequently, Industry 4.0 enables business owners to better oversee and understand every aspect of their operations. Moreover, it paved the way to a more improved cooperation and access across departments, partners, vendors, products, and people.

2.3 Basic IIoT Concepts and Glossary of Terms

Here are the 12 key keywords and phrases which are commonly used in Industry 4.0:

Artificial intelligence (AI). Artificial intelligence is a term used to describe a computer's ability to do jobs and make judgments that previously required some level of human intelligence.

Big data. This term refers to a large sets of structured or unstructured data that can be compiled, saved, sorted, and analyzed to discover patterns, trends, relationships, and opportunities.

Cloud computing. Cloud computing is the activity of storing, managing, and processing information utilizing networked remote servers housed on the Internet.

Cyber-physical systems (CPS). This term is also called cyber manufacturing which is an Industry 4.0-enabled manufacturing environment that provides realtime data gathering, analysis, and transparency across all aspects of a manufacturing process.

Digitization: The process of collecting and converting various types of information into a digital format is referred to as digitization.

Ecosystem. In manufacturing industry, an ecosystem refers to the potential interconnectedness of your entire operation, including inventory and planning, financials, customer relationships, supply chain management, and manufacturing execution.

Enterprise Resource Planning (ERP): Tools for managing business processes that can be used to manage data throughout a company.

The Industrial Internet of Things (IIoT) is a term that refers to the connections that exist between people, data, and machines in the context of production.

Internet of Things (IoT) is a term that refers to links between physical items such as sensors and machinery and the Internet.

Machine learning refers to a computer's ability to learn and improve on its own using artificial intelligence without being explicitly instructed or programmed to do so.

Real-time data processing refers to the ability of computer systems and devices to process data in real-time or near-real time and produce real-time or near-real-time outputs and insights.

Smart factory is one that invests in and implements Industry 4.0 technologies, solutions, and methods.

2.4 Smart Manufacturing Use Cases

The following cases can help users in appreciating the value of Industry 4.0 in a manufacturing operation:

Supply chain management and optimization is the first example. Businesses gain better visibility, control, and insight into their entire supply chain. Companies can gain an advantage over less-efficient competitors by employing supply chain management capabilities to deliver products and services to market faster, cheaper, and with higher quality.

Predictive maintenance/analytics is the second case. Manufacturers can use Industry 4.0 technologies to identify when possible problems will arise before they occur. Preventive maintenance is significantly more automated and streamlined with IoT solutions in place. When problems arise or machinery needs to be repaired, systems can detect them. Manufacturers can use these types of data to shift from preventative to predictive maintenance.

Asset tracking and optimization is the third case. Manufacturers benefit from Industry 4.0 because assets at each level of the supply chain are more effective. This allows them to keep a better eye on inventory, quality, and the possibility for logistical efficiency. With IoT in place at a location, employees may gain better insight into their assets from anywhere in the world. Standard asset management procedures such as asset transfers, disposals, reclassifications, and adjustments can all be automated and handled centrally and in real time.

2.5 Benefits of Adopting an Industry 4.0 Model

Industry 4.0 encompasses all aspects of the product life cycle and supply chain, including design, sales, inventories, scheduling, quality, engineering, customer service, and field service. Everyone has access to up-to-date, relevant views of production and business operations, as well as far more comprehensive and timely analytics.

Here is a brief overview of some of the advantages of using an Industry 4.0 business model:

- It improves business competitiveness, especially in the face of disruptors like Amazon which continue to enhance their logistics and supply chain management. At this point, investment in technology and solutions is required that will help businesses improve and optimize their operations
- It enables one's business deal with possible difficulties before they become major issues. Predictive analytics, real-time data, internet-connected machinery, and automation can assist the business in being more proactive in addressing and resolving potential maintenance and supply chain management concerns.
- It enables the business cut costs, increase profitability, and accelerate growth. Industry 4.0 technology aids in the management and optimization of all elements

of production and supply chain activities. It gives the business access to the realtime data and insights needed to make better, faster business choices, which may help the entire operation run more efficiently and profitably.

2.6 Internet of Things and Its Impact on the Fourth Industrial Revolution

The most significant impact of IoT on industry is the creation of new opportunities for enterprises to collect and accurately evaluate data. The utilization of data in industrial settings, considerably improves determining possible equipment failure.

For example, big data may be used for predictive analytics to help firms save money on maintenance, such as detecting if a machine will need repairs soon just by measuring the millions of vibrations it makes each day. If any of the measurements are out even slightly, it could indicate that the equipment is going to fail. It can save a corporation from the significant costs of a production line equipment problem if it is fixed ahead of time.

The manufacturing industry in the United States is now experiencing a labor shortage. Today's workforce is unprepared for the future of work, making it more difficult to fulfill customer demand, implement new technology, and boost productivity. The consequences of this mismatch or gap ripple across the entire manpower supply chain. Employers are struggling to locate qualified candidates, while schools are struggling to keep up with the advent of Industry 4.0 and the Industrial Internet of Things (IIoT). Despite the urgency, both sides have failed to make meaningful headway in closing the gap, in part because we are not working together.

Worse, the shortage of competent personnel joining the advanced manufacturing business is only going to get worse. 3.4 million Sophisticated manufacturing jobs will be needed in the next ten years. According to a 2015 research by the Manufacturing Institute and Deloitte, the skills gap might result in 2 million of such jobs staying unfilled.

With this anticipated scarcity, it is clear from an industrial perspective that manufacturing is not "killing employment," as many people believe. Jobs in traditional manufacturing have vanished, but they are being replaced by sophisticated manufacturing occupations, which pay well and operate in cleaner, safer surroundings. Smart factories require workers who have the skills to complete the rote tasks that used to be performed by machines on assembly lines.

2.7 Bahrain's Adoption of Industry 4.0

Bahrain is a leader in the GCC when it comes to embracing innovative technology and digitisation in all aspects of its business. Its manufacturing, transportation, and logistics divisions are constantly implementing cutting-edge technology in assembly lines, communication systems connecting to their separate client bases, and end-toend factory to consumer deliveries.

Currently, Bahrain has adopted Industry 4.0, often known as the fourth wave of the industrial revolution. The Internet of Things (IoT) which allows any device or machine to connect with other devices without the need for human intervention, is a major aspect of Industry 4.0. Bahrain has recognized the significance of this development and is taking the necessary steps to enable IoT in a variety of sectors, including greater ICT investment and the encouragement of a healthy start-up culture. Increased efficiency, cost-effectiveness, and foreign investment will be among the benefits of Industry 4.0. Finally, such move can also create job prospects that will redound to the over-all economic impact.

According to EDB Bahrain (2021), the country wants to establish itself as a regional hub for Industry 4.0 technologies. As a result, the government is collaborating with QiO, a global leader whose expertise focuses on speeding Industry 4.0 adoption, to undertake a number of pilot projects in Bahrain, with the backing of Bahrain EDB and Tamkeen. The goal is to provide immediate advantages and highlight investment opportunities. BFG International, a locally based global leader in composites technology, is set to launch an industrial automation program as part of QiO's first pilot project, which will be powered by QiO Technologies' cutting-edge core software.

2.8 Strategy for Adopting Modern Technologies

As the model body for pushing the Kingdom's digital government projects, the Information and eGovernment Authority (2021) strives to assist other government entities in identifying viable areas for the deployment of technologies such as the Internet of Things, Blockchain, and Artificial Intelligence. In this context, the Information and eGovernment Authority is continually investigating and analyzing the potential of emerging technologies to have a wider positive impact on citizen involvement and government administration. The Information and eGovernment Authority is now devoted to promoting technology-driven innovations, which include but are not limited to.

2.9 Cloud Computing Adoption in Government (Cloud First Policy)

The Information & eGovernment Authority is committed to modernizing government ICT and leading by example in the use of cloud computing services to cut costs, improve security, boost productivity, and offer exceptional citizen services. As part of its commitment, IGA follows the government's cloud-first policy and has developed

a strategy, plans, and targets, as well as support mechanisms, to guarantee that the cloud-first policy is adopted by all government institutions.

2.9.1 Invest in Block Chain Initiatives

The Information & eGovernment Authority and the banking and financial sectors will collaborate to create a platform based on new technologies for accessing Know Your Customer (KYC) data through verified and authenticated channels after receiving consumers' consent electronically.

2.9.2 Initiatives in Artificial Intelligence

The Information and eGovernment Authority is looking at the possibility of using a generic Artificial Intelligence approach to reform government.

3 IIoT and Higher Education

Turcu and Turcu (2018) proposed a holistic view of all IIoT-related higher education perspectives in order to approach higher education in the context of the Industrial Internet of Things.

From a scientific standpoint, universities are conducting research in both the IIOT and IIoT-related domains, contributing to the broadening of knowledge horizons. The Scientific Point of View. The Industrial Internet of Things, or IIoT, has gained popularity in recent years. Furthermore, the number of publications dedicated to the Industrial Internet of Things is rapidly increasing. Several of these publications present the results of university-based research. A comprehensive evaluation of the literature was conducted by evaluating key papers from six academic databases (Web of Science, IEEE Xplore, ScienceDirect, SpringerLink, Scopus, ACM digital library). A vast number of journal articles, conference papers, books, and book chapters were discovered.

Universities actively encourage the diffusion of IIoT know-how among students and graduates through their teaching, thereby increasing the stock of skilled human capital. Various international research, publications, and scientific papers show that the largest hurdle for advocates of the Industrial Internet of Things is people, not technology. While digital technologies are quickly becoming commonplace, an organization's Digital IQ Price Waterhouse Coopers is critical to its success (PWC Global Digital IQ Survey, 2015).

From a technological standpoint, colleges encourage the transfer of their expertise to industry by emphasizing technology transfer. As a result, improving the digital abilities of personnel who will be responsible for implementing digital initiatives is crucial. There is little doubt that advancements in IIoT technology have and will continue to have the potential to alter the industrial sector. The Industrial Internet of Things (IIoT) is a cutting-edge idea. Many improvements have been developed in recent years to address the new difficulties provided by the IIoT and Industry 4.0. Technology transfer, on the other hand, is critical for disseminating knowledge and adapting these advances to real-world conditions. The Association of University Technology Managers (AUTM) defines technology transfer as "the process of transferring scientific results from one institution to another for further development and commercialization."

Experts expect that major changes in the key components of education will be required based on current trends, ranging from content to distribution inside the Internet of Things and New effective educational programs will have to be enhanced or developed, and/or existing academic curriculum will have to be restructured, in order to satisfy changing requirements and respond to the increasing demand for a future highly skilled workforce. Furthermore, in order to revolutionize the learning process, higher education institutions must transcend the traditional manner of learning by embracing the latest technologies.

Workers that are adept at developing and deploying IIoT systems will be in higher demand, according to Manyika et al. (2015). Within the IIoT context, digital competencies and innovation are commonly regarded as some of the primary drivers for boosting company competitiveness.

A great number of research have been conducted worldwide on the university technology transfer process. In a variety of ways, active academic technology transfer can benefit a university, its region and country, industrial partners, and the general public. A large number of scientific papers and studies have revealed some of them. Academic inventions and technology transfer could help students by allowing them to engage in real-world translational research, get experience with the patent application process, and collaborate with industry, start-ups, and manufacturers (McDevitt Mendez-Hinds et al., 2014).

4 A Symbiotic Relationship Between Education and Industry

While educators are professionals in teaching, employers bring industrial knowledge to the table, according to Lichtenberger (2017). Members of industry can ensure that students are up to date on IIoT advances by cooperating with schools and technical training programs, while educators may focus on making the learning experience entertaining and meaningful.

This involvement can occur sooner than most people in the industry realize. Children and teens in K"-12 classes who are exposed to science, technology, engineering, and math (STEM) learning activities early in their lives are more likely to be strongly engaged in the subjects in the long run. Industry leaders may be able to supplement hands-on or project-based learning with real equipment or lifelike models that

resemble future factories, allowing students to become more interested in STEM careers.

Instructors in post-secondary education, want direct access to current industry events as well as forecasts for the future in order to educate students for specific occupations following graduation. This creates a significant potential for employers to form relationships with educators in order to ensure that the educational system is an effective means of preparing the workforce of the future.

Other options include serving on the curriculum advisory board of local K"-12 schools or institutions, as well as developing apprenticeship programs for high school and postsecondary students to gain practical experience. Employers might also consider participating in summer programs and competitions that encourage students to pursue careers in Science, Technology, Engineering, and Mathematics (STEM) fields. These initiatives enable manufacturing professionals to provide assistance and resources to students who will become tomorrow's workforce. More crucially, symbiosis lies at the heart of all of these activities. If business leaders assist educators in addressing the content areas that kids need to succeed, they can produce a workforce that is ready to welcome future advancements.

Disruptive technologies that have been used to establish the IIoT should be considered as building blocks for a curriculum that has been changed to match the IIoT's requirements. Furthermore, several studies and analyses indicate that colleges provide students with traits that would help them to respond to an unpredictable future such as ambiguity handling, emotional intelligence, and flexibility (Edmondson and Ward, 2017).

It is true that the IIoT's educational vision includes a focus on individual technical growth. The transition from higher education to employment is a difficulty that could be more easily addressed if universities and employers worked together as part of a university-employer partnership. Indeed, the graduate employment rate as a major success indicator for institutions supports the importance of employer university connections. As a result, universities have expanded their attention on promoting students' and graduates' employability rates, as well as their partnerships with business and industry.

The goal is twofold: to better prepare students for the job market and to boost graduate employment rates. In reality, to attract potential employers, certain universities must work harder and in more inventive ways. Involving the business sector in the development of academic curricula based on specific demands has become a popular alternative in recent years. Furthermore, students can get job experience through placements and internships at various companies (O'Halloran & Kvochko, 2015).

As a result, in order to create a better environment for Industrial IoT education, the training requirements in many fields must be thoroughly explored. Academic and Higher Vocational Education and Training (HVET) programs, work-based learning, educational virtual and remote laboratories, national and international educational regulations and instruments, extensions, and so on should all be examined.

4.1 Benefits of IoT on HEI's

Potter (2020) stated that the Internet of Things (IoT) has had a significant impact on organizations in a variety of sectors and industries in recent years. It's the same with higher education and research. There is a need to investigate how the Internet of Things (IoT), artificial intelligence (AI), and machine learning (ML) are transforming this industry.

4.2 Educational Facilities That Are Connected and Immersive

Universities can use forward-thinking technology and the Internet of Things to create immersive educational settings that include virtual reality and enhanced reality, allowing students to learn more effectively. They can give students the impression of being on the place, increasing both their learning experience and the teaching experience for staff.

This technique can be supported by a variety of learning situations; for example, in a course on geology and volcanoes, students can see live, 3D information from an active volcano in Indonesia, Japan, or Italy via live feeds, sensors, and other data. IoT and AI take it a step further, allowing students in a North American classroom or at home to communicate and share information with students, professionals, and professors in Europe, Africa, or Asia. This is a huge learning opportunity that is only now being explored.

4.3 Infrastructure that is Interconnected and Safer

Universities' infrastructure can be connected to the devices of researchers, students, and instructors, allowing university employees to better organize and utilize instructional spaces. Students can check ahead of time to see if a study pod is available or if they can collaborate with their classmates online instead. Researchers can check in real time if their lab is available or book a lab elsewhere. Due to improved sensors, RFIDs, cameras, and any other connected device on the IoT for better protection and responsiveness, security teams on campus can watch and observe the entire facility. In the event of a building evacuation, technologies can convey the safest strategy and directions for evacuation in real time to everyone inside the building.

4.4 Personalized Learning Solutions

Learning devices, health trackers, and webcams are examples of IoT smart devices that can collect information about pupils. The institution can create a customized learning solution for each student using the learning management system. A learning route, a study schedule, and much more will be included. They will be able to see how resources are being used, and the system will be able to provide more relevant resources to pupils who are understanding specific courses, thanks to AI. They can also supply extra study resources to pupils who are having difficulty with a particular subject.

Smart, networked sensors would be able to detect when students are being distracted by a particular lecture and adjust the learning solution for that subject. Professors can receive feedback on their students' learning and attention levels, allowing them to better engage with their classrooms.

4.5 Sustainability and Benefits of IoT

As has been demonstrated in other industries, the Internet of Things may significantly cut costs while increasing production. This includes things like remotely monitoring room usage and purchasing equipment that saves energy and money. General analytics can be established for each area of a building in order to apply space, cost-cutting, and energy-saving initiatives.

High-level sensors in research equipment can convey preventative repair warnings, reducing downtime and maintenance expenses. The same may be true for data collecting for access control, waste control, and anything else that consumes a considerable amount of time and resources.

5 The Emerging Technologies Ecosystem in Bahrain

The Bahrain Government is actively working to develop a culture of innovation in all sectors of society, with the goal of creating the suitable ecology for emerging technology. It also encourages people who are involved in the design, development, and deployment of new technologies to ensure that they are in line with the Kingdom's values and meet international standards.

In order to realize the Kingdom's Vision 2030 and in support of the Government Action Plans, emerging technologies currently play a critical role. The Information and eGovernment Authority (iGA), the Economic Development Board (EDB), Tamkeen, the Central Bank of Bahrain (CBB), and other government institutions continue to adopt new technology (Barain.Bh, 2021).

5.1 AI Stands for Artificial Intelligence

Bahrain's leadership aims to use current technology like Artificial Intelligence (AI) to improve government services has aided Bahrain's digital achievements. In this field, the Kingdom also offers training and development programs.

At this point, Tamkeen developed the Artificial Intelligence Academy at Bahrain Polytechnic in collaboration with Microsoft Corporation, which provides a platform for young people to improve their innovation and creativity skills. The main goal of the academy is to train qualified students and teachers from various schools and institutions around Bahrain.

His Highness First Deputy Chairman of the Supreme Council for Youth and Sports and President of the Bahrain Olympic Committee, Shaikh Khalid bin Hamad Al Khalifa, has created a tournament for students targeted at boosting Artificial Intelligence innovation. The competition provides students the opportunity to showcase their technological ideas and skills.

The Bahrain government stated in 2019 that it will test new standards for Artificial Intelligence procurement in the public sector developed by the World Economic Forum's Centre for the Fourth Industrial Revolution. The Centre collaborated closely with the Economic Development Board and the iGA to develop standards that allow governments to ethically and sustainably deploy artificial intelligence technologies.

5.2 The Chat-Bot Project

The Information and eGovernment Authority is currently working on a chatbot project that will be deployed soon. This helps to improve customer service standards by increasing the capacity of the Government Services Contact Center 8001 8000, which will improve the efficiency of responding frequently requested questions.

Bahrain hosted the 8th World Robotics Olympiad on an educational level (WRO 2018). Students from public and private elementary, middle, and secondary schools competed to show off their inventive robotics design and construction concepts.

The 2015 VEX Competition, a national qualifying event for Bahrain, brought together children from elementary, middle, and high schools to compete for a spot in the World VEX robotics competition.

The Ministry of Labor and Social Development has started a program to teach children how to install and program robots. The initiative aims to motivate young people to pursue careers in science and technology as future leaders. To boost efficiency, reduce expenses, and limit human error, the Ministry of Finance implemented Robotics Process Automation in its many departments.

5.3 The Role of Bahrain's Education in the Fourth Industrial Revolution

Curriculum development and educational results are heavily influenced by the Fourth Industrial Revolution. The Kingdom of Bahrain is working hard to build a sustainable, knowledge-based, and diversified economy in order to offer fair and comprehensive education for all citizens and to improve lifelong learning opportunities for all. This is consistent with Bahrain's Economic Vision 2030 goals.

Currently, the Kingdom of Bahrain has introduced a number of ground-breaking programs at universities and educational institutions to keep up with global developments and market needs, including the Master of Environment and Sustainable Development Program, Big Data Operations Program, and the Financial Technology Master Program.

6 Conclusions

The main aim of this paper is to discuss the challenges of the Industrial IoT (IIoT) in the educational sector in general and Bahrain's Higher Education institutions in particular. The introduction of the Industrial Internet of Things (IIoT) has led to the changes in digital technology, requirements, and markets which brought significant impact on industries and business procedures. With this development in technology, the educational sector in general and HEIs in particular must embrace and acquaint themselves with the new ways that people, machines, services, and data can interact. Companies in a variety of industries can profit from the IIoT. Likewise, several difficulties must be addressed in order to take advantage of the IIoT's opportunities. Thus, in addition to focusing solely on technological difficulties, the interactions among all stakeholders, from individuals to organizations, and from corporations to governments, must be considered. Moreover, business and governments must intensify their efforts and increase investments in the coming years and must also rethink of new approaches to education, skills, and employment. Higher education must find new ways and means to close the skill gaps. In addition, HEI's must foresee and solve concerns connected to future large-scale changes in the work landscape and the "holistic" character of skill requirements in a timely manner. In this regard, strengthening employer-university ties for internships, training needs assessments, and other purposes are important strategies that should be supported and expanded in the near future.

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The Role of Emotional Intelligence in the Improvement of Industrial Multicriteria Decision Making: A Model Driven Approach for Emotional Intelligence Testing



Sara Amar 🕞 and Karim Arrhioui 🕒

Abstract Industry 4.0 drove a mass technological revolution in manufacturing and supply chain management. The introduction of cyber systems, Machine Learning, Artificial Intelligence, and smart manufacturing helped with the development of a personalized manufacturing strategy and reinforced the switch from the traditional industrial processes to an automated machinery. This radical change is led by the belief that a connected world will perform better in decision-making and management due to the continuous updates of information. However, this big move towards computerization is based solely on engineering processes and mathematical modelling, leaving behind the human based inputs. The automation of the industrial process and decision making proved its efficiency when dealing with problems based on pure quantitative criteria. However, the human factors and in decision making are essential to evaluate the qualitative criteria. Predominantly, industrial decision making is always related to the satisfaction of the customer and the quality of developed products. These characteristics are vastly based on emotional maturity and psychological preferences, thus the importance of the evaluation of the emotional intelligence of the decision maker to ensure his or her ability to provide an optimal input during the decision process. Therefore, we focus in this study on the analysis of the impact of emotional intelligence on multicriteria decision making. A detailed presentation of the different tools of testing and assessment is provided. A proposal of an automated application to measure the emotional intelligence of the decision makers is discussed for future implementation using domain-specific languages.

Keywords Industry $4.0 \cdot$ Multicriteria decision making (MCDM) \cdot Emotional intelligence \cdot Human factors engineering \cdot Model-driven engineering

S. Amar (🖂)

K. Arrhioui Ibn Tofail University, Kenitra, Morocco

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Liwa College of Technology, Abu Dhabi, UAE e-mail: Sara.amar@ect.ac.ae

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1 Introduction

The fourth industrial revolution consists of a heavy automation of the manufacturing and management activities. It is reshaping the way individuals and organizations interacts and react to the different aspects of life: from work, social behavior and performance to production quality and decision making. Industry 4.0 also brought a new approach to achieve sustainability and provide faster and optimal solutions to the economic, social, and environmental goals of society.

The manufacturing strategy is evolving from a mass production to a more personalized one, therefore the incorporation of high technological solution such as Internet of things, Industrial internet, Smart, additive, and cloud-based Manufacturing is inevitable to satisfy the customer and preserve a competitive advantage.

The digital revolution and its accessibility to customers around the world participated in the change of customer behavior and drove companies to embrace disruptive digital and physical technologies to reach these new values. Industry 4.0 brought a notion of a better and sustainable manufacturing and supply chain management, however, according to Ghobakhloo, in his paper "Industry 4.0, digitization, and opportunities for sustainability", he revealed that economic sustainability functions such as production efficiency and business model innovation are the more immediate outcome of Industry 4.0, which paves the way for development of more socioenvironmental sustainability functions of Industry 4.0 such as energy sustainability, harmful emission reduction, and social welfare improvement (Ghobakhloo, 2020).

In fact, several authors expressed their concerns about the disturbance generated by the emerging era of Artificial Intelligence (AI) and Machine Learning (ML) on the human factors' abilities. In their book entitled Financial Intelligence in Human Resources Management: New Directions and Applications for Industry 4.0, Singh et al. stated that, it is becoming highly difficult to develop, gain and maintain Emotional Intelligence (EI) in the era of AI, a quality much needed in an environment characterized by its volatility, uncertainty, and complexity (Singh et al., 2021). Emotional Intelligence is also proven to be not only essential for manufacturing and supply chain management to reach sustainability goals, but it is also a required competence in the learning process for engineering students. According to an analysis study conducted by Mitrović Veljković et al., students with a clear knowledge of their own emotions are able to use them for personal development (Mitrovic Velikovic et al., 2020). They are able to concentrate on solving problems which leads to an increase in their cognitive abilities. These personal characteristics are an essential component in the design of smart business models and decision making (Kaczor & Kryvinska, 2013).

Industry 4.0 concept was developed to support a dynamic business world that is characterized by its complexity and ambiguities. It is no longer straightforward to define the uncertainties and to measure probable outcomes of a specific decision where many changing factors and criteria must be considered. Even though, the technological and digital evolution introduced by the industry 4.0 throve in decision making through engineering methods and mathematical modeling, it did not translate well in real world problems. According to Hoffmann Souza et al., in their paper "A survey on decision-making based on system reliability in the context of Industry 4.0" using technology does not justify the investment (Decision) made (Souza et al., 2020). Reliability is not clearly represented when it comes to horizontal management decisions, industrial decision making requires the consideration of both types of criteria, the qualitative and the quantitative type.

Indeed, the efforts of automation and AI proved effective considering the first type of criteria (quantitative), however, the later type (qualitative) is difficult to formulate and analyze using engineering methods, thus the importance of the human interaction in the decision process.

Emotional Intelligence is therefore a much-needed tool to identify and evaluate qualitative criteria for industrial decision making. MCDM methods does require a semantic evaluation that should be provided by the decision-maker or the stakeholder. It is in fact an essential measure to include the preferences of the stakeholder in the decision analysis to reach an optimal solution for the problem (Amar & Abouab-dellah, 2016). Emotional intelligence also plays a role in the pre-decision-making application as well as the decision-making process call for the formulation of team of collaborators coming from different backgrounds and having a different expertise. This diverse team should study the problem and find an adequate solution by providing semantic evaluations, therefore a difference in their level of compatibility will have an impact on the outcome of the evaluation, it might even lead to conflicts and dismissal of the project.

EI is used by philosophers and psychiatrists to study and measure the different aspects of the emotional abilities of the individual. These emotional abilities or human factors have an impact on the performance and cognitive competences of the human being. It is, in fact, an essential element to support the decision-making process, especially to evaluate the ability of the decision maker to provide an adequate evaluation for the qualitative aspects of the multicriteria problem.

Despite its importance, this measure is rarely applied in industrial management. The emotional intelligence evaluation is usually considered as a non-industrial activity. It is performed separately by the human resources management department and is usually considered part of the employee mental wellbeing or stress management programs and not as an asset for decision making improvement.

Moreover, even given the high automation and digitalization of industrial processes, the incorporation of EI testing in information systems and enterprise resource planning (ERP) products is almost nonexistent. Furthermore, the EI test making for industrial decision support requires the collaboration between EI experts and industrial managers in order to create the adequate test to measure the exact needed assets for the specific industrial problem.

Overall, a deep understanding of the different models of EI measuring and their impact on the decision-making process is still lacking in research and applied programs, hence the proposed study.

In this chapter, we present an analysis of emotional components that affect decision making. Our objective is to fill in the gap of research regarding the missing link between the accuracy of the qualitative criteria evaluation used in MCDM models and EI testing.

We also propose a solution to semi-automate the EI testing with an objective to be included in the information system for decision support and business management. A practice that is still missing in the literature. We propose a Model-Driven Approach to represent the business model and the different required items in the form of a CIM and its transformation to a PIM. The proposed study is the first step to develop a novel domain-specific language for test-making.

The remainder of this chapter is organized as follows: the purpose of the study is highlighted in the second section. The third section is dedicated to the literature review, first we present a state-of-the-art review of the multi-criteria decision making, pointing out the elements of semantic evaluation needed in the MCDM process where EI is a valuable asset.

The second part of the third section is dedicated to emotional intelligence and human factors engineering; it contains a state-of the-art of the several EI testing Models found in the literature. The fourth section consists of the presentation of itembased EI tests, we define the different items and their classification. The developed Model-Driven approach of EI testing is proposed in the fifth section, we present the CIM, the PIM and the transformation rules. Finally, we conclude this chapter with a summary of the proposed study and the future perspectives.

2 The Purpose of the Study

The computerization of the manufacturing process and industrial activities is essential to keep up with the fourth industrial revolution. Decision making is one of the important aspects of industry that are high in the list of processes to automate given its vital impact on the business continuity and success.

There are several attempts in artificial intelligence proceedings to incorporate emotion detection and learning into microprocessor driven decision-making. These attempts are generated by the volition to mimic the patterns of human reasoning. The purpose of this project is to study the relationship between human factor engineering and decision making in an industry 4.0 concept. The question is how emotional intelligence evaluation can be used to enhance the qualitative measurement during a multicriteria decision making process. Based on the results, we propose a prototype to develop a domain-specific language for the emotional intelligence evaluation directed especially for MCDM cases.

3 Literature Review

3.1 Decision Making

The human factor engineering is an essential element in several fields such as decision making, engineering education and human-AI teaming (Roth et al., 2021). The purpose is to study and analyze the application of information on physical and psychological characteristics in order to design devices and systems for human use.

According to William K. Holstein, human-factors engineering can be used to designate knowledge, a process or a profession (Chapanis & Holstein, 2018). It is a collection of data and principles about human characteristics, capabilities, and limitations related to machines, jobs, environments and decision-making.

In an industrial environment, the human-factors (H-F) engineering is adapted to define not only the knowledge but also the processes and the responsibilities of the manufacturing teams.

As a process, the H-F engineering refers to the design of machines and equipment, manufacturing systems, work methods, procedures, and plant facilities to take into account the safety, comfort and productiveness of the operators. These elements require the analysis of the human behavior as well as the engineering and economic outcomes of the industrial decision-making process. A process that is considered complex with multiple criteria and different outcomes (Amar et al., 2018). In fact, the Multi-Criteria Decision Making (MCDM) is used in several activities of management and optimization, especially when it comes to problems such as location, planning, resource management, sizing, evaluation, etc. The severity and criticality of issues varies from a situation to another. However, despite the difference in the difficulty level of the decision, the question always remains the same: "how to make the most optimal choice?".

The choice in question depends on the consideration of several factors and criteria that are affecting the outcomes of the decision. Therefore, a refined study should be conducted to evaluate and analyze the different aspects of the problem; this analysis should generate a decision, or a series of consecutive decisions called "The decision process".

According to Tompkins, the decision process is an environment of interactions which can evolve in space and time (Tompkins et al., 2010). In this environment stakeholders share their concerns, interests, and visions regarding the subject matter. These interests can be cumulative and sometimes described as contradictory, for example "Increase the production rate and reduce the transportation cost".

The presentation, the formulation, and the modeling (Mathematical, cognitive, or other types of modeling) of the problem is usually the mission of the decision-maker also called the analyst. His or her objective is to represent the concerns and the vision of the stakeholder and find a solution responding to the final objective. The aim of the decision process does not necessarily have to lead to finding the optimal solution for the final concern (Interest). It can be used in resolving several questions in order to support the stakeholder vision and define a clear idea of his final concerns (Mammeri, 2013).

The multi-criteria decision problem involves taking into consideration several factors and criteria necessary to achieve the final concern or interest. A criterion can be defined as a function $c : A \rightarrow X \subset \mathbb{R}$ that enable the decision-maker to compare two or multiple alternatives. This activity of comparison is relative to a certain extend to an identified actor (decision-maker or stakeholder) (Vanderpooten, 1990). In fact, the criteria are considered an important basis in the decision-making process, each criterion has a different level of impact on the final concern depending on the characteristics of the study and the general concept of the problem.

Multi-criteria decision support is one of the original uses of operational research. There are several decision support methods in the literature; they vary according to the used algorithm, the nature of the problem and the characteristics of the adopted approach. However, the decision process is not completely separated from the interaction of the decision-maker or the stakeholder preferences. In fact, it is an essential input to build a good support system and generate a good decision. According to Hess and Bacigalupo, the ability of organizations, corporations and entities to contemplate, evaluate and implement quality decisions is dependent upon a multitude of intrinsic and extrinsic factors (Hess & Bacigalupo, 2011).

The Multi-Criteria Decision Making (MCDM) discipline can be divided into two sub-categories:

- MADM: The Multi-Attribute Decision Making, it consists of the selection of the best "alternative" action from a finite and predetermined set of alternatives
- MODM: The Multi-Objective Decision Making. This sub-category consists of the selection of the best action in a continuous or discrete decision space. Multiobjective optimization is among the most popular use of the MODM.

The modeling of a decision support system is an essential segment of the decisionmaking process. It consists of modeling and presenting the problem in an explicit format. Several approaches were developed in the literature, defining the role of the decision-maker and the stakeholder in the formulation and modeling process. The four most popular approaches are presented in the Table 1.

The Multi-Criteria Decision Making can be implemented following different approaches, but the general process remains similar. According to Hoffmann Souza et al., the decision process is based on three basic axes (Souza et al., 2020):

- The formulation of the problem
- The selection of the multicriteria model
- The analysis and implementation.

There are several developed methodologies to support the MCDM; they differ from the point of view of the mathematical approach such as the aggregation methods, weighted metrics method, Goal programming. Other methodologies are based on the use of a mixed evaluation (Ranking, Evolutionary) of the criteria such as ELECTRE (ELimination Et Choix Traduisant la REalité), PROMETHEE (Preference Ranking

Approach	Description
Nominative	The nominative approach is inspired by economic rationality. The participation of the decision-maker in the construction of the model is rarely requested. The results obtained through the model are validated according to their consistency with the axioms of economic rationality Example: "If action α is more profitable than action β and action β is more profitable than action γ "
Descriptive	The model is based on existing data and behaviors/observations. The objective is to describe the outputs already observed and obtained which can be reproduced under the same circumstances and conditions The decision maker has no relevant role in developing the model. The results provided through the descriptive approach are validated by the observation and comparison of other phenomena of the same nature
Perspective	This approach is notable by the practice of structuring information to build the model "inputs-based model". It is not based on any existing information (Observation or economic axiom) The participation of the decision-maker is not required during the construction phase of the model, but it is mandatory for the validation of the results
Constructive	This approach is based on an interactive practice. The decision-maker interfere during the building phase of the model and during the validation of the results The essence of the approach is the expertise and the knowledge of the decision-maker while the task of the analyst is to formulate and define the steps of the model. Example: "The analyst seeks to build a model that reflects the preferences of the decision maker"

Table 1 Decision support models

Organisation Method for Enrichment Evaluations), VIKOR (Vlsekriterijumska optimisacija I KOmpromisno Resenje), and TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution).

The focus of this study is the human input in the decision-making process and the evaluation of its accuracy based on the emotional intelligence level. Therefore, the adequate choice of decision-making methodology for this study is the Analytic Hierarchy Process (AHP) developed by Thomas L. Satty. The hierarchical and analytical characteristic of the method is led by the monitoring and analysis of different decision elements including the consideration of both qualitative and quantitative criteria in a single model (Saaty, 1988).

The AHP consists of three fundamentals: Decomposition, Evaluation and Synthesis and operates via five main phases:

Phase 1—Hierarchical Breakdown: The hierarchical division of the problem to several levels is operated based on the following scale: the upper level (first level) is reserved for the objective, the final or global concern; the intermediate level (second level) corresponds to the criteria and sub-criteria involved in the resolution of the set objective, while the lower level (third level) is formed by the different alternative or actions proposed to the decision-maker.

Phase 2—Bi-Comparison: This phase is dedicated to the comparison of the subcriteria (two-by-two) of each level and the comparison of the alternatives based on their importance with respect to the final objective. The operation of comparison is structured on a numerical scale system, for example:

- 1: same or equal importance of two criteria.
- 9: one criterion is more important than another.

The decision maker in this phase is the main operator in the bi-comparison.

Phase 3—Priority of intermediate levels: The priorities of the intermediate levels vary based the importance of its criteria. They are represented in the AHP method by a weight associated with each level. These weights are measured from the normalization (to 1) of the values of the main eigenvectors of the matrices formed in the second phase. A weight value close to 1 means that the criterion corresponding to a higher priority is more important in regard to the final concern or objective.

Phase 4—Synthesis: The purpose of synthesis is to define the final priorities. They are measured progressively by aggregating the weighted priorities of the current level and the priorities of the following higher level.

Phase 5—Consistency of the evaluation: The AHP method uses the semantic evaluation of decision-makers to build the comparison matrix, which requires consistency between the assigned evaluation values. Therefore, the bi-comparison matrix should be completed at random, thus the importance of the coherence ratio index. This index represents the probability that the bi-comparison is implemented randomly.

In an attempt to combine qualitative and quantitative criteria in the same mathematical model, AHP introduces the transformation of the semantic evaluation given by the decision maker to numerical values based on a predetermined scale. This step enables the use of mathematical analysis to optimize the outcomes of the decision and to include the stakeholder preferences since it is an important step to achieve a well-balanced solution.

This semantic evaluation can differ from a decision maker to another since it is based on the emotional abilities of the human being not rational ones. Therefore, it is important to measure the emotional maturity and intelligence of the decision maker involved in the evaluation to assure an adequate input.

However, emotional intelligence and human factors are a complex concept evolving psychological and philosophical analysis. Therefore, we present in the following sub-section a state-of-the-art analysis of emotional intelligence (EI), we put an emphasis on the emotional intelligence testing for decision making problems.

3.2 Emotional Intelligence

An emotion is defined as a response to a stimulus in a given environment (Vikan & Vikan, 2017). This output is extremely influenced by the culture of the person. In other words, the emotional responses are shaped by the cultural environment (Barrett,

2017). Based on this definition, each emotion is the result of the processing of certain stimuli coming from the sensory channels.

In fact, these sensory channels are an important element in transforming the emotion to an explicit shared expression through language. In her book "How emotions are made: The secret life of the brain", Lisa Barrett considers language to be a critical element in shaping the concept of emotion in any individual. In fact, learning an additional language would affect the individual perception of emotions (Berehil et al., 2020). Emotions are different from reactions which are directly based on sensations such as pain, a feeling of change in temperature, and basic needs such as hunger and thirst. Emotions vary in types (joy, sadness, fear, etc.) and in intensities, from slight to very intense (fear, terror).

The emotion does generate several unintentional actions in the individual. For example, feeling angry can induce a disruption in the respiratory cycle or tension in muscles. Therefore, the emotion cannot be reduced to a simple feeling, but it consists of different elements which can be categorized into three components: experience, physiological reactions, and behavior (Vikan & Vikan, 2017).

Experience can be described as sensations, perceptions, souvenirs and thoughts, the physiological reaction is defined as heart beats, sweat, breathing and muscle tension and the behavior consists of facial expressions and expressive actions.

Emotions are linked to the experience in which the individual is triggered by something that is important and meaningful to him. It is possible that the responses are so quick that the individual is not immediately aware of his emotions and requires a moment to understand them.

The other two components of emotions are linked to specific behaviors and the reaction of the body that is involved in the behavior. The excitement includes physiological and neurological reactions that are triggered when an emotion is activated. For example, in the case of fear, breathing and heartbeat become fast for more oxygen and blood flow to the muscles in preparation of immediate action.

The definition of the emotion and its components plays a primary role in the development of the emotional intelligence theory. Several authors have defined EI based on their understanding of emotions and their progress through time (Ben-Zéev, 2001; Chakraborty & Konar, 2009a; Matthews et al., 2004). Researchers, from different fields, have tried to interpret the phenomena related to emotions, their physiological activation and control with respect to their field of expertise. For example, physiologists associate emotions with changes in the neurological and hormonal factors of the individual, which are caused by several physiological conditions of the body such as blood pressure, blood circulation, breathing and body temperature. Psychologists consider emotion to be the result of the process of four evolutionary phases which are cognition, evaluation, motivation and feeling. Philosophers on the other hand, are primarily concerned with the rationality of emotions.

Emotional intelligence is the skill of identifying, expressing, understanding and regulating one's own emotions and those of others (Lazarus, 1991). In this context, there are several elements that enable the evaluation of an individuals' emotional intelligence level such as the competence which indicates the level of recognition by an individual to its emotions or the ability to represent emotions via thoughts. Some

researchers consider also that the aptitudes to control, contain and regulate emotions are a measure of quality and strength in term of competence.

Emotional intelligence was a subject of interest exclusively in philosophy and psychology fields. Over the past two decades, it rose to fame thanks to the best-selling book "Emotional Intelligence" by Daniel Goleman and the high interest in experimental psychology. In fact, Goleman debated that emotional intelligence has a significant impact on the cognitive abilities of the human being, therefore individuals with high EQ (Emotional Quotient) may not have a high IQ (Intelligence Quotient) (Goleman, 1996).

The term Emotional Intelligence brought together the rationality of intelligence and the irrationality of emotions (Chakraborty & Konar, 2009b). This contradictory aspect of the EI drove a discussion about the meaning of intelligence while dealing with emotions. In fact, artificial intelligence (AI) researchers defined intelligence by following a pure rational theory and described intelligence in terms such as reasoning, learning, planning and perception (Konar, 2018). However, despite the heavy logical description, the terms are not totally free of emotional significance.

Emotional intelligence can be defined as the study of the element of emotions as a main component of intellectual activities (Konar, 2018). Recently, several artificial intelligence solutions were proposed to identify and evaluate the emotional intelligence of the individual such as emotion detection through facial expressions or psychological experiments using brain imaging. Emotional detection is also done using item-based testing for emotion abnormality.

Modeling the emotional intelligence can be based on several approaches, such as: *Ability approach*: The main characteristic of the ability approach is that emotional intelligence is conceived as a form of intelligence thus the cognitive processing is involved in emotions. In fact, it is related to the intelligence in general and should therefore be assessed using performance metrics, which requires from the test taker to perform discrete tasks and to solve specific problems. The most known model following this approach is the four-branch model developed by Mayer and Salovey in 1997.

The foundation of the model is the identification of EI as set of a certain number of mental abilities that are subject to the assessment (Salovey & Grewal, 2005; Salovey & Mayer, 1990). The four branches are:

- Perception of emotions
- Facilitating thinking through emotions
- Understanding emotions
- Managing emotions.

Trait approach: The Trait emotional intelligence or trait emotional self-efficacy approach is founded upon the perception of emotions as assets evaluated through questionnaires and rating. It is a very-known model developed by Petrides where he believes that the existence of a good way of being is impossible. In fact, the Trait approach considers that certain emotional states are more advantageous in some contexts than the others (Petrides & Mavroveli, 2018). For example, during an

independent project, being emotionally and socially reserved may be more conducive to project success than being expressive and sociable.

Likewise, Petrides's approach recognizes that emotional experiences are both subjective and socially constructed, and that what can be an adaptive emotional response for an individual or for a cultural environment, may be ineffective for another (Keefer et al., 2018).

Competence approach: The competence approach was introduced by Goleman and consisted of five categories and 27 skills (Goleman, 1998). This first prototype was refined from 27 to 18 skills and 4 categories based on Boyatwis experiments with 596 people including managers, salespeople, graduate students in engineering and management (Boyatzis, 2008).

The four categories are (Boyatzis et al., 2000):

- Self-awareness
- Self-management
- Social awareness
- Social skills.

The following section represents the different aspects of EI testing including the items and their classification.

4 Emotional Intelligence Testing

4.1 Item-Based EI Tests

The purpose of emotional intelligence testing is to measure the functionality of emotions to predict personal and professional effectiveness. However, the process is not straightforward due the vast array of existing measures and ideologies. In fact, there are several proposals and recommendations in the literature, J O'Connor et al. suggested to start with measures based on assessing traits since these measurements generally have very good psychometric properties and have no theoretical basis contrary to ability-based measures that are used for a specific purpose (O'Connor et al., 2019).

Table 2 presents different tests and their categories.

4.2 Item Construction

Items or elements of a test are defined as units Items or elements of a test are defined as units of measurement having a stimulus and normative form that enable a response. Based on the response, the performance of the individual or "Test candidate" can be deduced following a certain psychological context (Osterlind, 2002).

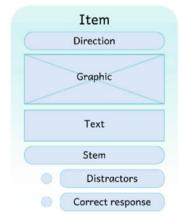
Table 2 Emotional intelligence tests Intelligence			
	Ability approach		
	MSCEIT	Mayer, Salovey, Caruso Emotional Intelligence Test	
	STEM	Situational Test of Emotion Management	
	STEU	Situational Test of Emotional Understanding	
	Trait approach		
	TEIQue	Trait Emotional Intelligence Questionnaire	
	SREIT	Self-Report Emotional Intelligence Test	
	Competence approach		
	ESCI	Emotional and Social Competence Inventory	
	EQ-i	Emotional Quotient Inventory	

One of the important elements of the item development is the quantification aspect, in fact, an item provides data that can be objectively or subjectively quantified. After a numerical interpretation of the quantities, a score is associated with the performance of the test-candidate, thus making it possible to compare him with a group of people or with a predetermined criterion.

The classification: The items should be identified and clearly defined for the test making, for reference, the used vocabulary during the exercise of test making and test taking can vary depending on several factors (Morissette & Laurencelle, 1993). Osterlind defined these items nomenclature in his book "Constructing Test Items: Multiple-Choice, Constructed-Response, Performance and Other Formats" (Osterlind, 2002), as Constructed-response, Correct response, Dichotomously, Scored, Distractor, Examinee or test taker, Item format (Fig. 1), Alternative, Stem, Stimulus, Test item. The following terms presented in the Table 3 are chosen for model development in this study.

The definition of an item is the first step to create a model-driven approach for constructing and programming emotional intelligence tests.





Term	Definition
Constructed response	Unlike selected response items where the response alternatives are given, the open-response items invite the candidate to provide a word or phrase
Dichotomously	The response in this category is set as correct or incorrect Items using scales are not considered as dichotomously scored
Distractor	An incorrect alternative offered to the candidate to distract him or intimidate him when he is not sure of the correct answer
Examinee, test taker	The individual taking the test by choice, obligation, or necessity
Item format	is determined by its design and layout. The most commonly used formats are multiple choices, Likert scale, true or false, short answer, sentence completion On the 26 tests presented in the work of Osterlind, 17 are composed exclusively of multiple-choice items (Osterlind, 2002)
Stem	Is the part of the item that presents the situation and formulate the question. It is considered as the stimulus that triggers the candidate's answer

Table 3 Relevant terms

5 Model-Driven Approach for Emotional Intelligence Testing

The importance of emotional intelligence testing and its assimilation in the workplace is widely discussed in the literature and is considered as an asset to business success and development. However, the tests to measure emotional skills are not integrated enough into business information systems.

The introduction of EI testing in management system would be useful for the employee emotional development as well as for the company's digitalization objective. Therefore, we aim in our study to propose a domain-specific language that introduces EI testing into enterprise resource planning to support decision activities. Our vision starts with using Model-Driven Architecture to introduce EI in the system which is presented in this chapter.

Model-Driven Engineering is used to overcome the constant disturbance due to the evolution of information systems. MDE main feature is to sustain the expertise of the application development, execute platform standards and provide tools to define metamodels at several levels of abstraction and model transformation engines (Blanc & Salvatori, 2011).

Therefore, in this chapter we propose to combine model-driven engineering and emotional intelligence and present the CIM (Computation Independent Model) and its transformation to the lower level called Platform Independent Model (PIM) metamodels. The purpose of the model is to incorporate the emotional skills evaluation into the decision-making process through an information system. The final objective is to add the step of EI evaluation to ensure the accuracy of the semantic quantification of the criteria and priority measurements as mentioned in the second section of this chapter. In fact, the CIM is widely used for Model Driven Architecture. The CIM can be transformed to models of low abstraction such PIM and PSM which can be used to generate the code. The CIM metamodel is used to define the instance in a simplified manner to be transformed automatically to PIM class diagrams (Melouk et al., 2020).

A Model-Driven Architecture based application starts with the creation of a platform-independent model expressed via the Unified Modeling Language. The UML is a general model that can be then transformed into a specific platform.

Some complex systems may consist of several interrelated models organized via layers of abstraction including mapping defined from one set of models to another. This set of models can be subject to changes, in fact, horizontal transformations can occur inside a layer of abstraction and vertical transformation through a set of layers.

Model-Driven Architecture literature is much focused on the PIM and PSM levels and their transformation processes, while few papers deal with the CIM level modeling. The CIM can be executed through different views such as a functional view, a dynamic view and a static view, then implemented via the PIM transformation using ATL (Atlas Transformation Language) (Bousetta et al., 2013; Rhazali et al., 2015).

Another approach of CIM modeling was introduced by Kherraf in his paper "Towards a Structure for the Computation Independent Model" that consists of three interconnected models (Kherraf et al., 2010). These models are defined as a Business Motivation Model, a Business Process Model and a Requirements Model. Laaz et al. presented in their paper "Combining Domain Ontologies and BPMN Models at the CIM Level to generate IFML Models", a combinatory model based on Business Process Model and Notation (BPMN) and Ontology Definition MetaModel (ODM) (Laaz et al., 2020).

5.1 The CIM Model

The emotional capacity of a company can be defined as the ability to perceive, understand, monitor, regulate and use the emotions of its employees and illustrate them in a structured manner (Huy, 2005).

A proper management of emotions can increase the capacity of companies to innovate and manage the constant changing conditions of their environments. In fact, according to an empirical study conducted by Akgun et al., if the collaborators of a certain company express their emotions in an appropriate manner and can understand those of others, then this company will be able to improve its production and business processes and to introduce products or innovative services (Akgun et al., 2009).

Following this ideology, we propose in this chapter a CIM metamodel constructed by following two types of processes: Business activities and Emotional activities (Arrhioui et al., 2018).

The introduction of the emotional dimension will enable the automation of emotional intelligence evaluation in all business processes such as decision making, recruitment, human resource management, teaming, and training, etc.

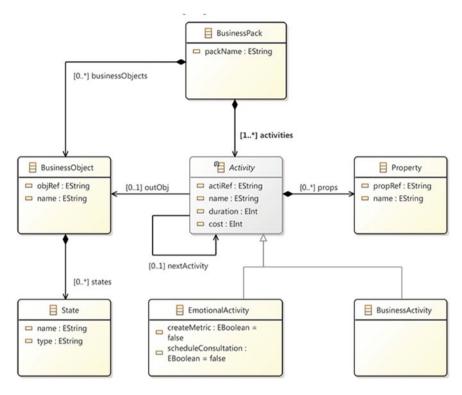


Fig. 2 CIM metamodel

The emotional intelligence process is based on an emotional skills measurement through a series of items or through the scheduling of a consultation with a coach or a supervisor to ensure the correct implementation of the process. The developed metamodel is illustrated in the following Fig. 2.

The developed metamodel includes the following elements:

- BusinessPack: the root element which includes all the sub-elements, it represents a business process.
- Activity: The main element of the metamodel. Each activity is linked to the next (except the last). This correlation is performed using the *nextActivity* association. In our model, we divide the activities into two categories:
- BusinessActivity: ordinary business activity such as confirming a production. It can represent a primal task or a sub-process.
- *EmotionalActivity*: activity controlled by the results of the measurement of one or more emotional skills or by the decision of a manager or a coach after a consultation.
- *BusinessObject*: it represents a processed and submitted data structure (*outObj*) by an activity.
- State: allows to define the states of the BusinessObject.

5.2 The PIM Model

The CIM metamodel describes the emotional and professional activities related to the human actor. The next step is to define the target metamodel in the form of the PIM level. We choose to use the simplified metamodel of class-diagrams. The PIM metamodel is presented in the following Fig. 3.

This metamodel contains the following elements:

- *CDPack*: The root element which includes all the sub-elements in a common package.
- Classify: metaclass defining the hierarchy for elements Class and DataType.
- *Class*: defines the structure of objects through attributes and operations. It can inherit from a single class.
- Operation: represents a class method. It can admit parameters and return a result.

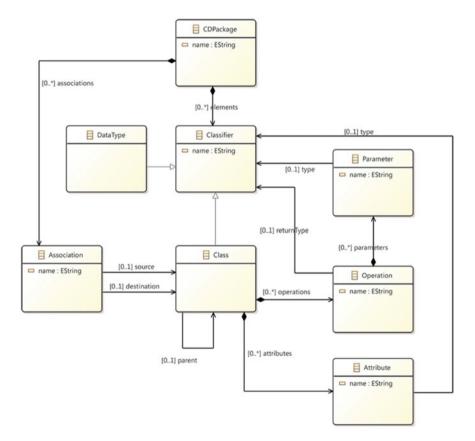


Fig. 3 PIM metamodel

- *DataType*: defines the type of a variable (attribute, parameter of a method or result returned by a method).

5.3 The Transformation

The transformation (Model-to-Model and Model-to-Text) enables the automation of certain sections of the development process which is one of the main objectives of the driven-approaches. In our developed prototype, after defining the CIM and PIM metamodels, we define the *Model-To-Model* transformation rules then we implement them as a transformation engine using QVT (Query/View/Transformations standard).

The transformation process (Fig. 4) considers the instances of the CIM as inputs and provides class diagrams conforming to the PIM metamodel as outputs. The transformation rules are provided in Table 4.

During the transformation of *EmotionalActivity* (Fig. 5), if the boolean attribute *creatMetric* is false, then the transformation will be done similarly to a *BusinessAc-tivity*, otherwise a new measure is created and linked to the corresponding class of *BusinessObject* related to the *EmotionalActivity*.

A measure is defined by an evaluated dimension based on a series of items. The items are following the multiple-choice model. The candidate must choose, for each item, an alternative from the available choices. In case of an insufficient total score, a decision must be taken to ensure the continuity of the process and to participate in the increase and the improvement of the emotional skills level of this candidate. The measurement elements are presented in the following figure (Fig. 6).

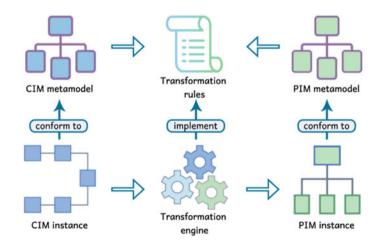


Fig. 4 M2M transformation

Source	Destination	Transformation
BusinessPack	CDPackage	<i>businessPackToPackage()</i> creates a package of class diagrams, then, for each activity, we call <i>businessObjectToClass()</i> If the activity is an <i>EmotionalActivity</i> , we check if a measure should be created If <i>nextActivity</i> is not null, we call <i>nextActivityToAssociation()</i>
BusinessObject	Class	<i>businessObjectToClass()</i> creates a class with the same name as <i>BusinessObject</i> , then calls <i>stateToOperation()</i>
Activity	Association	<i>nextActivityToAssociation()</i> transform the <i>nextActivity</i> association into an association between two resulting classes of two <i>BusinessObjects</i> linked to two successive activities
State	Operation	<pre>stateToOperation() transforms each state of BusinessObject in one method</pre>
String	DataType	<i>typeToDataType()</i> creates a data type with the same name as the given string

Table 4 Transformation functions

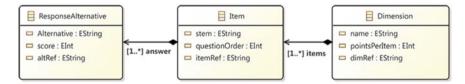
```
modeltype processMM uses "http://processmm/1.2";
modeltype classDiagNM uses "http://classDiagNM/1.0";
```

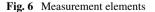
transformation processToClassTransformation(in Source:processNM, out Cible:classDiagNM);

```
main() {
```

```
Source.objectsOfType(BusinessPack) -> map businessPackToPackage();
}
mapping BusinessPack::businessPackToPackage() : CDPackage {
    name:=self.packName;
    self.activities -> forEach(Act){
        if(Act.oclIsTypeOf(BusinessActivity)) then {
            elements+=Act.outObj -> map businessObjectToClass();
        } else {
            if (Act.oclAsType(EmotionalActivity).createMetric) then {
                var emoClass = Act.outObj.map emotionalBusinessObjectToClass();
            elements+=emoClass;
        }
}
```

Fig. 5 Code except from the M2M transformation





6 Conclusion and Future Work

6.1 Conclusion

The ideology of the fourth industrial revolution established the concept of digitalization as an effective and an efficient way to achieve success, follow up with the dynamic market changes and manage the big amount of data produced every day.

The use of self-sufficient technological solutions such as machine learning and IoT where the manufacturing system can learn and develop constantly based on the data received from the outside seems a good method to keep up with the fastchanging market. However, the decision making is not always based on market data and mathematical algorithms, it does involve a human component through the expression of preferences and emotions.

Our objective in this study is to introduce the human factor into the multi-criteria decision-making models using emotional intelligence testing. In fact, there are several models of MCDM that require the input of the decision maker or the stakeholder. These inputs usually take the form of a semantic evaluation that is transformed to a numerical one based on a predetermined scale.

This approach, even though it helps the quantification of qualitative criteria, does not assure the accuracy of the semantic evaluation since we don't know the emotional abilities of the evaluator providing them. Therefore, an emotional intelligence test is essential to enhance the efficiency of the human input in the decision process.

In this perspective, we presented a proposal to include emotional intelligence testing as an application using Model Driven Engineering. The proposed model is based on a CIM (Computation Independent Model) and its transformation to the lower-level Platform Independent Model (PIM). The rules and elements of the metamodels are presented to define the transformation process.

Emotional intelligence testing is not only useful for decision making in industrial management. It is a tool that can improve the prosperity of the employees. Managing emotions is usually an important element in dealing with stress, avoiding conflicts, and establishing a good working environment. It is a substantial factor in the happiness level and motivation of employees.

Emotional intelligence testing should also take into consideration the effects of cultural differences of the employees and decision makers. It is commonly known that culturally related differences in EI are likely to have implications for the management in certain work contexts. Moreover, according to Iqbal et al. (2021). Emotional Intelligence is affected not only by the human abilities, memories, or cultural background, it can change based on several factors such as the recent pandemic. In their paper Iqbal et al. showed that emotional intelligence influenced cognitive outcomes and relational engagement of students during the Covid-19 pandemic.

Therefore, developing an application that enable managers, doctors, educators to evaluate and manage the emotional intelligence of their team is crucial, especially when considering the recent drastic changes in the lives of individuals.

6.2 Future Work

The future perspectives for our work can be divided into three sections. The first section is to improve the study regarding the relationship between decision making and emotional intelligence. In fact, Human Factors Engineering (HFE) is one of the research fields that focus on the study of the management and engineering of human based criteria. A potential collaboration with psychiatry or personal development researchers is considered to conduct human experiments to further personalize the design of the EI test making.

The second section consists of the improvement of the current CIM. In fact, the presented model can be updated by adding different item types such as True or False, Short Answer, Fill in the Blank, etc. Therefore, the scales like Likert items and Semantic Differential items will be supported.

The third potential improvement of this work concerns the creation of the PsyTest-Maker which is already under development. Our objective is to develop a domainspecific language to create the test maker. The creation of emotional intelligence tests will be handled by PsyTestMaker through its ergonomic environment and its intelligible syntax. The implementation of PsyTestMaker in the information system of a company will support a semi-automation of the emotional intelligence testing since our model will always require the interaction of a psychologist in a certain form.

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Redesigning and Reinvention of Retail Industry Through Artificial Intelligence (AI)



K. P. Jaheer Mukthar, K. Sivasubramanian, K. Sivasubramanian, Edwin Hernan Ramirez Asis, and Martha Esther Guerra-Munoz.

Abstract In the recent competitive world, the retail business has to provide stateof-art quality services to their customers like ever before. The large volume of data is more efficiently used to promote their business through strong support with Artificial Intelligence (AI). A particular system of developments and its application in computers with human intelligence, visual-audio perception and recognition, and the translation of various languages to take appropriate decisions in the business. Artificial Intelligence is the system of digitalization and computer- enabled robots will perform the desired target in connection with smart and intellectual ways. Digital transformation in the fastest-growing retail sector is more about connecting things. It is much influencing in altering, transferring, and converting the data sets into actions for an improved business outcome. Artificial Intelligence provides many solutions for innovation processes via deep and machine learning in the retailing industry. It will generate excellence in consumer services, increase the volume of business, faster degree of expansion, creative aspects, and intelligent operation. It is ultimately applying and operating in the business in a highly differentiated way as compared with competitors. An abundance of retail operators is using Artificial Intelligence in a few segments of their activities. It will also be used in customer relationship management software to aggravate the automated services such as marketing and forecasting analytics process to identify the behavior of consumer shopping. The AI works with the cloud and it enables data processing on a saved data pool, which calculates the forecasting for product demand. It also helps in product availability and recommendations according to the consumer's requirements. The main aim of this paper is to find out the prominent significance of Artificial Intelligence in the retail industry for sales promotion and revenue generation. It also addresses the significant

E. H. Ramirez Asis Universidad Nacional Santiago Antunez de Mayolo, Huaraz, Peru

M. E. Guerra-Munoz Universidad Popular del Cesar, Valledupar, Colombia

K. P. Jaheer Mukthar (⊠) · K. Sivasubramanian

Department of Economics, Kristu Jayanti College (Autonomous), Bengaluru, India e-mail: jaheer@kristujayanti.com

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advantages of increasing the market size with innovation and technology. The present study emphasized the support of various secondary data sources to yield the results. It is revealed from the study that the Artificial intelligence capabilities for edge and cloud, helps the retail industries with power in huge data handling, personalized and effective experience for the clients, gentle and appropriate product recommendation facilities, accurate and unique forecasts, increasing the inventory efficiencies and development of the overall retail business.

Keywords Artificial Intelligence (AI) • Retail Industry • Business • Technology • Innovation • Consumer and Computation

1 Introduction

The ideology of computer-enabled artificial intelligence came into existence in the year 1950 with the name of the Turing test (Turing, 1950). It means that the computer system could communicate with the human. After a few months, Princeton University, New Jersey scholars constructed the first artificial neural system by using the 300 vacuum tubes with a gyro pilot (Bernstein, 1981). The artificial intelligence term was devised in the year 1955 at Dartmouth College, Hanover, USA. During the same year, the scholars from the Carnegie Institute of Technology formed the first artificial intelligence program called the logic theorist (Gugerty, 2006). Retail operations related to the commodities and services rendered to the ultimate customers. The value transaction takes place by different conduits of distribution across the fastest growing range of businesses such as motor vehicle sales, food industry, apparels sales, electricals, and electronics. Though the direct physical instore retail sale is the prominent way in this particular market. Online stores are figuring out a significant share of the retail industry in numerous markets worldwide. The majority of retail associates are operating omnichannel elements, which are targeted to achieve the integration of online and offline modes in a unified way. In the year 2019, the world retail industry market created a sales value of nearly twenty-five trillion dollars, with a projection to reach almost near to twenty-seven trillion dollars in 2022. There are many advantages of applying Artificial Intelligence in the service sector. It could enhance the effectiveness and productivity over automation, diminish errors due to mental and emotional indicators, and recover the superiority and brevity of management data by spotting either irregular or long-run trends that could not be simply selected by existing reporting systems. These applications are specifically supportive while regulations, namely the European markets, increase senior management system of responsibility to view and consider the better quality of information generated by the industry. But while organizations did not work out adequate prudence and upkeep in Artificial Intelligence applications, they encounter probable drawbacks, which include unfairness in data input, process, and outcome while profiling consumers and counting credit as well as due assiduousness hazard in the supply restraint. The users of Artificial Intelligence should have a thorough considerate of the information

that has been applied to equip, retrain, test, upgrade and use the Artificial Intelligence methods. The product suggestions and planning would be the growing area for AI in the retail industry. The technological advancement in Big Data would drive the growing adoption of AI-enabled gadgets and services across various industrial areas (Chan, 2019). The present study aims to understand the significant role of artificial intelligence in the promotion of retail industries and analyses the various positive impact of artificial intelligence on the sellers and consumers in the retail business operations.

2 Retail Marketing

A retailer or retail sales outlet is the establishment that delivers the commodities to the ultimate and final consumers in an organized distribution channel. The commodities and services are produced for the ultimate consumption of the people, the retailers are playing a pivotal role in delivering those goods and services. The global retail is evolved from the French work retailer that is to cut apiece, a breakdown. Retailer buys the commodities in large quantum of commodities from wholesale agencies or the producers and manufacturers and divides the huge into tiny quantities and sells in the market. The retailers are acting as the bridge between the producers and consumers.

3 Role of AI in Retail

- (a) Quicken containerized arrangements of computer apparition and data-oriented uses. By enlightening data approachability and interoperability, the client could be able to generate the in-store atmosphere required to convey applicable client experiences and improved functioning results. It will also help find the brand's latest offers and trends of reference enactments for retail operations.
- (b) The computer hardware and software offer the computer vision to automated sign-out structures, smart shelves, and a robotic system of inventories. Artificial Intelligence supports very little power acceleration for the computer visualization at the edge.
- (c) The Artificial Intelligence technology and innovation enables vision-oriented solutions designed to support and configure for better understanding of clients in the retail atmosphere with three dimensional (3D) system
- (d) The AI processors come in an array of options to provide the right condition of performance where the organization requires it. The very ideal and appropriate for the retail industrial solutions at the superiority levels which includes the digitalized signage, innovative robotics, advanced POS systems, and highly innovative and interactive kiosks for self-services by clients in the stores.

- (e) The dedicated software with the support of AI technological platforms provides better performance, internal security provisions, and remote management procedures to support and ensure goodness for the retailer's devices.
- (f) The AI-measured platforms deliver a high level and profound performance for both machine and deep learning systems in the cloud with internal features to trigger machines' performance better than the best. It gives a strong base for demand estimation, projective analytics, product suggestions, and user-friendly operations to clients.
- (g) With the requirement of high memory space to accommodate the images, videos, and product descriptions, Artificial Intelligence makes it convenient and provides a large quantum of memory applications to meet the existing and future demand.

4 Literature Review

Retail operating managers are required to focus on measuring the Artificial Intelligence innovative software across the value restraint to gain the benefits in the long run. The Artificial Intelligence AI-enabled retail business value chain would be deeply contingent on well-trained employees who hoard good-quality information at each hint point in the value shackle. While the information or data is lesser than the optimal quality, this would generate susceptibilities and areas of risk, as the companies might inadvertently generate biases with associated inverse outcomes by the information that is being offered for bright automation (Oosthuizen et al., 2021). The traditional retail trade models are encountering interruption by new competitors who could deliver enormous value to the consumers in an efficient manner (Begley et al., 2018). But in the recent modern retailing, commenting that the traditional models are inefficient in generating the value chain such as shortening manufacturing units and third persons are engaging consumers directly (Reinartz et al., 2019). Artificial Intelligence (AI) is well-defined as a system of the ability to interpret or represent very clearly concerning the external data and to learn from various such information and to apply such learnings to reach explicit goals and targets through the very feasible way of adoption. It is a common topic is about every boardroom and in many places. It is also analyzed that how Artificial Intelligence is varied from the related perceptions like the Internet of Things, Machine learning, and Big Data. The AI studies help to make an appropriate framework for many users such as Universities, colleges, corporate, and government authorities (Kaplan et al., 2019). The knowledge could anticipate forthcoming consumer product requirements and support retail vendors in accumulating appropriate combinations for their consumers. Receiving insight and knowledge from the value chain information should, thus, be a key stimulus to implement Artificial Intelligence innovation and technologies in the retail vending value chain. Nevertheless, for Artificial Intelligence to attain its fullest potential and capacity, siloed heritage information and technology systems must be swapped with vigorous and measurable technology. So that the present linear system to the retail vending value chain is not conducive to the advanced insights are available through the Artificial Intelligence technique (Wirth, 2018). The majority of the shop keepers or the physical retailers are struggling to stay in the business itself due to heavy competition, as demonstrated by various malls that have been closed in different countries or the failure of protuberant established retail sellers. Meanwhile, the retail sellers are a basic segment of preserving gorgeous and important inner urban areas. The retailers would attract many shoppers, local people, visitors, travelers, and sightseers who then support restaurants, attractions, and vacation facilities. While the vivacity and pull of neighborhoods and internal cities diminish, collateral impacts are heavily, frequently taking the format of decreased housing prices, increase in delinquency rates, and lesser neighborhood record which would signify societal costs (Chang & Jacobson, 2017).

The persisting player's absolute size shapes the source for leveraging the new bases of value formation, predominantly transparency of commodity information. Initially, by a combination of practically endless ledge space and unconventional search procedures, trade platforms could sartor a wide variability of offers to individual shopper requirements. Due to their larger assortment complexity and breadth, plat-forms deliver healthier matches between the supply source and the demand than either precipitously combined manufacturers or recognized stores can offer. This matching competence upsurges the significance of the exhibited product subsection and nurtures savings and suitability through inferior product and business costs (Parren & Kozhinets, 2018). Individualization is therefore perilous for a variety of manageableness. The platforms will deliver the transparency advantages by hustling and associating product evidence from dissimilar sources such as prices, features, and customer reviews. The learnings from massive data on buyer and seller behavior in glancing and transacting, retail podium could carry precise endorsements for crossselling and up-selling. As with trademarked product podiums, retail platforms are particularly suitable to associate the objective, quantum of information to progress buyer decision making. The retail platforms are exclusive in combining an otherwise irresistible variability of contractors and product substitutes. The addition of buyer and practiced reviews enhances some empirical information and data, but reductions short of first-hand physical involvements and individual relations. Hence, multifaceted increased involvement, and therefore increased risk of product decisions are lesser likely to be conquered by the retail outlets. Besides, as trade platforms are in the "sole-product" trade and accompany many classes, they are less able to propose supplementary facilities and complete explanations or shape type-specific involvements. The retail podiums apprehend effective gains by adapting the communication to their trade models such as speed, ease, frictionless, and commodity-focused. Subsequently, the platform and consumer interface are sturdier for decision circumstances that revenue from a high notch of suitability, such as tedious acquisitions and one-stop spending endeavors straddling numerous product groups (Peterson et al., 1997).

It is looked at a particular form of cross-channel impacts of online to offline and vice versa (Avery et al., 2012). On the other hand, the data privacy nowadays, the blend of Artificial Intelligence and big data suggests that industries know much about the respective consumers (Wilson et al., 2016). Constructing knowledge from marketing, trade, social sciences, management, and computer sciences including robotics would consider three important Artificial Intelligence-related magnitudes such as level of intelligence, type of the task, and analyzing the AI-enabled robotics (Davenport et al., 2019). The business models in the present days used by the online traders normally need consumers to place orders, after which the online shop keepers deliver the commodities. The online shop keepers might be able to forecast what the customers are required to buy with the help of Artificial Intelligence. Assuming that these forecasts will achieve a high level of accuracy in business (Agarwal et al., 2018). The process of AI implementation in sales organizations will improve the skills of the sales professionals (Barro & Davenpet, 2019). The variation between task mechanization and framework consciousness map into thoughts of narrow against general Artificial Intelligence (AI). The task varies in their consequences, choosing a movie is relatively less consequential, but steering a car may involve more consequences. Applying Artificial Intelligence substantial tasks is apparent as connecting additional risk, in turn dropping acceptance intentions (Castelo & Ward, 2016).

It is studied that the facts of the world of offline and virtual are assembling which is in line with the change in the pattern of shopping, rethinking, and demanding character of the buyer. Knowingly or unknowingly, the retailers have to select the new updated innovative techniques to meet the buyer's requirement or else they have to encounter the drop of sales, revenue as well as their reputed consumers. The retail industries are started implementing artificial intelligence into their business processes for better efficiency and convenience (Kaur et al., 2020). The data analysis is made easy through the deployment of artificial intelligence with big data, accumulation of various data, and also for sharing approaches (Santoro et al., 2018). The buyer's consumption pattern and the requirements have altered entirely through the transformation. Major retail giants are facing a sudden drop in their sales volume and revenue generation caused in lieu with hesitant and erratic purchasing behaviors of the modern generation of consumers, as they get plentiful required information like competitive prices, worthy offers, huge discounts, compare the related commodities and suggestions for alternative product categories. It makes it so convenient in shopping their requirements through their mobile phones, tablets, or laptops directly without any hurdles rather than walking into the showrooms. Due to the large scale retail operators such as Walmart, Tesco and Target are realized that it is so significant to join hands with the small and tiny start-up retail companies which already support the online platform to retain the clients either through a deep examination of transactional information or through providing extremely well-designed offers for the better satisfaction of the consumers and to elevate the basket size in the market (Verma & Jatinder., 2017). In this view, the Internet of Things (IoT) is projected to play a crucial role in providing measurable commercial profits to the supply chain making the operational processes an efficient and productive way. The IoT technology offers the managers innovative insights on the cost proposition, creation of value, supporting them to build their relationship with their high profiled consumers along with the adoption of effective and efficient policy creation and practices. The food and food-related retailing scenario is becoming more compound and elastic

putting the burden on the retailing industries to re-structure and re-module their promotional strategies linking with changing consumer preferences. The artificial intelligence and IoT techniques were expected to support the retail sellers in controlling the quality of the products, plan for the waste management system, and provide necessary suggestions for buyers and sellers (Kamble et al., 2019).

5 Methodology

The data sources are collected from various published data across the globe namely consumer technology association, statistical data sources, and MIT technological review. The literature is surveyed from numerous published online journals, books, book reviews, research articles, magazines, and newspaper editions. The collected data and the literature have been reviewed and analyzed descriptively to bring out the significance of AI in the retail industry.

6 The Objectives of the Study

To evolve the significance of AI in the retail industry.

To reveal the application and benefits of artificial intelligence in the retail industry for the customers and sellers. To bring out the role and implications of AI in the e-commerce business of the retail sector.

7 Analytical Representation and Discussion

Artificial intelligence-enabled retail value chain, therefore, moves away from a linear approach to the value chain to an iterative approach based on knowledge management (Oosthuizen et al., 2020). The AI becomes dignified to uncheck the next movement of the digital interference and businesses have to prepare for today and the future too. The capital for AI is leaping in a very fast manner, conquered by digital monsters such as Google and Microsoft. Across the globe, it is estimated that software organizations are spending twenty billion dollars to 30 billion dollars worth of money as an investment in AI in the year 2016. With the AI adoption outside of the innovation sector, few of the firms were deployed at a larger scale (Bhghin et al., 2020). The implications of the artificial intelligence revolution for business, manufacturing units, and customer service continue some amount in the demesne of assumption (Butler-Adam, 2018). Impending on various manufacturing industries, the global manufacturing areas are increasingly gratified the developing economies to construct and establish regionalized production spots aiming to capitalize on local recognized assets. The distribution of consistent business performance and procedures by the

leading global firms to their main suppliers has performed a pivotal role in motivating this tendency (Cammett, 2006). Artificial intelligence is an important element at the lead of an uprising in business and also in society. The AI affords corporations a host of ways to healthier understand, forecast, and absorb customers. Among the marketing, artificial intelligence adoption is consistently increasing every year and in various contexts, from offering and involving the best of a class of service support during consumer interactions to assisting in the identification of optimal promotions (Campbell et al., 2020). The application of a powerful intelligence solution system is one of the relevant solutions for digitalization which is now dispersal in industry and corporate. Digitalization through artificial intelligence brings ideas for planning, problem-solving, and decision-making skills for better profitability (Carlsson, 2018). The consumer goods experts have projected that the highest rate of automated intelligence will be adopted over the next couple of years to be in the manufacturing sector. In these areas, the potential and significant impact will take place. In the manufacturing sector, the ongoing maintenance of output line machinery and materials could represent a considerable expenditure. On the other side, any downtime could be costlier. The brands could apply predictive maintenance to establish this kind of challenge. The forecasting maintenance applies innovative and advanced artificial intelligence to identify the appropriate machine breakdowns and automatically schedule the specific services required (Chao et al., 2019). The AI is restricted to some extent to machine learning modules, resulting in a fragile system that could not cope up with unexpected variability and it will not match with human specialist's competencies. To efficiently collaborate with human expertise, artificial intelligence would require collective skills (Chen et al., 2016) (Table 1).

The AI in retail sector market share on revenue is stood at Dollar 720.0 million during 2018 and the total retail market is predicted to grow to 35.4% between 2019 and 2024. The retail trade market is being driven through the fast-growing e-retail sector and attracting capital for Artificial Intelligence by various retail giant companies (Christensen et al., 2016). The application and use of Artificial Intelligence solutions would support the retail market players to gain knowledge into the various gadgets and internet-based buying nature of the consumers globally (Christensen, 2003). The recommendation and suggestion system held the biggest share in the retail market in the year 2014 to 2018, under the solution segment of the offering area. This

Table 1 Advantages of artificial intelligence for retail trade 2018 in percentages	Benefits	Percentage (%)
	Cost saving	49
	Increased productivity	44
	Automated process & tasks	39
	Faster delivery of products & services	38
	Increase on innovation	22
	Ability to identify new revenue stream	16
	Source Consumer technology association	

would be credited to the heaving practice of all Artificial Intelligence-based suggestion engines through different online retail stores, like Amazon, Flipkart, Snapdeal, ebay, and Alibaba, etc., to recommend products and services based on the past services and current purchase pattern of the consumers. Furthermore, with the growing admiration of digital marketing in Asia and America, demand for suggestion modules is increasing rapidly (Daugherty & Wilson, 2018). The following table reveals the percentage of benefits which is received by the retail industry in various heads such as cost savings, productivity, automated process, etc.

The product suggestion and planning would be the leaping area for Artificial Intelligence in the retail industry. The growth of Big Data analysis would be driven by the growth of Artificial Intelligence enabled gadgets and services across various fields and verticals (Black & Van Esch, 2020). There would be a range of various innovative technologies involved in Artificial Big data analysis such as machine learning, language processing, automated machine- oriented decisions, and deep learning. As per the consumer technology association, Artificial Intelligence has various advantages in the retail sector across the globe with cost controls, higher productivity, speedy solutions for business issues, speedy delivery of innovative products and services, increased technology which highly constructing its way into a hyper solution, including the automated vehicles, gadgets, and extrapolative analytics in the retailing industry. In this view, 49% of cost has been saved and productivity increased by 44%. The automated process and tasks contribute 39 and 38% for faster delivery of products and services. The increase in hyper technology and identification of new revenue stream consists of 22% and 16% respectively (Fig. 1 and Table 2).

The global total e-commerce sale is contributing to the total revenue generation was 7.4% in the year 2015 and it has a steady growth of 18% till the year 2020. It is also projected positive growth for the upcoming years 2021 to 2024 (Fig. 2).

The below table shows the cases where AI systems have been used for the benefit of increasing business in the retail sector. Almost 48% of customers have benefitted through AI. Quality enhancement and invention have taken place by 47%.

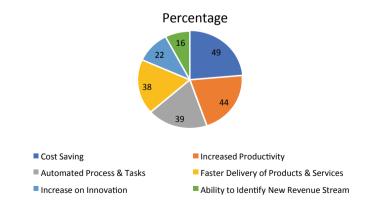
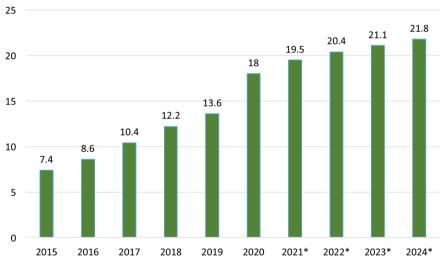


Fig. 1 Advantage of artificial intelligence

Year	Share of retail sales
2015	7.4
2016	8.6
2017	10.4
2018	12.2
2019	13.6
2020	18
2021*	19.5
2022*	20.4
2023*	21.1
2024*	21.8

Source https://www.statista.com/statistics, 2021. *Note* * refers to the projection



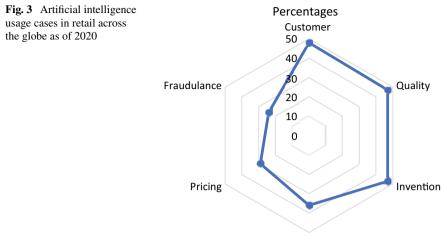
Share of Retail Sales

Fig. 2 Share of retail sales

The personal services, pricing, fraudulence detection contributes 36, 29, and 24% respectively (Fig. 3 and Table 3).

Product endorsement and development will be the mounting zone for AI in the retail segment. The progression in Big Data analytics will motivate the increasing implementation of synthetic enabled procedures and facilities across diverse manufacturing fields and verticals. There is an assortment of diverse technologies intricate

Table 2Global total retaile-commerce sales 2015–2024



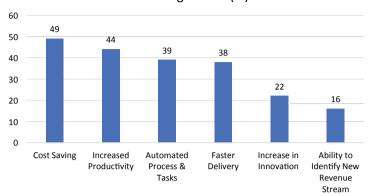
Personal Services

Table 3 Artificial intelligence usage cases in retail across globe as of 2020	Particulars	Percentages (%)
	Customer	48
	Quality	47
	Invention	47
	Personal services	36
	Pricing	29
	Fraudulence detection	24

Source MIT technology review insights

in AI and Big Data, with machine learning, normal language dispensation, subterranean learning, and additional for automatic machine-driven choices. The AI benefitted in many areas such as cost-saving with 49%, productivity with 44%, automated process with 39%, faster delivery with 38%, innovation with 22 and 16% benefitted in the identification of new revenue stream (Fig. 4).

According to the Consumer Technology Association, AI has diverse welfares in the trade industry like cost minimization, increased output, faster solution of business issues, speedy delivery of updated products and services, improvement in technological innovation which is quickly making its way into numerous advanced answers, with independent vehicles, clever bots, progressive extrapolative analytics, in the retail interplanetary. This factor is predictable to progress client analytics and behavior knowledge raising the importance of product optimization. It is revealed from the study that the Artificial intelligence capabilities for edge and cloud, helps the retail industries with power in huge data handling, personalized and effective



Advantages of AI (%)

Fig. 4 Advantage of AI percentage

experience for the clients, gentle and appropriate product recommendation facilities, accurate and unique forecasts, increasing the inventory efficiencies and development of the overall retail business. Artificial intelligence creates better market forecasting. By excavating insights from market, customer, and market data, business intelligence instruments forecast industrial movements and make projecting changes to corporates' marketing, merchandising, and market strategies. This would also influence supply chain training, as well as valuing with persuasive planning. Similarly, the mobile and online portals are identifying customers and modifying the e-commerce knowledge to reproduce their present context, previous purchase, and buying behavior. The artificial intelligence system consistently evolves the user's online shopping experiences to make hyper-oriented displays for every interaction. The advanced customer relationship management and marketing module learn the consumer's actions and favorites through frequent connections for the development of an enhanced buyer's profile. It is also found that there are various techniques involved in artificial intelligence, machine learning, and data analytics.

8 Major Applications of Artificial Intelligence in Retail Industry

The "Point of Sale" becomes a cashier-free counter: The transformation of the robotic structure of stores would result in reducing the lines, reducing the total number of human workers, and major savings on operational expenditures of the retail outlet.

Chatbots to access with consumer service: The AI-enabled chatbots offer an even greater level of consumer service, greater searching experience, alerting through notifications about new arrivals, and provide solutions for a better selection of products. In-store assistance: The online retail vendors also spend on innovation and technologies that would help customers during the buying process and help greatly for the staff in the physical outlet. One of the major applications of artificial intelligence is the 'Kroger Edge' technology eradicates the paper or plastic sticker price tags in physical stores. This innovative technology helps to promote the product through video advertisements, product information, and offer details.

Price Adjustments: The applications of Artificial Intelligence for retail outlets could support the businesses determining prices for the commodities, envisaging the likely outcomes of numerous pricing approaches. To execute the pricing adjustment process, systems should collect information about the other relevant products, sales promotional events, accumulation of sales figures, and customer profiles.

Prediction of Prices: Forecasting of price for a product based on the demand, trends, fashion, seasonality, and product features. Artificial intelligence is used in this process of forecasting the price of a particular commodity through predictive analytics and machine learning for the retail industry. It will massively help to construct the customer base and loyalty.

Product categorization with the application of machine learning: Many retailers are using machine learning models to categorize over a lakh substances from various vendors. The systems based on machine learning label goods and categorize them in various divisions for clients who are expecting a typical product.

Visual Search and Voice Search: The searching of commodities in the web stores and online app stores through the search box by typing is time-consuming for the customers. So that the visual search and the voice search applications are introduced through artificial intelligence to allow the customers to upload photos or voice instruction and find the similar category of commodities based on the color, style, pattern, and shapes.

Client satisfaction tracks: Artificial Intelligence could be able to sense the mood of the clients during the shopping procedure. Many leading retail companies introduced the facial recognition method for this function. High sensor cameras are installed at the entrance of the shop. It will sense the mood of the customers. If the customers are not satisfied for any reason, the store executives will immediately talk to the customers to have a good relationship with customers.

Prediction of consumer behavior: The artificial intelligence podiums allow business proprietors to brand use behavioral economics and shape an individual method for each customer. Personal artificial intelligence has a proactive platform that analyses every customers' behavior and emotions to hike the basket size. The algorithm strategy follows the customer's demonstrative reactions and pattern of previous buying experiences and it attempts to come up with the best pricing strategies for a specified visitor.

9 Conclusion

This paper exhibits the various significant advantages of artificial intelligence in the retail industry. It is revealed from the existing literature and the available data that the application of artificial intelligence in the retail industries made many positive changes in the business outcome. It supported a lot in marketing, integrating the business integrative business environment and managing firms systematically as well (Bolton, 2019). It also helps to reduce the cost of the retail business operations in the long run (Brynjolfssn & McAfee, 2016). Based on the various studies, it is observed that consumers are started using artificial intelligence-enabled tools for the purchase of commodities from online retail platforms. So, both the buyers and sellers are simultaneously using modern technology. Most of the purchase strategies and decision-making processes for the purchase of goods and services are influenced by artificial intelligence applications (Fairhurst & Fiorito, 1990). Subsequently, the consumers are started using the recent innovative technology during their online and offline purchases to enhance the satisfaction level (Fiorito et al., 2010). The study portraits that computerization and artificial intelligence create a positive outcome in the retail market (Frey & Osborne, 2017). More specifically, the fashion product purchases happening through online mode required the support of artificial intelligence massively. (Goworek, 2014).

This theoretical analysis found that artificial intelligence supports the sellers to showcase their products promptly and the consumers can easily buy the commodities with easy navigation online. It is significantly supporting the consumers to identify the best offers, compares the relevant commodities on a single page, and helps in hassle- free payment gateways. It fulfills the need for high memory space to accommodate the images, videos, and product descriptions, the artificial intelligence makes it convenient and provides a large quantum of memory applications to meet the existing and future demand as well. Apart from the online shopping modules, the AI components also greatly help in the physical stores through robotics. It is much supports for the signage boards, in-store window displays, and customer service desks and kiosks for the enhanced customer experiences at the store. The AI technology protects and safeguards internal data storage. The AI influences and helps in many managerial processes such as demand forecasting, projections, product upgrading, and marketing analysis.

The study reveals various similarities and dissimilarities compared with the existing literature of the relevant studies. The present work on artificial intelligence has many similarities with the previous works carried out by various researchers such as the application of artificial intelligence in the service sector, reducing the cost by using AI components in the retail industry, providing cutting-edge support services to the customers for better experiences, providing dedicated servers for billing and delivery systems. The study also brings out certain dissimilarities or unique advantages such as client convenience, robotic usage in customer services, intelligence for online product suggestions, navigation processes in online and offline, and in-store marketing activities.

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The Role of Artificial Intelligence in Human Resources



Abdulsadek Hassan

Abstract The study aims to identify the Role of Artificial Intelligence (AI) in human resources (HR) especially after Corona Virus (19) pandemic. The study showed that human resources have become part of the heart of the organization, linking all parties together, relying on artificial intelligence has become a must in the era of transformation we are witnessing. The study also showed that examples include looking at the candidate's experiences for the job and reading all the resumes submitted to choose the most suitable candidate, because recruitment is a long-term process, and it is not easy to undo, and the HR staff is united and their knowledge, where artificial intelligence provides a common summary that avoids them focusing on different and contradictory matters.

Keywords Artificial intelligence · Human resources · Technology

1 Introduction

Artificial intelligence (AI) has become a promising field in our modern age, as it helps to improve performance and effectiveness in many organizations, and in the long run, it has a profound impact on the entire organization, so most managers understand the value that AI offers and develop strategies to harness it for the benefit of the organization, but for the HR department, it has often been overlooked about harnessing the latest technology, which slows the department down when it comes to leveraging new technology (Ashwini & Aparna Patil, 2018).

AI technologies are already influencing the human resources sector and recruitment processes, by building detailed training and development plans for each employee from background processes that rely on big data or data analytics related to employee practices in real time (Kim et al., 2018).

And with the emergence of new technologies, we are already starting to see creative use cases for AI in ways that can make workflows more positive, according

A. Hassan (🖂)

Ahlia University, Manama, Bahrain e-mail: aelshaker@ahlia.edu.bh

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to a review by Infor, a leading provider of cloud-based industry-leading applications, The Impact of AI Technologies On the work of employees in the human resources and recruitment departments (Glikson & Woolley, 2020).

Just five years ago, the above examples might have been considered fiction. However, with the advent of innovative text analysis algorithms and industry-leading classification methodologies, as well as the maturation of big data analytics, AI technologies are poised to revolutionize the HR sector in unimaginable ways (Mohanta et al., 2020).

That by 2030, artificial intelligence will boost the global economy by \$13 trillion and have the greatest impact on it. The use of artificial intelligence applications in this field will be beneficial for everyone, whether job seekers, various institutions or society. We are talking here about the "economics of the future (Suen et al., 2019). Therefore, we decided to foresee with you in this report the future of employment, jobs and the work environment in light of the increasing reliance on artificial intelligence applications (Sampson et al., 2020). The human resources department bears many burdens, including managing relationships within the organization, searching for job candidates, and hiring new employees, so these departments will seek to introduce artificial intelligence into their activities (Suen et al., 2019).

When hearing the term artificial intelligence, the first thing that may come to mind is robots, but the truth is that there are no limits to artificial intelligence applications, especially as it represents a simulation of human intelligence by employing programmed machines to think like humans and imitate their actions (Golembiewski, 2019).

Artificial intelligence is characterized by the ability to analyze and take action in order to achieve a specific goal, and it can be employed in many different sectors, whether in personal or professional life. On the other hand, AI is important in the workplace to enhance the efficiency of employees by automating simple and repetitive tasks and letting them accomplish more complex tasks (Abubakar et al., 2019).

AI is mainly embodied in chatbots and pre-installed algorithms. It has been proven to enable companies to deliver an improved experience to their candidates and employees by demonstrating its ability to recruit employees, answer HR questions, make real-time decisions, and customize learning experiences (Ivanov & Webster, 2019).

2 The Aspects of Artificial Intelligence in Human Resources

Knowledge: When the database is constantly up-to-date, managers have a complete picture of the skills and experience they have; Then they can find the right person for a specific task in a matter of seconds (Ashwini & Aparna Patil, 2018). Using predictive analytics tools, managers can create a chart that shows what skills and people they will need next year, and the year after. It's a quick and easy way to organize workforce (Matsa & Gullamajji, 2019).

Development: Employees are directly guided by an intelligent system that knows the skills they need; In order to excel in their current and future roles (Demir et al., 2020). They also receive proactive alerts that provide recommendations to help them keep pace with the training they need and know their compliance with rules and regulations (Bednar & Welch, 2020). Managers also receive customized reports and recommendations based on the tasks and actions of the employees (Smids et al., 2020).

Recruitment: Instead of manually searching for candidates, what if your system automatically found and contacted individuals with the required skills. What if this system could answer any question that the candidates might ask before the personal interview? (Canaan et al., 2019).

Focus on value: When AI tools take on repetitive manual tasks; Employees can focus on tasks that add value to the organization, and those that need their skills and experience to accomplish (Arslan et al., 2021). Undoubtedly, this would enable the HRM specialist to devote more time and resources to taking care of other employees personally (Kamaruddin et al., 2018).

3 Artificial Intelligence Applications in the Workplace

Researchers identify 5 modern applications of the artificial intelligence revolution in the workplace, as follows:

- 1. **Recruitment and qualification**: Machines today scan CVs of applicants and choose from among them what is suitable for a personal interview. It is very useful in the case of large organizations that employ hundreds of employees annually (Suen et al., 2019). One example is Plyometrics Provides, which uses a series of 'games' built on neuroscience principles to assess candidates on their cognitive and emotional characteristics before they reach the interview stage (Evjemo et al., 2020). Then there's Montage, which enables organizations to conduct text-chat interviews and reduces the impact of unconscious biases in the hiring process (Glikson & Woolley, 2020). As for onboarding, chatbots are the current tool that helps new hires integrate into their job roles, and Unabot stands out as one of the most popular of these (Ertel, 2018).
- 2. **On-the-job training**: An employee's journey with learning and growth does not end with just getting the job (Ashwini & Aparna Patil, 2018).

AI technology will play a role in the continuous training of most future employees and the transfer of skills from one generation to the next (Rodney et al., 2019). An example in this regard is that the engineering giant Honeywell has developed tools that use virtual and augmented reality tools along with artificial intelligence to monitor work experience and extract lessons learned for new employees (Glikson & Woolley, 2020).

3. Enhanced workforce: Some employees may feel uncomfortable with AI; because of belief

It will replace them at work, and consequently they will lose their jobs, but the issue is more of a "reinforcement" than a "replacement". Technology helps us perform our jobs more efficiently and effectively, and Batterworkswill tools that monitor work-flow, give intelligent suggestions and perform repetitive tasks are a good example (Ivanov & Webster, 2019).

4. **Workplace Monitoring**: Technology can certainly be used to monitor employees in the workplace

This may include practices that go beyond legal surveillance to illegal "espionage!" Some private sector companies already use techniques to monitor the level of employee frequency to the bathroom to evade work, or voice analysis to determine the level of stress or anxiety and even sleep and exercise habits! The company (Blizzard Activision) has developed software to analyze personal data generated from wearable devices, such as (Fitbit) and mainly focus on monitoring and analyzing the level of health of employees (Paruzel et al., 2020).

5. **Robots in offices**: It has become fashionable to see robots in factories and warehouses, but what is new is that they are inside offices, and among such robots are delivery robots (Segway) that can make their way between the corridors of the workplace to deliver messages and parcels from one office to another, in addition to (Gamma) robots specialized in security monitoring, as well as (ParkPlus) robots (Yano, 2017).

Not all of these solutions and trends may be appropriate for immediate application in all the organization. Each organization has its own set and plans with regard to investing in artificial intelligence (Gillath et al., 2021). However, understanding these trends and being aware of them gives those in charge of digital transformation programs an opportunity to understand the possible opportunities. And then work on seizing it (Malik et al., 2020).

4 The Use of Artificial Intelligence in the Recruitment Process, and Its Advantages

Saves time: it performs time-consuming tasks that can be run automatically, for example it is possible to use a chatbot based on artificial intelligence; To answer candidates' simple questions, schedule interviews, and screen applicants (Arslan et al., 2021). They are certainly important things and need to be done with precision, but they can be easily automated (Glikson & Woolley, 2020).

Eliminates Bias: When it comes to finding the perfect candidate for a position, the last thing we want our judgment to have been some bias. There are some AI-based tools and applications that help reduce bias by analyzing job applicants and how likely they are to succeed in a job (Libert et al., 2020).

Recruitment roles: This allows recruiters to make data-driven decisions rather than making decisions based on their gut feelings (Ertel, 2018).

Artificial intelligence helps find candidates through some software that analyzes people's presence on the Internet, such as their social media profiles and their public data and performs predictive analyzes on the basis of this data about how likely people are to accept a job and the roles they might be interested in Jain (2017).

It also contributes to improving the candidate's experience: for example, with the use of a chatbot; It responds to the candidate at any time even in the middle of the night, it can guide candidates through the recruitment process more efficiently and gives them immediate answers when they need it (Jain, 2018b). So, the artificial intelligence tools that are added in the hiring process can improve the candidate experience during their introduction and recruitment stages (Suen et al., 2019).

Despite this, there are some potential harms to the use of artificial intelligence in the recruitment process, such as that it does not recognize the emotional behaviors of the candidate, and it is impossible to replace human qualities such as empathy with software (Rodney et al., 2019).

5 The Benefits of Artificial Intelligence in Human Resources

Publisher stresses that integrating artificial intelligence into the recruitment process and making it automated brings benefits in 3 main directions, as follows:

Automated analysis of CVs through artificial intelligence and machine learning components: which in turn reduces hiring time by eliminating manual processing of CVs by employers. Currently, running manual reviews is the most time-consuming activity, with a recruiter spending an average of 23 h on this task during just one job (Golembiewski, 2019). Moreover, 88% of applicants for a job advertisement are already ineligible for this position; So, the purpose of an application based on AI technology is to automatically find the most suitable candidates according to the required specifications (Sampson et al., 2020). The system can also learn from the employers' decisions; So that he can at the appropriate time present his recommendations and suggestions (Cançado et al., 2017).

Use of chatbots to pre-qualify candidates: AI in the recruitment process enables the use of chatbots "chat bots"; To qualify candidates and answer their inquiries before starting the hiring process itself, through initial qualification questions related to job needs and providing feedback and suggestions for the next step (Suen et al., 2019). Thus, enhancing the candidate's experience and providing continuous feedback in a timely manner (Ribes et al., 2017). A study conducted by CareerBuilder also shows that 67% of candidates have a positive impression about the company if they receive constant updates during the hiring process (Evjemo et al., 2020).

Spontaneous interviews: which in turn allow for the provision of "feedback" and support by analyzing the words, speech patterns and facial expressions of the candidates (Jarrahi, 2018). In the context of this current digitization, it is clear that the role of recruiters will change through their reliance on artificial intelligence during

the wide range of the search and selection of candidates. According to the study "Trends and Challenges in Human Resources" conducted in 2016 by "Valoria", the most important strategic challenge for human resources in companies is maintaining a high level of employee commitment, but it ranks only third in the level of companies training them to deal with this challenge. While the challenge of retaining high-potential employees ranks "sixth in the level of training" (Sampson et al., 2020).

However, professionals in this field are of the view that integrating AI into HR processes will enable recruiters and HR officials to focus more on the recruitment strategy and process planning involved in this approach, as well as help to maintain a higher level of employee commitment (Chakraborty et al., 2020).

Video technology

In light of the above, Al-Bilad newspaper indicates that artificial intelligence is one of the emerging technologies that has taken over many sectors, including the employment sector (Ertel, 2018). The first to use this new technology was the famous company Unilever, and the technology is a new application that analyzes the videos of new employees and mainly monitors the voice, facial features and language of the new employee (Evjemo et al., 2020). The application belongs to the American company Hirevue, which claims to have achieved excellent results and has outperformed the recruitment mechanisms adopted these days (Ribes et al., 2017).

But the most important question remains, which is how to rule? The presence of a video clip of one of the applicants does not necessarily mean that it is suitable for the new job, but it turns out that the application focuses on specific details, such as mentioning the word "I" or "we" during the new applicant's speech, whether he speaks very quickly or at an appropriate speed for the job, in addition to monitoring Facial features, such as signs of frown or amazement, and of course a smile, which is an important thing in some jobs (Jain, 2018a).

Bias problem

Researchers highlight warnings about this technology, the most important of which is the bias that may occur, as this type of application is trained on a sample of data and uses it to make future decisions (Canaan et al., 2019). One of the concerns that has begun to surface is that the training samples may be biased to one side, or perhaps the new employees are unfamiliar with the camera, which leads to their failure to get a job in a particular field (Arslan et al., 2021). Despite these problems, there are a large number of companies that rely on this technology (Seeber et al., 2020).

The controversy over the problem of bias regarding the relationship of artificial intelligence to the recruitment process and the selection of candidates appears to be the most prominent. In addition to increasing efficiency, automating sections of the screening stage can also lead to a decrease in unconscious hiring bias (Suen et al., 2019)." Peter Cappelli, director of the Center for Human Resources at the Wharton School at the University of Pennsylvania, is skeptical, saying: "Any kind of structure eliminates bias. If you ask employers to standardize the questions they ask, you will eliminate bias. Many technologies enforce structure. on the recruitment process

(Silva et al., 2018). As the often-cited Amazon example shows, technology can be just as biased as humans (Abrams et al., 2019).

Talent recruitment

Among the applications of artificial intelligence in the field of human resources, talent recruitment is the most popular, as the virtual assistant can take advantage of multiple sources of data to reduce the workforce that spends time and effort on normal tasks. For example, chatbot designed to eventually become a consultant to HR professionals on how to recruit and recruit new employees into the organization (Arslan et al., 2021).

Besides, chat bots are useful for job seekers, because communication with chat bots is neutral and equal for everyone, given that they will never form a personal assumption about the employee compared to the HR administrator (Evjemo et al., 2020).

Answer Frequently Asked Questions

As people are more and more inclined to receive instant answers to their queries, chat bots are available to provide a 24×7 service for instant response to consumers and employees. AI is especially important for HR professionals because it saves time to familiarize new employees with information about the job and the company as a whole, such as the company's profile and policies, team members, task distribution, and other information (Kshetri, 2020).

For example, Jane is a chatbot created by Loka in 2014, which is able to answer any question stored in a database. Usually, these questions are as straightforward as "How to use a VPN?" Or as simple as "What is the password for the Internet?". The bot is also designed to familiarize employees with features and facilities that they may not have known about yet (Pariav et al., 2018).

Chatbots also provide an opportunity to analyze and follow up on employee issues so that HR administrators can address them before things get worse (Karupiah et al., 2018).

Cognitive support

The virtual assistant has become essential for remote employees who make up 2.8% of the workforce, because they do not have easy access to the human resources department. Chat bots come to provide an advanced level of employee experience, from providing real-time answers to questions asked to personal learning and development (Jain, 2018b).

Moreover, there is the fact that the responsibility for the mental and emotional well-being of employees lies with the human resources department, so the role of systems that support AI is to monitor the mood of employees and maintain their satisfaction. For example, AI can see anxiety in a person's behavior and tone of voice, thus helping employers to look into the matter and solve the problem before it harms employees and the company (Richards et al., 2019).

Education and Training

The newest use of the virtual assistant is currently being trialled by professors who teach online courses known as Open Online Courses (MOOCs). As the number of students enrolled in it increases, there is more work for university professors and their colleagues and assistants (Hudson et al., 2019).

Jill Watson, powered by IBM's Watson analytics, is one of the nine Teaching Assistants for an online course titled Knowledge-Based Artificial Intelligence by Professor Ashok Joel. The professor notes that 300 or more students attended this course and estimates that approximately 10,000 questions were asked during the meeting (Hudson et al., 2019).

AI provides the opportunity to expand the scope of personalized learning encounters and increases the student's ability to adapt to the learning environment. For example, Jill Watson was primarily designed to provide answers and feedback to questions asked faster and was already able to answer 40% of all students' questions, allowing professors to tackle more complex technical or philosophical inquiries (Nawaz, 2020).

The effects of AI extend to all aspects of HR, which will force HR staff to gain more information about the role of chatbots and explore their efficiency to deliver a simpler and more effective employee experience (Rajesh et al., 2018).

With the right algorithms, AI-enabled systems can automate repetitive administrative HR tasks such as managing employees, analyzing company policies and practices, and even litigation strategies. So, within a decade, people will see that it makes no sense to run a company, find a new job, or even live their lives without using artificial intelligence, i.e. virtual assistants (Boselli et al., 2018).

6 The Future of Human Resource Management

We can glimpse the future of human resource management through the following seven trends.

1. Artificial intelligence and machine learning

These new technologies will have a huge impact on human resource management in companies and organizations. It will make it easier for experts to hire the most qualified employees, and it will save time and effort for those candidates for this or that job (Sivathanu & Pillai, 2018).

2. Bots and chatbots

These bots and chatbots will answer all the frequently asked questions of employees regarding attendance, leave, employee data locations, etc., which will save a lot of time and effort for managers and specialists in this matter, but rather direct their efforts to the most important and feasible areas (Upadhyay & Khandelwal, 2018).

3. Virtual and Augmented Reality

Human resource management can use virtual reality technology in the preparation of virtual work environments to train employees before the actual and realistic application (Omar, 2020).

4. Performance management and feedback

Through the digital HR management platform, managers can manage and direct the performance of their employees, provide feedback on the work of these employees and evaluate them impartially and automatically if necessary (Jatobáa et al., 2019).

5. Time tracking systems

Biometric time-tracking systems allow HR managers to track employees and fingerprint times, and time tracking technologies will make the work environment more accurate, not to mention that it will make it easier to track employees who work outside the company (Jia et al., 2018).

6. Middleware

This middleware will be able to solve a difficult problem, which is the problem of communication between employees themselves or between different departments in the same company, which helps in the smooth flow of information, enhance transparency, and facilitate the completion of information (Driskell et al., 2018).

7. Technology and employee health

New technologies can protect employees and ensure their safety; This is done through a specific type of technology called Wearable tech, which helps maintain employees and ensure that they remain in better health all the time, which will be reflected in their production rates and the quality of their job performance (Bitkina et al., 2020).

Integration of artificial intelligence technologies

The ability to access today's AI-enabled tools and applications is sufficient to integrate these advantages with new technology packages relatively quickly, as well as to be able to test them directly (Bednar & Welch, 2020).

But would it be so easy to treat the necessary algorithms as a black box that collects all the details, work them out very quickly and put them on a PowerPoint presentation in time for that all-important executive meeting? No, it is not possible in the near future (Demir et al., 2020).

Artificial intelligence techniques will help companies to develop in the previously mentioned fields, as well as many areas that have not yet been delivered to these technologies. But in the end, there will be winners and losers, just like any other trend within the technology and analytics sector (Gillath et al., 2021).

The winners here are the business owners who take the time and effort to understand the nuances of the tools, algorithms, and underlying data structure that do all the magic (Abrams et al., 2019).

Owners of profitable companies will also realize that the process of using artificial intelligence techniques is a complete journey, not just a destination, and that when

the experience of using these technologies begins, it will undoubtedly reveal many pitfalls that will have to be modified during their work approach (Pueyo, 2018).

Forecasts of performance levels and terminations

Machine learning is perhaps the most successful branch of AI from an industry perspective. A big part of machine learning's success is being able to embed and present a final model with its training data, test procedures, and expected benchmarks in a black box that collects all the details and runs simple (Ertel, 2018).

Predictive talent analytics and employee travel risk models will revolutionize how HR departments manage workforce planning (Cappelli et al., 2019).

And the fact that you can automatically enter data into the ranking tool to get rich and valuable results in relatively little time is like magic to me. But with the real world being a much more complex place, it takes a lot of human intervention to model travel risks under a variety of scenarios (Jain, 2018b).

Improve learning

Learning management systems and training modules have been used for several years within the human resources sector with the aim of providing the appropriate career path for employees and developing their capabilities in order to help them excel in their current positions and enhance their ambition for higher promotions (Jia et al., 2018).

AI within this trend can leverage increasingly sophisticated big data technology to marshal large and diverse data sets such as several terabytes of resumes and performance reviews, and tons of historical information, to reveal an optimized training and education model tailored to a specific job level or experience level (Mohanta et al., 2020).

Sentiment analysis to enhance the role of employees

Sentiment analysis techniques have also been used in recent years to reveal employees' positive and negative feelings (Gillath et al., 2021).

At a time when many business owners have begun to take risks and use these technologies, in the coming years we will witness the rise of sentiment analysis applications to broader levels within the human resources sector with the aim of measuring the feelings of employees and the extent of their participation and role (Coupe, 2019).

How does sentiment analysis technology work to enhance employee engagement?

When certain user answers are obtained, core words from those answers are essentially mapped into a lexicon and the words are given positive or negative scores (Silva et al., 2018).

Some scoring mechanisms are simplified, with a simple + or - rating assigned to a word, while others are rated at multiple levels and within a certain range of positive or negative scores (-5 to +5) (Canaan et al., 2019).

As systems evolve and more data becomes available, AI will continue to impact human resources in a variety of ways (Ivanov & Webster, 2019).

Taking the time to understand the benefits and pitfalls of various approaches is just as important as building the right algorithms and data infrastructure (Kim et al., 2018).

The end result will provide huge advantages and benefits to those companies willing to make the appropriate effort to implement artificial intelligence. The journey of using AI techniques effectively within HR practices is a long one, but hard work and fatigue is the price to pay to be a winner (Kamaruddin et al., 2018).

During the past few years, many business sectors around the world have undergone major modernization transformations; It resulted from the integration of new and advanced software (Jain, 2017). These technological developments have contributed to accelerating business procedures, making them more in-depth and accurate (Glikson & Woolley, 2020). As new technology continues to reshape the HR business in various sectors, a number of trends can be identified that are transforming the HR business (Petriglieri et al., 2019).

According to the Disruptive Techniques in Human Resources Report 2018, issued by Deloitte, a global professional services organization, 39% of large companies and 49% of medium companies have shifted their business towards cloud technology, with expectations of this percentage rising in the coming years (Shen et al., 2019). Although cloud solutions are not new, they have seen an increase in their use by human resources departments, especially within the recruitment process. For HR departments that have not yet resorted to cloud solutions, the current stage is a good time to make this transition; To ensure the centralization of data in companies, its efficient storage and ease of retrieval and presentation (Silva et al., 2018).

In this context, it is not surprising that data security requirements are rising with the expansion of the use of technology and cloud solutions. With the increase in the use of software encryption, and the adoption of cyber security standards, employees can be assured that their sensitive data stored on the cloud is protected (Ertel, 2018).

Artificial intelligence continues to have an impact on reshaping traditional HR functions, based on improved application-based capabilities, automatic data generation, and machine learning. Institutions need to reconsider their structure; With the aim of adding more value to its employees and equipment as much as possible (Karupiah et al., 2018). According to Deloitte's report "Global Human Capital Trends 2018: The Rise of Social Enterprises", 74.5% of people in the Middle East believe in the importance of artificial intelligence, robotics and automation technology (Tahira, 2021).

We have already seen automation of processes instead of performing tasks manually, easing administrative burdens and simplifying traditional procedures. For example, automation is particularly effective in reducing repetitive processes and low-value tasks; To save time in doing business that adds more value to the business. In addition, automation can be used (Ertel, 2018); To reduce bias among candidates, through an evaluation platform based on special work algorithms, to collect a more diverse and richer pool of those who are qualified to join the work sites (Berhil et al., 2020).

There is no doubt that artificial intelligence technology has contributed to improving decision-making processes, employee experiences, as well as the completion of tasks. In the coming years, we expect this trend to continue to accelerate affecting the human resources and payroll sector, especially with the use of virtual and augmented reality technology (Malik et al., 2020).

7 HR Digital Transformation

The process of developing digital human resources proceeds on two tracks; The first is the challenge of transforming its operations while ensuring that it is innovative and adaptable. On the second track, HR processes need to be revamped to make them more automated and more data intensive (Tahira, 2021). These changes will not be successful unless with the support of co-workers at various levels of the organization up to the positions of the executive management (Demir et al., 2020).

Empowering employees

With employee self-service (ESS) portals, staff can now manage multiple private HR processes, such as: applying for leave, managing expense claims, and changing personal information such as: bank statements and relatives' details (Canaan et al., 2019). The benefit of this transformation is not only to free up more time for supervisors of HR operations; Rather, it goes beyond that to utilizing that time in areas that require more strategic thinking and human intervention. In addition, workflow procedures are integrated into the system, and made available for scheduling, task notifications, secure access, login and workflow procedures (Rodney et al., 2019).

Mobile software development

With the rapid shift towards the use of cloud technology, the need for electronic software for smartphones that supports its capabilities has increased. Nowadays, mobile devices are used for just about everything, and HR managers are keen to find new ways; To use applications that support capabilities available across desktop devices. In line with cloud solutions, payroll applications should be able to access all data on the go. Our payroll management solutions are constantly upgradeable and easily accessible via any smart device (Thomas et al., 2016).

Six types of indispensable HR technology in 2021

The year 2020 was the great turning point in the world of companies, especially with remote work due to the spread of the new Corona virus, which forced all companies in all departments to adapt to the reality, especially the human resources department, so what are the different types of technology that may help them move forward in This new year? (Glikson & Woolley, 2020).

First, let us define the term HR technology, it describes the software and hardware associated with it that helps in developing and improving the function and tasks of HR (Jia et al., 2018).

This of course includes calculating employee salaries and compensation, bringing in the company's distinctive skills, talent acquisition and management, performance appraisal and many more (Karupiah et al., 2018).

Learn with us in this article the six most important types of HR technology that are indispensable in 2021.

The use of artificial intelligence

With the progress and technological development, artificial intelligence has become one of the most important pillars used in many companies, as it can also be used to facilitate the work of the human resources department (Thomas et al., 2016).

The use of artificial intelligence helps in the task of recruitment in particular, as it may be useful in this area by.

Develop algorithms that help find the right people for the job

Artificial intelligence helps in analyzing the personality of potential candidates for a job by following and analyzing their activity on various social media (Arslan et al., 2021).

The use of artificial intelligence in the recruitment process contributes to saving time and effort for the employees of the human resources department, which helps to speed up this process and increase its efficiency (Jarrahi, 2018).

8 Digital Transformation

Although there are many companies that are starting to switch to digital technology, the year 2021 will witness a greater and increasing demand for this technology (Coupe, 2019).

Employees deal with an ever-increasing number of information such as that of job applicants, current employee accounts, financial documents, employee evaluations, and more (Nawaz, 2020).

But how can digital technology help in this area?

It is possible to organize all the information in a better and neater way, making it easier for everyone to access it without difficulty (Jia et al., 2018).

Some programs give an indication or evidence that there is a defect in the information by analyzing it, which gives a suitable time for the human resources department to discover it and work on resolving it (Coupe, 2019).

This, in turn, will reflect positively on the work of this department in companies, which means improving the work environment in the company as a whole (Driskell et al., 2018).

Develop a remote working mechanism

One of the things that is expected to continue in 2021 is remote work, but with the acquisition of experience in this field, and the harnessing of various technology tools,

the topic will be easier and less complicated, as the Human Resources Department is constantly creating ways that contribute to facilitating remote work (Glikson & Woolley, 2020).

Increasing employee engagement and communication with each other

Statistics indicate that 80% of companies in the United States of America pay great attention to the psychological health of their employees and link it to productivity and efficiency at work (Ivanov & Webster, 2019).

Therefore, the Human Resources Department is constantly working to understand the psychological state of employees, especially with remote work, in order to improve it and find new ways and mechanisms that help facilitate work (Matsa & Gullamajji, 2019).

Improve employee performance appraisal

Working remotely and from home has been a double-edged sword for companies and employees, and for this reason, the Human Resources department is always working to overcome these difficulties and find the necessary solutions, and one of the most important of these problems is evaluating the performance of employees and ensuring their sense of job security (Jatobáa et al., 2019). The Human Resources Department has been able to develop technological mechanisms that facilitate the process of evaluating the performance of employees periodically by managers through the presence of these evaluations on the cloud to comply with the requirements of each department and can be accessed at any time and place (Gillath et al., 2021).

This in turn motivates employees to work harder in order to collect any increases or rewards without any bias, as this process is done electronically programmed (Pariav et al., 2018).

Data protection and privacy

With most data residing in the cloud, there is an urgent need to find technological tools that help protect this data and ensure its privacy from hacking (Evjemo et al., 2020).

There are many services, including assistance in protecting data on cloud computing, in addition to the human resource planning and management system, employee and manager services, and other human resource management services (Rodney et al., 2019).

It is worth noting that cloud services help the human resources department to keep all the information and documents they have on the cloud, without the need for physical papers, arranging and saving them in certain places (Silva et al., 2018).

Continuous learning and development

With remote work starting and going on for a long period of time, there was a need to find ways to help employees develop and learn online as well (Glikson & Woolley, 2020).

Nowadays, many companies provide specialized educational courses for their employees to help them meet their needs in order to develop them and thus obtain better work results (Arslan et al., 2021).

Some global statistics indicate that 15 years from now, artificial intelligence will replace 15% of current jobs, but this does not mean that employees will not have a place anymore, but that they have to learn new skills and develop themselves to keep pace with this development (Smids et al., 2020).

The development witnessed by the world of human resources from new strategies and used technology tools directly affects the performance and work of companies as a whole. This means that the employees of this department should have a degree of responsibility in order to catch up with the rapid pace of development and harness it while facilitating their work and developing the company itself (Omar, 2020).

How artificial intelligence is changing the workplace?

While many people warn that jobs are being sacrificed this time in favor of AI in a much shorter timescale than in previous industry-changing events, the numbers so far don't match. Rather than eliminating jobs, workplace AI is increasing workers' skill sets, and thus rewards, across a wide range of industries from healthcare to clerical work (Ivanov & Webster, 2019).

Including AI in the workforce can improve conditions. According to a report in The Economist, AI will help remove unconscious and conscious biases in hiring and rewarding employees. It also notes that AI in the workplace will benefit employees in other ways such as ensuring that appropriate safety equipment is worn using smart scanning technology (Smids et al., 2020).

As companies become more dependent on AI, so will the challenges of using it, so they have to address some of the concerns about trust and AI justice. There are some ways to ensure this (Jain, 2017).

1. Appointment of a Responsible for AI Education

Appointment of a Chief Ethical Officer for AI who must work in conjunction with the Ethics Board. Including specialists in data science, organization, public relations, communications, and human resources. He should be responsible for the design and implementation of AI education activities (Abubakar et al., 2019). Should be responsible for employees to reach him in case of fairness concerns using AI. In addition to the spokesperson for the non-technical staff. Ideally, this role should report directly to the CEO for vision and implementation (Gillath et al., 2021).

2. Determine the fairness of the organization

Principles for using artificial intelligence fairly are defined. Then ask all departments that actively use it to apply it in their own way. This is especially important for line managers and owners of products and services (Berhil et al., 2020).

3. Ensuring AI fairness along the supply chain

Require suppliers who work in the organization and have artificial intelligence built into their purchased products and services to comply with company policies. Recruitment agencies that use modern technology to screen job applicants can be (Bednar & Welch, 2020).

4. Educate employees and stakeholders through training and a "learning by doing" approach

Require mandatory training and certification for all employees on the principles of AI fairness. For professional staff, provide training on how to build models that do not violate fairness principles. All Insights courses should leverage AI fairness charters to directly address the issues facing the company. Ensure that course content is regularly reviewed by the Ethics Board (Demir et al., 2020).

5. Create a plan for human resources workers

It should include an annual review by Human Resources to assess the diversity of the team working on data-driven and AI technologies. It also includes a candid review of the competencies and skills that are currently being advertised for major product development (Boselli et al., 2018).

6. AI Integrity Test Before releasing any technology

Requiring departments and suppliers to run tests before allowing any AI algorithm to start working. Once you know which groups may be treated unfairly due to data bias, simulate users from that group and monitor the results. This can be used by product teams to iterate and improve their product or service before it is deployed (Bitkina et al., 2020).

7. Communicate your approach to AI justice

Prepare results learning sessions for principles of fair use of technology with employees who interact with customers and the public for any new or updated product or service. This is especially important for marketing and external communications, as well as for customer service teams (Tahira, 2021).

8. Allocate a standing item at board meetings to AI justice processes

This discussion should include reporting on progress and commitment, topics raised from the Chief AI Ethics Officer and the Ethics Board, and the results of high-priority fairness outcomes tests (Driskell et al., 2018).

9. Ensure that the instructions are followed

Regularly track and report engagement and completion of AI justice activities along with demonstrable impact of administering justice in real business value terms. Provide these updates to department managers and executives to communicate with employees to enhance this by making AI platforms and software fairer, the organization is more effective and productive (Seeber et al., 2020).

10. Document everything

Documenting and reporting the approach to AI justice in employee and supplier trainings and high-level events, including for clients and investors (Mohanta et al., 2020).

What are the most prominent opportunities and challenges of artificial intelligence in the field of employment in light of the Corona pandemic

The repercussions of "Covid 19" led to a wider reliance on artificial intelligence and its applications over the past year, and the impact of this technology was not far from the world of employment (Ertel, 2018). Since the beginning of the pandemic, an increasing number of companies have resorted to using smart systems in this field, from using facial recognition algorithms, questions or assessments, etc., to help identify qualified candidates for interviews. In this article, we try to highlight the most prominent opportunities for artificial intelligence in employment and the challenges it faces (Canaan et al., 2019).

1. Improvements

Even before the pandemic, artificial intelligence and digital transformation were a key consideration for companies around the world. An example of this is Vodafone Telecom. Each year, more than 100,000 university graduates apply for just 1,000 jobs (Abrams et al., 2019). In an effort to deal with such a large number of candidates, the HR department has contracted with HireVue, a company that develops pre-employment assessment tools, to test an AI application that "eliminates human bias" from hiring processes (Silva et al., 2018). As for how the system works, it analyzes the visual interviews, from the candidate's employability score, which is compared with the scores of other applicants (Canaan et al., 2019). The program also identifies the most eligible, and unrecommended, candidates. Vodafone concluded that the AI system overlapped with internal evaluations of 70% of the 'highly recommended' candidates. According to the Washington Post, more than 100 companies have already applied HireVue to more than 1 million applicants (Pueyo, 2018).

2. Empowering those in charge

We assume that recruiters will always have a key role in the hiring process, at least for the foreseeable future (Evjemo et al., 2020). But AI can help them automate routine tasks to increase hiring productivity, and even enhance the candidate experience to reflect the company's values and brand (Matsa & Gullamajji, 2019). For example, this technique is adopted to match jobs with large candidate databases or reduce scheduling problems. Chatbots are also used to engage in conversations with applicants, for example informing them of position details or answering any related query (Thomas et al., 2016). As is the case with the Australian-based company Predictive-Hire, which provides a chatbot that asks a series of questions in an open interview to candidates, then analyzes their responses to assess job-related personality traits such as flexibility, leadership, and others (Abubakar et al., 2019).

3. Assessment of competencies

LinkedIn, a work-centric social networking platform, introduces the AI-powered LinkedIn Recruiter app. The app helps HR administrators build talent pools of candidates, in order to improve the potential for successful recruitment (Ivanov & Webster 2019). The application's algorithms scan people's accounts for talents who are not necessarily in the job search mode. The purpose behind this is to nominate those who can occupy future positions with companies. Then, the recruiter can draw on these talent pools, and report when the position for which they qualify becomes available (Gillath et al., 2021).

4. Facing challenges

We have listed above some of the advantages that artificial intelligence provides in the field of employment, and not one article is enough to mention them all. However, this technology faces difficulties, most notably bias, which is one of the biggest flaws in the applications of this technology, whether in employment or any other field. Because it may be difficult to predict which of the job candidates will be successful in his work, by relying on the analysis of data such as facial expressions or body language and others. Other problems associated with training algorithms with quantitative amounts of structured as well as unstructured data also arise (Ertel, 2018). Therefore, any discrepancy in this data can lead to the expansion of biases in the system. There is also limited data on which algorithms are trained, which can result in discrimination and "unfair" outcomes such as giving preference to lightskinned or males over females. There are also concerns that rhetoric that focuses solely on bias and discrimination may allow companies to evade other issues related to labor rights and so on, arguing that smart recruitment tools are a "fairer" alternative to human-based recruitment, and that algorithms can be modified, while correcting human biases is difficult (Smids et al., 2020).

5. Post-pandemic

It is true that "Covid 19" has forced changes to work mechanisms, such as remote productivity, redesign of office spaces, and greater use of virtual conferencing and online meetings (Ashwini & Aparna Patil, 2018). However, it also highlighted challenges for companies seeking new employment strategies. We assume that it will not only be a "transient event" caused by the epidemic (Smids et al., 2020). We expect to see more smart applications that may also be embedded with virtual reality innovations in the workplace.

And with smart CV searches for applicants, those who say they have experience for a position can be selected more easily. Candidates may be asked to demonstrate their skills before being hired via VR simulations later! While we do not deny the existence of fears that robots will replace human workers in the future, the economic benefits of artificial intelligence technology in the field of business and employment cannot be denied, whether we support or oppose this technology (Silva et al., 2018).

Does artificial intelligence threaten the existence of some jobs?

With the use of artificial intelligence more and more in many sectors and considering it the technology revolution of the near future, and in light of the increasing interdependence of human work with technology and the Internet, it was necessary to search for the impact of artificial intelligence on the labor market, and to know to what extent there are jobs that may be threatened with absence. Hardiness (Petriglieri et al., 2019).

Studies differ among themselves on the role of artificial intelligence in the existence of some professions and jobs. One of them considers that artificial intelligence will affect the labor market, as many people will lose their jobs, while the other believes that, on the contrary, artificial intelligence will be positive for humans if they use it well. Entering the field of this intelligence requires training in certain skills, whether for employees or people to work in it, and the use of automated work through artificial intelligence is an aid factor for humans, provided it is properly used (Jarrahi, 2018).

In this context, researchers explain that artificial intelligence will certainly create new job opportunities. The mechanism of work according to software is based on inputs and outputs, where the human being first gives the inputs to the machine, which in turn works to produce the outputs (Bitkina et al., 2020). This machine performs what is called auto-detect, based on certain existing software, and what was given of the inputs and data. Here, it is certain that new job opportunities will appear, and there will be companies that will lay off their employees, and there will be jobs that will disappear, but in return there will be other new jobs (Hudson et al., 2019).

The greatest impact of artificial intelligence will be on jobs that require writing, data entry and computing, but humans will still exist (Ertel, 2018). With the industrial revolution, machines were found to help man, but did not abolish him, and saved him from fatigue and effort. researchers give an example about the translation profession, that part of it may turn into an automated one and will not disappear, as it helps those who suffer from educational difficulties in special cases, and the machine can do the simultaneous translation, but it cannot reveal all the words, and human intervention is required to verify from the authenticity of the hadith that was translated by the machine (Ribes et al., 2017). The margin of error is always present, and it always requires human intervention. As for the sectors that are least threatening to job opportunities, it is the industrial sector (Jatobáa et al., 2019).

But in sum, according to some researchers, in every sector, artificial intelligence can be an aid or a hindrance, but it is certain that it will never replace humans. What changes with artificial intelligence is the human role at work, but it will continue to work, for example in the education sector (Ribes et al., 2017). The role of the teacher has not disappeared despite online education, but what has changed is the role that has become a facilitator, but there is always someone who has to prepare educational content and correction. In every development, roles change, and new roles are created, but evolution does not replace man (Ivanov, & Webster, 2019).

According to The Future of Jobs Report 2020 issued by the World Economic Forum, and by extrapolating the numbers published in the Future of Jobs Survey

2020, employers expect that by 2025, increasingly redundant roles will decline from 15.4% of the workforce to 9% (a decline of 6.4%), and that emerging professions will grow from 7.8 to 13.5% (5.7% growth) of the total employee base participating in the company (Ashwini & Aparna Patil, 2018).

Based on these numbers, we estimate that by 2025, 85 million jobs may be displaced through a shift in the division of labor between humans and machines, while 97 million new roles may emerge more adapted to the new division of labor between humans, machines and algorithms, across 15 industries and 26 economies. covered by the report (Bednar & Welch, 2020).

The 2020 edition of the Future of Jobs Survey shows that the leadership positions in high demand are roles such as data analysts, artificial intelligence scientists, machine learning specialists, robotics engineers, software and application developers, as well as digital transformation specialists (Silva et al., 2018). However, jobs such as process automation specialists, information security analysts and the Internet of Things are emerging among a range of roles that are in increasing demand from employers (Jain, 2018b).

According to a report published by the International Labor Organization entitled "The economics of artificial intelligence: Implications for the future of work", many observers believe, in fact, that artificial intelligence, given its focus on mental rather than physical capabilities, is capable of becoming a "technology of other general purpose" with a wide range of applications in various sectors and professions (Bitkina et al., 2020).

The development of AI has benefited from three interrelated trends: high availability (unstructured) databases, proliferation of computing power and increased investment capital to fund innovative technology projects (Kim et al., 2018).

This allowed for the rapid development of new applications in areas where humans are thought to have a special advantage: making predictions and making decisions about routine, non-mechanical tasks. Typically, these types of tasks are found mainly in service sectors that - even in emerging economies - employ more than half and sometimes as much as 70% of the workforce (Demir et al., 2020).

There are two main sets of tasks that have become the focus of AI applications, particularly:

Matching tasks: the most important set of tasks related to all those jobs that consist of matching supply and demand, especially in markets with a heterogeneous product and service structure (Driskell et al., 2018).

Classification tasks: Early applications of AI centered on image and text recognition technologies, particularly facial recognition, in part in relation to increased cameras and technology (Thomas et al., 2016).

9 Conclusion

There has been a modern, modern knowledge explosion in recent years in AI-based tools for human resource applications. These tools are designed to handle key HR functions including recruitment, talent retention, training, benefits, and employee satisfaction. These products have the potential to enhance employee productivity, save time and money for human resource departments, and improve equity and diversity outcomes.

Meanwhile, articles warning of the negative consequences of AI point to its use in human resources as a major area of risk. There are good reasons for these concerns. Recruitment decisions have major stakes with dire consequences for individuals, organizations and society.

Concern is growing about AI algorithms that encode bias and discrimination, further complicated by labor and anti-discrimination laws. Mistakes in adopting AI-based HR products can also undermine employee confidence, leading to lower productivity and job satisfaction. Finally, unique aspects of HR setup, including small data sets, complex social interactions, and data privacy concerns, pose challenges to developing effective algorithms.

Artificial intelligence is a relatively new player in human resources. Few HR professionals have technical knowledge of how AI systems work. They face pressure to adopt AI-based tools, often without the necessary resources to fully assess the potential consequences of these decisions. The goal of human-centered AI in the HR Toolkit is to provide HR professionals with a framework for making sound decisions for the organization and society.

The work relies on a multi-stakeholder community to bring together technical knowledge, an understanding of regulatory contexts, legal and ethical expertise, and lessons learned from past experience. Members of the project community include HR professionals in private and public environments, AI for HR vendors, people analytics experts, AI ethicists, labor law experts, and academics.

The first component of the resulting toolkit is a short handbook that provides an overview of how AI systems work and the main concerns about their use in a human resource context. The rest of the toolkit is a purchasing guide with questions to ask both the sellers and the particular organization. These questions cover the trade-offs in the design of algorithms, the quality and storage of the data used, the value proposition and the expected level of accuracy, as well as aspects of the organizational context, including the attitudes and acquisitions of decision makers, HR professionals, and employees.

The success of the toolkit depends on the contribution of all members of the community to ensure that it meets the needs of HR professionals, reflects a thorough understanding of AI algorithms, and leads to decisions that benefit all stakeholders including workers and society at large.

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Transforming into Smart Business: The Role of Artificial Intelligence



Sami N. M. Abushammala, Hussam F. Abushawish, Mahmoud O. Jalambo, and Ashraf Yunis Maghari

Abstract Artificial Intelligence (AI) is the peak of the fourth industrial revolution, since it is implemented in various business activities such as HR, supply chain management, manufacturing, e-Commerce, marketing, and corporate finance. Several AI tools were presented in this chapter to shed the light on how such technologies can be implemented to improve organizational predictive capability and boost business performance. Thus, organizations are urged to implement AI systems to overcome forceful threats, as AI augments BI to achieve competitive advantages. Unescapably, AI transformation requires changes in both the individual and the collective mindsets in organizations. This chapter proposes an AI business model, named SHAM, to guide organizations in emerging countries towards AI-driven business transformation. Since the current study is descriptive in nature, the SHAM model was built based on an extensive literature review using the Comprehensive Literature Review Meta-Framework of the seven step model (CLR Meta-Framework). The SHAM model adapts the Sense-Think-Act paradigm which is a broad roadmap in robotics research to fit the business context. The Sense step is to conceptualize the organizational direction towards the new AI-driven entity; the Think step is to build a solid strategy for the AI transformation; and the Act step is to implement the strategy to reach the desired smart business. The model is conceived to empower organizations to transform into smart businesses to achieve competitive advantage, adaptation to the environment, and success.

Keywords Smart business · AI · BI · Business transformation · SHAM model

S. N. M. Abushammala · M. O. Jalambo University College of Applied Sciences (UCAS), Gaza, Palestine

H. F. Abushawish (⊠) Palestine Technical College—Deir El-Balah, Gaza, Palestine e-mail: hashawish@ptcdb.edu.ps

A. Y. Maghari Islamic University of Gaza, Gaza, Palestine

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1 Introduction

Artificial Intelligence (AI) is gaining a continuum impetus in all aspects of human activity. AI is currently a universal technology that plays a pivotal role in various fields and sub-fields of human activity. A report by the World Economic Forum confirmed that by 2022 AI is expected to make 133 million new jobs while endings 75 million jobs; a matter which causes concerns for some but also creates potentially greater opportunities for some others, depending on the lenses through which one looks at it (WEF, 2022). Furthermore, Orlando presented essential findings during the Gartner Symposium/ITxpo, based on the collected data from more than 3,000 chief information officer respondents in 89 countries and all major industries (Orlando, 2021). The report findings stated that AI is the leading technology and that organizations used their financial resources to make the transformation into a digital business.

To facilitate this transformation, it was revealed that approximately \$15 trillion in revenue/public-sector budgets and \$284 billion were spent on AI technology. This is to say, regardless of organizational acceptance and readiness, AI is a critically determining factor of the human future, and it will soon be embraced by all organizations. AI is becoming an integral part of military bots, law, music, transportation, business, and healthcare, among others (Russell & Norvig, 2002). In modern organizations, AI and data-driven technology are considered the core of a competitive advantage. By means of AI, organizations can develop computer systems that can mimic human intelligence in performing tasks, normally done by humans, to make performance easier, safer, more dynamic, and more creative.

With an increasing awareness of its impacts on business, particularly in emerging economies, business organizations are shifting their emphasis to AI as a super capability to achieve competitive advantage over their rivals. In this respect, AI is probably the most defining factor of success in the world of business in the years to come (Boucher, 2020). Therefore, organizations are making the transformation into modern business intelligence (MBI) which utilizes machine learning and data-driven artificial intelligence. The idea is that, by incorporating AI into their cultures and work structures, organizations can make much of their intelligent computer systems to analyze their data masses and make predictions and decisions that would empower them to gain competitive advantage and become exceptionally responsive to the rapid changes in their external environments. To this end, as organizations develop promising AI capabilities, in return, they will achieve great benefits in terms of extraordinary performance, competitiveness, success, expansion, and effectiveness while maintaining greater levels of efficiency.

It is evident that AI as an element of the 4th industrial revolution has great potential for advanced and emerging economies alike. Nevertheless, the question which comes to mind is how relevant it is for the latter, where technological infrastructure, advanced technical skills, and related policy development are fatally insufficient (Ayentimi & Burgess, 2019). Therefore, the current chapter proposes an AI model for digital transformation in the business organization. The idea is that organizations in emerging economies need to catch the opportunities which AI can offer to bring about a radical change in their performance to enhance their competitive advantage. Otherwise, falling short of utilizing the capabilities of AI will cause major drawbacks to these organizations leading them to failure. Therefore, the significance of this study stems from the fact that it introduces a new model of AI implementation to transform organizations into smart businesses. Despite the dissemination of the AI revolution worldwide, still emerging economies are incapable of using AI systems to revolutionize their own business organizations. Given the limited resources and the lack of AI knowledge, these economies do not have the courage to transform into a smart businesses. Simply put, organizations in such economies do not possess a well-identified AI-driven transformation strategy nor do they have a guiding model to light their road towards the intended transformation. This is a well-identified gap which is addressed in this chapter by proposing a powerful AI-driven business transformation model for organizations in emerging economies.

The scope of the study involves Organization Theory (OT) which explains the link between the business organization and its environment in terms of internal capabilities in relation to external threats and opportunities. In this sense, AI is conceptualized as the organization's best tool to ensure building powerful internal capabilities in the face of the brutal external changes which affect the performance and success of organizations.

1.1 What is Artificial Intelligence (AI)?

The manifestation of the term AI is linked with publishing the paper "Computing Machinery and Intelligence" in 1950. The main goal of AI, from an economic perspective, is to maximize profits by reducing the cost of human error and shrinking labor costs (Gad-Elrab, 2021). The roots of AI research were founded upon the principle that "intelligence is the computational part of the ability to achieve goals in the world". Based on the astounding accomplishments in lately AI investigation remarked by the increasing influence of machine learning, it is becoming progressively obvious that implementing AI is much more than "pattern matching" (McCarthy, 2007).

Artificial Intelligence (AI) in the Oxford Dictionary is defined as "the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages" (Dictionary, 2021). Thus, AI is typically defined as "the scientific understanding of the mechanisms underlying thought and intelligent behavior and their embodiment in machines" (McCarthy, 2007). Despite the various definitions of AI, they share the same essence of having programmed smart machines to think and act instead of humans. Minsky (1982) stated that AI is the science of making machines capable of performing tasks that would require intelligence if done by humans (Minsky, 1982). Also, McCarthy defines AI as the science and engineering of making intelligent machines (McCarthy, 2007). To this end, AI can be defined as the science of making machines capable of making machines capable of making machines machines (McCarthy, 2007).

activities intelligently. In this respect, machine learning (ML) is the most common technique of AI which is capable of processing and analyzing huge masses of data to extract knowledge for better decision making.

1.2 What is Business Intelligence (BI)?

The term BI was authored by the Gartner Group in the 1990s. Be that as it may, the idea is a lot more seasoned; it has its underlying foundations in the Management Information System (MIS) reports of the 1970s. During that period, MIS was static, two-dimensional, and had no insightful capacities. In the mid-1980s, the idea of leader data frameworks arose. This idea extended the mechanized help to high even out directors and leaders. A portion of the abilities presented was dynamic multidimensional revealing, determining and expectation, pattern investigation, drill-down to subtleties, status access, and basic achievement factors (Aziz, 2020).

Business intelligence (BI) is a broad term for technology that empowers data preparation, mining, management, and visualization (Zeng et al., 2006). Zeng et al. define BI as "The process of collection, treatment, and diffusion of information that has an objective, the reduction of uncertainty in the making of all strategic decisions" (Zeng et al., 2006). Stackowiak et al. characterize BI as the method involved with taking a lot of information, breaking down that information, and introducing a significant level arrangement of reports that gather the quintessence of that information into the premise of business activities, empowering the board to settle on major everyday business choices (Stackowiak et al., 2007). They also define BI as the process of taking large amounts of data, analyzing that data, and presenting a high-level set of reports that condense the essence of that data into the basis of business actions, enabling management to make fundamental daily business decisions (Stackowiak et al., 2007). Azvine et al. view BI as a way and method of improving business performance by providing powerful assists for executive decision-makers to enable them to have actionable information at hand (Azvine et al., 2007). Safeer and Zafar stated that BI is the processes, technologies, and tools that help organizations to change the data into information, information into knowledge, and knowledge into plans that guide for better and effective decision-making (Safeer & Zafar, 2011). BI tools are seen as a technology that enables the efficiency of business operation by providing an increased value to the enterprise information and hence the way this information is utilized. In a nutshell, BI is the process by which enterprises use strategies and technologies for analyzing current and historical data, to improve strategic decision-making and provide a competitive advantage.

In this regard, there are plenty of BI tools that enable decision-makers to quickly identify performance gaps and market trends (Wanda & Stian, 2015). Accordingly, as part of the BI process, organizations collect data from internal IT systems and external sources, prepare it for analysis, run queries against the data, and create data visualizations. Within the various sectors of industry, the BI instruments assist executives and managers to identify actionable data from raw data, besides facilitating

data-driven decision-making. The resulting decisions of BI (Caseiro & Coelho, 2019) could be:

- Related to "environmental scanning" that guides managers to scan their organizations' environment;
- Associated to competitive analysis;
- More focused on the competitors, their strengths, weaknesses, and behavior; or
- Linked to technological intelligence. In short, BI is the process of utilizing technology in the preparation, processing, visualization of data into business reports that facilitate decision making leading to competitive advantage.

1.3 AI and BI—Synergy or Competition?

BI is capable of analyzing historical data to reach insights to inform better decisionmaking in organizations. The resulting insights from BI can then be used by AI applications to predict more accurate future insights by building predictive machine learning models and training machines to use human-like problem-solving skills, learning, and judgment. To this end, it is concluded that AI and BI introduce the best fit for organizational excellence, as both work in synergy and integration rather than being competing organizational elements. Whereas BI is proper for the analysis of historical data through using analytical models, AI is capable of building on these analytics to predict what will happen in the future and inform the organization how to act to achieve organizational excellence and competitive advantage in a rapidly changing environment. The integration of the insights of AI-augmented-BI in organizations enables them to build powerful predictive models and get quicker and more accurate results.

2 Methodology

This study is descriptive in nature, and it uses the Comprehensive Literature Review Meta-Framework of the Seven-Step Model (CLR Meta-Framework) to build the intended AI-driven business transformation model. Figure 1 shows the Seven-step Model for a Comprehensive Literature Review, adopted from Onwuegbuzie and Frels (Onwuegbuzie & Frels, 2016).

Following the CLR meta-framework, the study was conducted in seven sequential steps fitted into three stages: exploration, interpretation, and communication. The exploration stage includes 5 steps: exploring beliefs and topics; initiating the search; storing and organizing information; selecting/deselecting information; and expanding the search. The interpretation stage mandates extensive synthesis of information, and, finally, the communication stage comprises presenting the final research report including the proposed AI-driven business transformation model.

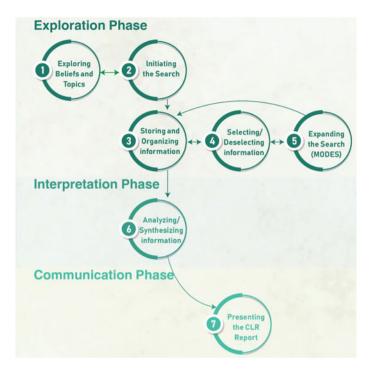


Fig. 1 CLR meta-framework of the seven-step model

The CLR meta-framework was employed in the following manner. First, a sufficient body of studies was collected. Then, a thorough screening of studies was conducted to identify the best-fitting ones to the scope of the current study. Consequently, only strongly related studies were selected for further extensive review, whereas unrelated studies were excluded. Later, the selected studies were reviewed and a lot of information was gathered. In the interpretation stage, the information was interpreted, evaluated, and synthesized to better understand the role of AI in business transformation and, thus, to propose an effectual AI-driven business transformation model. Finally, the findings and the SHAM model were combined and presented in the current chapter.

3 Transforming Organizations Through AI

The rapidly evolving digital technologies in the business environment are placing unprecedented pressure on organizations to adapt to technological changes which determine organizational success. Particularly, the rapid rise of AI as a key element of the fourth industrial revolution has created both tremendous opportunities and threats of change for organizations. In the ever-growing complex and unstable business environment, AI is introducing a new paradigm for organizations which seek to interact with the external environment more effectively and efficiently. It is also reshaping organizational culture and management systems and structures in response to changing organizational conditions. Although, the application of AI in business has promising gains to organizations, yet, it also raises forceful challenges that may serve both as opportunities and threats, depending on organizational readiness to implement and incorporate it into their day-to-day practices. The ability to handle the challenges, opportunities and threats, raised by AI will be a unique organizational capability in the journey of digital transformation of organizations toward a proper response to new environmental conditions in the interest of society, organizations, and employees (Chernov & Chernova, 2019).

4 Combining AI and BI for Organizational Excellence

Generally, BI refers to traditional analytics that transforms data into actionable insights in ways that aid human decision-making in organizations. Over the past two decades, BI has mainly succeeded to provide users with historical comprehensive reports and easy-to-use custom analysis tools. Due to the underlying data architecture, which consists of a central data storage solution such as Enterprise Data Warehouses (EDWs), the availability of BI functionality is large. EDWs form the backbone of traditional data management platforms and usually connect vast network systems of data sources into a central data warehouse. The data is then consolidated, refined, and pulled into different reports and dashboards after converting data in EDW to display old business information such as weekly revenue metrics or quarterly sales (Chernov & Chernova, 2019). Although BI makes data analysis easier, it leaves decision-making in the hands of humans rather than enabling computers to make rational decisions. AI, on the other hand, refers to advanced analytics that enables computers to make decisions with no human interference. In other words, AI makes decisions independently even in uncertain and unpredicted situations.

Utilizing AI to augment BI provides a perfect analytical solution and can be very insightful to organizations. Combining AI and BI in any business setting will lead to optimal analytics and actionable insights. Standalone BI can produce data patterns and representations by analyzing historical data, yet, when combined with AI, it creates optimal predictions and accurate decisions to enable organizational adaptation in the face of brutal external environmental forces. AI-enabled BI helps organizations to recognize unknown problems by deeply exploring unexamined data to reach critical insights. When combined, they can automatically review past data and alert organizations to take new actions. By utilizing the capabilities of AI and BI together, organizations can understand what these insights mean and how they should act on them more efficiently. AI-powered BI is just the best solution for organizations seeking agility and adaptation. The question is how this combination can take place (Purohit, 2021).

5 Modern Business Intelligence (MBI)

Generally, organizations have their own visions and missions that are translated into goals and objectives to face competitors. Then, these goals and objectives are achieved by organizing certain activities. Meanwhile, KPIs are developed to measure and predict how well organizations are meeting their objectives e.g. sales, income, supply chain, stocks, etc. (Aziz, 2020). By 2005, BI frameworks began to incorporate AI capacities just as incredible insightful abilities (Turban et al., 2010). While BI is to answer the question "What happened?" by providing efficient analyses, the Modern Business Intelligence (MBI) is to answer "What is happening, what will happen, and why?" which offers the ability to monitor and obtain a continuous development of organization within fast analytics while accomplishing objectives of the mission using predictive analytics.

BI needs historical and current data or information to determine KPI measurements by answering the questions of "what happened" and "how it happened". By using BI; managers, especially those utilizing business data, play a pivotal role in making decisions and the subsequent actions to be taken to enhance competitive advantage. MBI can be achieved through implementing AI by means of developing and integrating technical solutions into the workflow. In other words, MBI instruments are commonly used to make wiser business decisions, thus strengthening the organization's rank within the marketplace (Pallathadka, 2021).

6 Most of Today's AI Uses in Business

AI is quickly making a place for itself at the heart of businesses and organizations. According to Accenture, it is expected to affect 25% of technology spending going forward (Brown, 2018). AI has a tremendous ability to serve businesses and help them achieve success by making informed decisions through supporting human intelligence with the capabilities of powerful computers, accurate data analysis, and automating the required tasks. The following are possible reasons for implementing AI in today's business (Sriram et al., 2021):

- Chatbots to gain customers' satisfaction,
- An image search using process algorithms that help customers to search by images,
- Recommendation systems to help enterprises to predict customer's choices and suggest preferences,
- Inventory management algorithms analyze the past sales data to predict future sales.
- Cybersecurity to secure e-commerce platforms and avoid fraudulent financial transactions.
- In Human resources, AI saves time and effort as AI Engines are used for candidates' screening, selection, and recruitment.

• It helps companies to cut down Risk based on the predicted credit scoring classification according to their credit history.

7 AI Impact on Business

There is no doubt that AI technology plays a very important role in organizations nowadays, so it will not be just a passing technology. If someone other than you can make better decisions more quickly, with the potential of AI and the obvious advantages of being quick to automate and being able to make better decisions, they will beat you. Therefore, managers and decision-makers can no longer stand still or idly by. Below, are the likely impacts of AI on the processes of innovation, marketing, HR management, manufacturing and products, financial services and activities, retail and e-commerce, and supply chain management.

7.1 Transforming Innovation Process

AI has reached a place where it can take real-world decisions. AI takes advantage of the actionable data i.e. past data, history, and previous experiences to come out with new decisions in the light of the predicted data. This process happens through an Intelligent Agent (IA) that interacts with the environment in a repetitive cycle of sense-think-and-act. This IA can be a machine or software that takes the data in the form of images, videos, sound, text, etc., to move on the analysis stage using algorithms, aiming at delivering wiser decisions and powered solutions (Soni et al., 2019). Table 1 describes two examples of Transforming innovation process tools.

Tools	Purpose	Description
Crayon	a Competitive intelligence software platform	Crayon helps the organization to create sustainable business advantage through real-time capturing organization competitors' movements, using more than one hundred different data types such as product updates, messaging pivots, executive team changes, and more
X.ai	Scheduling	X.ai is an AI personal assistant tool that helps schedule meetings by type or buffer time for busy professionals. The famous brands including CocaCola, Disney, Bitly, and Zendesk, etc. are employing X.ai successfully. Once users mention their status as busy or available, their meeting will be scheduled accordingly

Table 1 Transforming innovation process tools

7.2 Transforming Marketing Process

AI tools always create new marketing opportunities by changing how people interact with information, technology, brands, and services. Marketing departments in organizations are expected to meet recurring customer expectations. In this respect, AI tools can help organizations to realize and identify customers' preferences and choices through common technologies such as *Search engines, Facebook*, and *YouTube* that billions of people use every day. AI can produce and post catchy ads to communicate promptly and smartly with customers. Therefore, AI tools will soon help companies to be able to tailor personalized campaigns in real-time (Dimitrieska et al., 2018). The following are some of the AI usages to transform the process of marketing:

- Recommendations and content curation
- Personalization of news feeds
- Pattern and image recognition
- Language recognition—to digest unstructured data from customers and sales prospects
- Ad targeting and optimized, real-time bidding
- Customer segmentation
- Social semantics and sentiment analysis
- Automated web design
- Predictive customer service.

There are various tools for AI uses in marketing. Table 2 presents three examples of transforming marketing process tools.

7.3 Transforming Human Resource Management

AI tools are integrated with human resource management (HRM) practices to change the way companies post their job vacancies, screen the applications for those vacancies, evaluate candidates, develop employees, schedule interviews, recruit, and engage employees. It is worth mentioning that AI tools could make more accurate decisions, based on existing data sets when compared to humans' possible errors in such processes. This transformation has caused machines to take over all the manual work thus leading HR professionals to take up more strategic roles. Recently, conversational AI platforms such as chatbots and cognitive agents are beginning to manage inquiries previously handled by HR service centers including benefits administration and record-keeping activities. Such platforms provide 24/7 coverage and operate alongside the human workforce (Edlich et al., 2019; Tewari & Pant, 2020). Table 3 describes two examples of transforming human resource management tools.

Tools	Purpose	Description
Frase.io	Search Engine Optimization	Frase.io is an AI multifunctional SEO tool that optimizes search queries and general content creating when researching a topic and finding the necessary information about the competition. It has algorithms for both content creation and promotion analytics
DigitalGenius	AI-NLP	DigitalGenius is a natural language processing (NLP) tool that carries out human-like conversations with customers via calls and SMS. It analyzes the question first and then takes it to the right answer, thereby helping businesses to improve their customer service operations. It analyzes customer service logs, understands everyday transactions, and then chooses the most appropriate response
Bold360	Chatbot	Bold360 is a web chatbot that understands customers' intentions with its own natural language processing technology without matching keywords. It runs conversations with customers using live chat, messaging, chatbots, and mobile apps

 Table 2
 Transforming marketing process tools

Table 3 Transforming human resource management tools
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Tools	Purpose	Description	
Textio	Job matching	Textio uses predictive technology to help organizations write better job matching to potential candidates. Many companies, such as Atlassian, Twitter, Microsoft, Square, and Starbucks, are already making use of this tool	
Skillate	Decision support		

7.4 Transforming Manufacturing and Products

The utilization of AI instruments has changed the assembling area from menial helpers to cutting-edge mechanical technology. Accordingly, AI-empowered assembling organizations to deliver more with fewer potential blunders to fulfill market needs. Implementing AI in today's manufacturing and products processes helped

Tools	Purpose	Description
Visual inspection AI	Manufacturing	Visual Inspection AI technology is launched by Google Cloud to build a solution for manufacturers, consumer packaged goods companies, and other businesses. It automates the quality control process, enabling manufacturers to quickly and accurately detect defects in products
Skyplanner	Production	SkyPlanner is an AI tool for Production planning and scheduling (APS) which used to organize the job order and production flow so that bottlenecks and harmonic motions in the production are avoided. It helps in delivering products to customers within the Promised

Table 4 Transforming manufacturing and products tools

businesses in rapid growth as they can shorten development cycles, improve engineering efficiency, prevent faults, increase safety by automating risky activities, reduce inventory costs with better supply and demand planning, and increase revenue with better sales lead identification and price optimization, etc. (Patel et al., 2018; Bughin et al., 2018). Thus, a new concept like "Intelligent manufacturing" refers to a smart approach for production where machines are linked to humans, so both machines and humans are working side-by-side with minimal guidance. Table 4 shows two examples of Transforming Manufacturing and Products tools.

7.5 Transforming Financial Services and Activities

Finance managers make better decisions through more precise forecasts and planning (Cook & Jones, 2018). In this regard, the recent AI advances are reshaping and redefining the scope, concepts, objectives, content, and tasks of smart Finance Technology (FinTech). AI essentially and comprehensively transforms the way modern businesses operate, transact, interact and cooperate with their participants and environments. Recently, AI has strengthened the efficiency, cost-effectiveness, customer experience, risk mitigation, regulation and security of existing economic-financial systems and services. More importantly, AI cultivates new economic-financial mechanisms and innovation, and, in return, it has a direct positive impact on corporate finance. In this sense, the three main current usages of AI inside the financial management are deployed in the account's payables/receivables, the financial reporting/controlling and the treasury/working capital management (Wallon, 2019).

In the same context, robotic process automation and natural language processing behind the bots leads to optimizing customer relationships and expeditious processing and autonomous tracking of all the possible mistakes such as a duplicated or wrong payment. While manual error correction could take hours, machine learning technology tracks down at a high speed the relevant information, finds the source of the problem, and suggests which payments are going together without permitting

Tools	Purpose	Description
Sage	Accounting software	Sage is an AI tool that is a provider of cloud-based financial management and accounting. It is suitable for small to midsize accounting firms, as it provides financial reporting and operational insights aiming at automating critical financial processes
Feedzai	Accounting software	Feedzai is an AI tool used for managing financial risk. It suits the world's largest banks, merchants, and processors. It fights financial crime with AI, powered by big data and machine learning

 Table 5
 Transforming financial services and activities tools

fraudulent transactions. Consequently, the transaction process which is influencing the corporation cash-flow and customer satisfaction is improved through AI usage (Taylor, 2021). Table 5 describes two examples of transforming financial services and activities tools.

7.6 Retail and E-Commerce

In the field of online business, AI has slowly formed into a useful asset to help deals develop and enhance internet business activities. The chatbot is utilized basically to consequently react to client questions, react to straightforward voice orders, and give item proposals utilizing a characteristic language handling framework. Chatbots likewise can assist customers with tracking down appropriate items, really looking at the inventory circumstance of items, thinking about different items, lastly assisting buyers with paying. Assuming there are any grievances or questions, the chatbot can likewise assist clients with reaching the relating administration workforce.

Artificial intelligence is additionally executed in internet business through a proposal motor. In other words, AI calculations can understand profound learning, measurable programming, and expectation and investigation of client conduct and monstrous informational collections. Moreover, they can anticipate which items are probably going to draw in clients. For instance, in view of late inquiries by likely clients, AI calculations in the proposal motor can record key subtleties of the looked-through item dependent on the computation results. The proposal motor then, at that point, creates proper ideas for the program and records them on an individual page, at last assisting purchasers with finding the favored item rapidly. Numerous online business organizations, for example, Amazon, Alibaba, Taobao, and Jd.com use proposal motors to recognize the ideal interest group for their items.

Finally, the current internet business industry is blasting. In any event, for little stock internet-based retailers, this sort of long-haul persistent value change is a major test. Artificial intelligence, which can handle enormous information rapidly, has tackled the issue of programmed estimating of countless items. For shippers,

Tools	Purpose	Description	
Yotpo	Marketing	Yotpo is an AI tool used to increase conversions with customers, thro collecting all the comments, publications, and reviews about a produc brand. It integrates the service with third-party platforms where custo pile up in masses, such as Facebook, Twitter, and Google Seller Ratin	

Table 6 Retail and e-commerce tool

ideal evaluating is extremely challenging, and this sort of estimating issue should be examined top to bottom to choose what computerized reasoning is great at (Song et al., 2019). Some uses of AI in the process of retail and e-commerce are:

- Smart searches and relevance features
- Personalization as a service
- · Product recommendations and purchase predictions
- · Fraud detection and prevention for online transactions
- Dynamic price optimization.

There are many tools for AI uses in retail and e-Commerce. Table 6 demonstrates an example.

7.7 Transforming Supply Chain Management

A well-working supply chain is a key to progress for each business element. Having an exact projection on stock offers a generous upper hand. There are numerous inside factors including item presentations and conveyance network extension; and outside variables like climate, outrageous irregularity, and changes in client discernment or media inclusion that influence the exhibition of the production network. As of late AI has been demonstrated to turn into an expansion of our mind, extending our intellectual capacities to levels that we never suspected would be conceivable. However, many accept AI will supplant people, it isn't accurate, rather it will assist us with releasing our actual vital and imaginative possibilities.

AI comprises a bunch of computational advancements created to detect, learn, reason, and act suitably. With the innovative headway in portable figuring, the ability to store gigantic information on the web, cloud-based AI and data handling calculations, and so forth, AI has been coordinated into numerous areas of business and has been demonstrated to lessen costs, increment income, and upgrade resource use. Artificial intelligence is assisting organizations with getting practically 100% precise projection and gauge of client interest, improving their R&D, and expanding fabricating with lower cost and better caliber, helping them in the advancement (distinguishing objective clients, demography, characterizing the cost, and planning the right message, and so forth), and giving their clients a superior encounter. These four spaces of significant worth creation are critical for acquiring an upper hand.

Tools	Purpose	Description
IBM supply chain	Decision-making	IBM Supply Chain insights organizations by analyzing client information and store network investigation to identify what items become less beneficial or get what client needs
Logility	Decision-making	Logility is a finished store network the board and retail advancement arrangement that helps little, medium, and huge organizations, as it includes an exhibition observing engineering and gives store network permeability; request, stock and renewal arranging; Sales and Operations Planning (S&OP); supply and stock improvement; fabricating arranging and booking; retail stock preparation and assignment; and transportation arranging and the executives

 Table 7 Transforming supply chain management tools

These cycles are urgent in bringing development quicker to the market. Inventory network pioneers use AI-controlled advancements to Dash et al. (2019):

- Make effective plans to dispose of waste
- · Real-time checking and mistake-free creation and
- Facilitate lower process durations.

Relying on the capabilities of AI tools to collect and process big data, aiming at taking the right decisions, accurate inventory management can ensure the right flow of items in and out of a warehouse. For example, order processing, picking and packing can become very time-consuming with a high tendency for error, AI tools help to prevent overstocking, inadequate stock and unexpected stock-outs. In other words, the quick analysis and interpretation of huge datasets via AI tools provide timely guidance on forecasting supply and demand. Thus, with AI algorithms, it is possible to predict and discover new customers' habits and forecast the seasonal demand, considering minimizing the costs of overstocking unwanted inventory.

AI tools facilitate smart planning and efficient management of warehouses to enhance the safety of workers as well as materials. AI can also notify manufacturers about any possible risks in the process of the supply chain by offering the essential feedback for proactively overcoming any cutting in the supply chain (Dash et al., 2019). Table 7 describes two examples of transforming supply chain management tools.

8 Implementing AI in Business: Major Challenges

There are various challenges to implementing AI in organizations. According to Chernov and Chernova (2019), the major challenge is concerned with the existing managerial mindset, that is, the willingness of managers to transfer which job tasks to AI. Generally, their findings suggested that only 42% of managers are ready for this

transfer. Yet, those in favor of the transfer are not willing to transfer all job functions to AI depending on the nature of each function and its need for human judgment rather than technical processing. The wide spectrum of managerial job functions and tasks included coordination and control, scheduling, planning and reporting, problem-solving, strategy development, data analysis, allocating resources, people development & coaching. The most appropriate job functions to be transferred to AI were reporting functions, scheduling and planning, allocating resources, and data analysis. Even though AI is technically capable of performing such tasks as individuals' improvement and training, procedure advancement, and critical thinking, yet supervisors were not prepared to move them to AI because of the conviction that these undertakings need human judgment which is a mix of insight, experience, and certain degrees of aptitude rather than analyzing Big Data, finding correlations, and choosing decision options.

Augmenting the old-fashioned practices of BI through the implementation of AI is another basic challenge to organizations. BI is a digital technique that uses traditional analytics utilizing statistical analysis to transfer data into actionable business insights to aid human decision-making. With the presence of big data in today's organizations, BI is not a proper business tool to analyze large masses of big data for future predictions. In this context, AI is seen to introduce the solution to handling large quantities of big data effectively. AI uses sophisticated machine learning and deep learning algorithms to carry out advanced analytics that enables computers to make decisions by themselves, with no human interference. Therefore, the big challenge that arises is the capability of the organization to establish synergy between AI and BI. That is, to use AI to augment BI to make it capable of carrying out big data analysis and expand its impact on organizational prediction and data-driven decisionmaking processes to improve business processes, customer service, and employee satisfaction. Leaders, in the first, need to change their mindset and shift their focus to AI as a promising technology. Then, they need to utilize the BI-driven historical patterns utilizing AI to produce accurate future data-driven predictions and decisions. Finally, the impact of combining AI and BI in this manner will foster organizational agility and adaptation, improve performance, and lead to exceptional results.

Organizations may realize the benefits of combining AI and BI in ways that help them create modern BI and business models, but developing AI systems are too difficult to achieve (Adixon, 2019). Despite the promising benefits of AI to business, yet most organizations fall short to put it into practice due to their insufficient capabilities in terms of low financial readiness; incompetent workforce who cannot handle AI technologies; and ethical, moral, and legal issues that need to be addressed before using AI technologies. AI uses revolutionary niche technologies that are highly expensive. While AI is an essential business component to wealthy and fortune organizations, the majority of businesses cannot deploy it into their activities because they cannot afford its capital and running costs in terms of AI deployment, technological infrastructure, and staff recruitment and training. This, in turn, creates business inequalities in the local and the international markets where the benefits of AI are exclusive to super businesses, making misfortunate companies less competitive and less advanced.

9 SHAM AI-Driven Business Transformation Model

The SHAM Model incorporates a sequence of steps that leads the transformation into a smart business. The SHAM model includes three recurring and sequential steps i.e., Sense, Think, and Act. The model was inspired by the paradigm developed by Siegel who mentioned that the "sense-think-act" is advanced as the operational definition of a robot, and as a broad roadmap for robotics research (Siegel, 2003). Figure 2 introduces the SHAM model.

As shown in Fig. 2, the SHAM Model suggests three sequential steps: Sense, Think, and Act. The Sense step comprises identifying the threats which affect the performance of the organization, envisioning a new business value, creating and sharing a vision for transformation, and introducing a new culture to align employees with the desired direction. At the Think step, a real need emerges for chartering an AI specialist to conduct a SWOT analysis to identify the gap between the current situation and the desired one. The primary mission of the specialist is to guide the design of an AI transformation strategy leading to a smart organization. At this stage, the resources needed to facilitate transformation into smart business should be adequately allocated to maximize readiness to the Act step. The Act step mandates building employee trust to accept AI as a supportive technology to their role. Consequent steps include creating the data masses, developing a highly accurate data model, building the AI system through applying the AI tools on the data masses, and finally

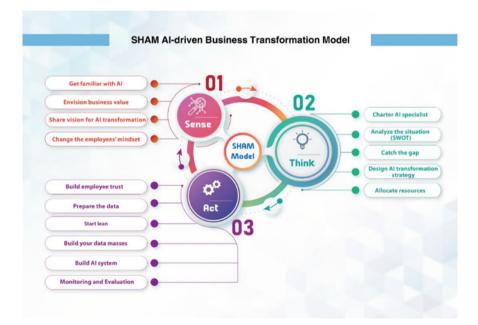


Fig. 2 SHAM AI-driven business transformation model

monitoring and evaluating the AI system and strategy for further improvement. The details of the steps are explained below:

9.1 Sense (the Need to Change)

Get familiar with AI (understand what AI is for). The decision-makers should believe that AI affords the most suitable tool for effective and efficient decision making, problem-solving, and prediction to help organizations to adapt to everchanging environments.

Envision your business value. One of the Fatal mistakes that seniors may commit is the failure to understand the capabilities of their organizations, that false expectation can lead to misjudgments. Accordingly, seniors should take the time to digest what modern AI can achieve.

Share your vision for AI transformation. Seniors should link the organizations' vision to the achievable team and individual goals to keep the AI a part and parcel of the day-to-day tasks. In this regard, seniors should plan well for their organization's future and motivate their employees, aiming at making the best out of their performance. So, it is a collective, rather than an individual, mission to feed into the AI organization to achieve its goals.

Change the employees' mindset. At this step, the organization wins the support of employees for the AI transformation by changing their mindset. With the new AI-oriented mindset, employees are encouraged to learn related competencies, develop critical thinking skills, master AI tools and, in return, become part of the AI transformation journey and success.

9.2 Think (Plan AI Transformation Strategy)

Charter AI specialist. Here, the basic task of the AI specialist is to transform human intelligence into the software so that computers can simulate it in solving problems and making decisions. He/she also designs AI training programs, specifies the required infrastructure, estimates the cost of transformation, and assures quality.

Analyze your situation (SWOT). SWOT Analysis is a suitable methodology to analyze the capabilities of the organization and the external factors which affect its performance. It also sets up an effective strategy for the future. In addition, it supports seniors to rapidly collect and process data, and it provides new opportunities to transform the way businesses are performing. Thus, implementing AI in organizations urges finding patterns and drawing perceptions from the actionable data, aiming at making better decisions.

Catch the gap. Based on the SWOT analysis results, the gap between the status quo and the desired situation becomes clear. That is, the infrastructure, structural changes, processes, competencies and capabilities required for successful digital

transformation need to be clearly defined so that the organization can fulfill these requirements to build internal capability for AI implementation.

Design AI transformation strategy. Utilizing the outputs of the SWOT analysis, it is time to build the transformation strategy through establishing strategic goals and action plans leading to successful transformation. The strategy is intended to guide employees, create a sense of collective focus and responsibility among them, and raise their awareness toward the envisioned AI outcomes.

Allocate resources. To ensure appropriate digital transformation toward AI, the needed resources should be adequately allocated. These resources include AI infrastructure, financial capability, competent personnel, and a supportive AI-driven organizational culture.

9.3 Act (Implement AI Transformation Strategy)

Build employee trust: AI enhances the employee role. AI technology is envisioned to work in synergy with human capital instead of replacing their role. To build trust, the adoption of AI should be marketed as a process that comes in the interest of both organizations and employees. Yet, organizations have the responsibility of easing the worries of employees and putting them on the new track rather than getting rid of them. In this sense, career mapping, training, and advocacy, among others, are perfect strategies to ensure employees' trust during the journey of digital transformation.

Prepare the data. Organizations should collect and store their data in suitable form for future utilization. In order to obtain high-quality data, the data should be cleaned. Different data sets can be integrated together for training effective and accurate machine learning models.

Start lean (with small data). Once you start you have to be lean, build a small system in a short time with the least effort using small data sets. Then you should measure the outcomes in order to ensure the intended outcomes with optimal efficiency.

Build your data masses (to build more accurate AI models). Data storage should be included in the AI transformation plan to store huge volumes of data in order to build more effective and accurate models. Fast and appropriate storage should be considered at the start of Designing AI systems.

Build AI system (apply AI tools on data masses). The functions and the various data types of the AI system should be clearly defined to achieve the intended goals of the organization. For this purpose, the organization needs to build the needed infrastructure including Graphical Processing Units, networks, and security systems.

Monitoring and Evaluation (**AI system and strategy**). As the model is recurring in nature, all the activities of the strategy as well as the AI system should be continuously tracked, monitored, and evaluated throughout the three main steps of the SHAM Model to ensure relevance, efficiency, effectiveness, impact, and sustainability.

10 Conclusion

This chapter looks at the benefits organizations can gain from AI. Particularly, the emphasis is placed on utilizing AI as a tool to augment BI. AI is seen to play a pivotal role in such central areas as process innovation, production and manufacturing, supply chain management, marketing, corporate finance, and HR management. Given this fact, the major contribution of this chapter is the introduction of an AI business model adapted from the robotics model 'Sense-Think-Act' as a tool to empower organizations to be responsive to an ever-changing environment in the most effective and efficient way. The ultimate lesson learned, in the context, is that AI is a determinant factor of successful digital organizational transformation through applying the sense-think-act model.

The major contribution is probably the introduction of an effective AI model for digital organizational transformation which empowers organizations to act effectively in an ever-changing environment to achieve competitive advantage and success. The proposed model was inspired by the working principles of robotics, following three sequential steps: Sense, Think, and Act. The Sense step enables seniors to recognize the risks that threaten the performance of the organization. As such, they have to envision a new business value, create and share a vision for transformation, and finally change the employee mindset to get collective support for the desired direction. Whereas the Think step guides the organization to charter an AI specialist to lead the SWOT analysis to catch the gap between the status quo and the desired end. The specialist, in return, helps the organizations to design an AI transformation strategy to guide the transformation into a smart organization. At this stage, the organization conceptualizes the resources needed to go through the transformation journey and to ensure readiness to the Act step. The Act step starts with building employee trust by confirming that AI enhances their role rather than substituting them. Having ensured employee trust, it is now appropriate to work on data by creating the data masses, developing a more accurate data model, building the AI system through applying the AI tools on the data masses, and finally monitoring and evaluating the AI system and strategy for further improvement. The key gain of the model is enhancing the capability of business organizations to utilize AI for their interest by institutionalizing their digital transformation to become more effective and smarter.

10.1 Implications for Future Research

Upon reviewing the related literature, it was noticed that a lot of employees and workers in business organizations have serious concerns with implementing AI in their organizations. This is due to the lack of solid evidence that AI systems support humans rather than substituting them. Therefore, further research is recommended to investigate the socio-economic impact of applying AI systems in business organizations. Moreover, there is a need to empirically investigate the utility of AI systems in specific business cases within emerging economies.

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The Dynamic Capital Structure Decision of Firms in Indonesia



Razali Haron, Naji Mansour Nomran, and Anwar Hasan Abdullah Othman

Abstract This study examines the impact of firm specific factors and ownership and the governing theories on the capital structure (CS) decision of firms in Indonesia. To meet its objective, a dynamic GMM-System is employed utilizing a panel data from 2004 to 2018. The study concludes that growing firms and firms operating in a highly concentrated industry consume high debt to benefit from interest tax shield. Conversely, firms operating in a highly dynamic environment consume less debt as to elude bankruptcy risk. This study suggests that Indonesian firms choose debt financing possibly to act as a controlling mechanism to mitigate agency conflicts that may exist between the controlling and minority shareholders. Long established and profitable firms with high tangible and intangible assets and high liquidity operating in a high dynamic environment follow the POT. The insights on the influence of ownership concentration and industry characteristics on CS decision are novel specifically on Indonesia thus contribute to the corporate finance literature.

Keywords Capital structure \cdot Emerging market \cdot Ownership \cdot Thin capitalization \cdot Indonesia

1 Introduction

Capital structure (CS) is undoubtedly a crucial element in the operation of a firm which aims primarily at reducing cost of capital as well as achieving maximum firm value (Musallam, 2020; Utami et al., 2021) and serve as strong pillars that lend competitive advantage to a firm (Ramli et al., 2019). Recognized as an important subject matter of discussion due to its significant influence over value of firm, CS

R. Haron (🖂) · A. H. A. Othman

IIUM Institute of Islamic Banking and Finance, International Islamic University Malaysia, Gombak, Malaysia e-mail: hrazali@iium.edu.my

N. M. Nomran Department of Finance and Accounting, College of Business Administration, Kingdom University, Riffa, Bahrain

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has been a highly debated issue in the corporate finance literature, both for the developed as well as the emerging markets (Haron, 2016; Ramli et al., 2019; Utami et al., 2021).

In the past few decades, researchers start to examine whether the emerging and developed market landscapes share similar atmosphere and influencing factors in their CS decision or are totally different due to different institutional and country specific factors as well as its individual corporate governance (CG) system (Muchtar et al., 2018). Reacting to this, this study gives a particular attention to the developing market, particularly in the Southeast Asia region. History sees these markets been severely affected by the 1997 Asian financial crisis, due to, as commonly reported, the mismanagement of the CG system (Brahmana et al., 2019). Realizing this fact, there has been an urgent call for a comprehensive review and a post mortem on the CG system then to restructure the governance system and to look closely at each of its mechanism. Researchers and policy makers then agreed that one of the main mechanisms contributing to sound and effective CG is the ownership structure, thus this aspect needs to be scrutinized and studied even further (Musallam, 2020; Utama et al., 2017). Claessens et al. (2002), Utama et al. (2017), Brahmana et al. (2019) and Musallam (2020) assert that the East Asian markets including Indonesia popularly known to be highly concentrated in ownership structure and mostly are family-owned. This kind of environment can easily trigger agency problems between the majority and minority shareholders thus may have certain effect on the CS decisions of the firms (Alareeni, 2018a, 2018b; El-Halaby et al., 2018; Linda et al., 2018; Nassar, 2018; Salman & Laouisset, 2020; Utama et al., 2017).

With respect to the above background, this study sets four distinctive objectives. First is to examine the impact of firm factors on the dynamic CS decisions of firms using a dynamic model (Generalized Method of Moments-GMM). This study focuses on an emerging market of Indonesia, being the biggest economy in Southeast Asia region (Soetanto & Liem, 2019) and the second biggest emerging economy behind China (Brahmana et al., 2019). The current study utilizes a set of longitudinal data from 2004 to 2018, 15 years study period involving 400 firms. Second is to examine the impact of industry characteristics on the CS decision of firms in Indonesia covering industry dynamism, munificence and concentration. Thirdly, acknowledging the argument in previous findings that ownership structure is a crucial mechanism in CG, this study intends to examine how ownership structure influences the CS decisions of firms in Indonesia as well. Indonesian firms are characterized with high ownership concentration and family control (Brahmana et al., 2019; Claessens et al., 2002; Musallam, 2020; Utama et al., 2017), weak legal system and investor protection, and weak disclosure requirements (Brahmana et al., 2019; Carney & Hart, 2015; Claessens & Fan, 2002; La Porta et al., 1999). Indonesia's capital market is thus a perfect setting to explore further the impact of ownership on firm CS. Fourthly, this study then concludes its finding by analysing and identifying the governing CS theories to explain the behaviour of firms' CS. These four objectives highlight the significance of this study comparative to others as it tackles four important aspects in a CS study using an emerging market background. It offers policy implications to take into account when choosing, deciding and implementing effective CS decision not just for emerging market but also other markets as well.

The following section of this study begins with the related theories and past studies on CS and a brief explanation of the factors influencing CS with the development of hypotheses. Next follows by the data and methodology. The fourth section explains the analysis of the findings and the discussion of the results. The last section concludes the study.

2 Literature Review

Modigliani and Miller (MM) (1958) first initiated the study of CS, eventually known as the MM irrelevance theory. The theory argues that in an efficient (perfect market), CS is irrelevant to firm value and firms should be indifferent in selecting either debt (equity) financing. This proposition triggers various streams of CS studies contending the irrelevance theory of being unrealistic as in reality there is a presence of taxes in the capital market. Acknowledging the argument, MM then modify their theory to include tax in their 1963 study and interestingly report that the existence of tax shield on debt has important impact on firm value. The findings reveal that when there is tax in the corporate income and interest from debts are tax deductible, higher firm value is more achievable using debt financing comparative to issuing equity. This means that highly leveraged firms are more valued because of the interest tax shield. Following this, firms rely heavily on debt financing as interest tax shield can minimize the amount of tax burden. In order to utilize the interest tax shield that comes with debt financing, firms come up with a tax planning strategy, known as thin capitalization. OECD (2018) defines thin capitalization as a firm's strategy to structure their financing with comparatively high debt rather than equity as to reap the tax shield. This phenomenon definitely affects CS decision of firms. However, thin capitalization impacts government revenue significantly as the government spending relies on its revenue via tax regime. Therefore, the government introduces thin capitalization rules to limit the thin capitalization activity (Pratama, 2017).

As for Indonesia, the country first issues its thin capitalization rules in 1984. However, after six months of implementation the Ministry has decided to postpone its implementation due to its threat to investment growth of the country. In 2015, after 30 years of postponement, the thin capitalization rules are reintroduced with several new guidelines and definitions of debt and equity. The new rules are effective in the 2016 fiscal year (Pratama, 2017).

Following the inclusion of tax in the work of MM (1963), the body of knowledge later introduces new CS theories to elucidate further the behaviour of CS across firms and countries. The Trade-off Theory (TOT) explains on the trade-off between the advantages of debt (tax shield) against the cost of bankruptcy. The Pecking Order Theory (POT) is in favour of the use of internal against external financing (Myers & Majluf, 1984).

The Agency Theory (AT) on the other hand, looks at the mitigation of agency conflicts, conflicts that occur between the shareholders and managers. Jensen and Meckling (1976) translate alleviating the cost arising from such conflicts into achieving an optimal CS. Mitigating agency conflicts requires sound and effective CG system. Ownership structure being one of the crucial mechanisms in effective CS system can mitigate agency conflicts between shareholders-managers. In a high ownership structure like Indonesia, wealth expropriation can occur where the controlling shareholder, being the largest party has the advantage and bigger opportunity to expropriate the wealth of a firm from the minority shareholders (Brahmana et al., 2019). According to the AT, the conflicts between the majority and minority shareholders may occur since the majority shareholder, being the controlling party has the privilege and advantage to enjoy substantial private benefit relative to the minority shareholders. La Porta et al. (1999) and Brahmana et al. (2019) highlight this notion further by claiming that a firm with highly concentrated ownership operating in emerging market with weak protection for minority shareholders is more vulnerable to agency problems.

2.1 Past Studies on Indonesia

History witnesses Indonesia undergoing numerous significant improvements in its financial system due to its financial market activities then were gloomy with massive flaws in the firm's choices of financing. State-owned banks were seen monopolizing the financing and over shadowing the equity and debt market (Moosa & Li, 2012; Musallam, 2020). The gloomy atmosphere in the financial market then forces responsible parties to come out with robust financial transformations. Following this, capital-raising exercises by firms became active in the equity market and banks becoming more efficient (Musallam, 2020). After undergoing significant reformations, Indonesia average real GDP is forecasted to grow at 5.5% per year (2016–2022), higher than the average real GDP of 5.2% among the ASEAN countries and continue to remain the biggest economy in the Southeast Asia region (OECD, 2018).

Several empirical and survey studies on Indonesia provide interesting findings in the literature of CS. Ang et al. (1997) document good access of financing for firms in Indonesia based on their survey on the CEOs of 180 firms listed on the Indonesia Stock Exchange (IDX) regarding dividend policy. The good access according to them is due to a reasonable interest rate and not because of information asymmetry, indicating no POT influence in this aspect. Another study that does not provide evidence of POT influence in the firms' CS in Indonesia is by Ruslim (2009). He finds that profitability which is a stylized empirical fact representing the influence of POT has nevertheless no significant effect on the CS of 18 firms in Indonesia within the period from 2000 to 2006. Bunkanwanicha et al. (2008) on the other hand, include CG structure in their study and report a high consumption of debt among firms in Indonesia with weak CG mechanism especially during the financial turmoil. The effects of some firm factors on CS may not support the stylized empirical facts documented in the literature as revealed by Moosa and Li (2012). Their study on 162 listed firms extracted from the 2009 annual reports reveals that not all-important factors in previous studies are important after all as in the case of Indonesia. Instead, they reveal only liquidity shows significant influence on CS. They argue that mixed result reported in the literature is perhaps due to the different models used in the various studies. They also report that the financial reformation have made positive impacts on the financial market and eliminated all inefficiencies during the dominance of state-owned banks in Indonesia.

Using common important factors in the study of CS, Saadah and Pariji (2012) discover significant influence of TOT and POT in the CS decisions of 53 manufacturing firms from 2001 to 2008. This lends support to Myers (2003) that a combination of theories will better explain the CS behaviour in any market settings. Hardiyanto et al. (2014) conclude firms in Indonesia strive for target CS and maintain certain debt ratio to ensure high firm value based on 228 firms from 2005 to 2011. They argue that certain firm factors have important influence on leverage (CS) thus in order to maintain the target leverage, managers must be aware of the cost on the CS adjustment.

Ramli et al. (2019) report significant influence of several factors on the CS decision of 90 Indonesian firms from 1990 to 2010, while Haron (2016) reports on the CS decisions of 365 firms from 2000 to 2011, and Haron and Adeyemi (2016) on a smaller sample size of 290 listed firms from 2000 to 2014. They conclude that POT seems to play substantial role in explaining the CS decisions of firms in Indonesia.

Nevertheless, most of these studies reviewed above are not fit to represent the general idea of the behaviour of CS of the firms in the country, partly due to small sample firms adopted by researchers and not controlling for endogeneity. For instance, Ruslim (2009) uses only 18 firms in his study and Moosa and Li (2012) takes only cross sectional data in the year 2009 to conclude on the CS of the firms. A recent study by Ramli et al. (2019) only cover 90 firms for a study period 1990–2010 while Utami et al. (2021) studied 154 manufacturing firms from 2010 to 2018, and both are not addressing endogeneity problems, despite endogeneity being a major concern in panel data (Musallam, 2020; Soetanto & Liem, 2019). Responding to these limitations, this study examines a wider span of study period from 2004 to 2018 and uses 400 firms as sample. In addition, this study also incorporates ownership structure, which is commonly ignored by past studies on the CS of Indonesian firms, perhaps due to the non-availability of such data on the on-line database.

Literature sees firms with highly concentrated ownership in Indonesia often face agency problems between the majority and minority shareholders (see, eg., Brahmana et al., 2019; Carney & Hart, 2015; Driffield et al., 2007; Musallam, 2020; Siregar & Utama, 2008; Utama et al., 2017). Referring closely with the findings from related studies and the manually collected data from firms' annual reports throughout the study period, this study explores further the influence of ownership structure (concentrated ownership) on the CS of firms in Indonesia. The findings from this study will be of useful reference to other countries which share similar ownership landscape especially among the emerging market thus enriches the literature.

3 Factors Affecting Capital Structure and Development of Hypotheses

This study incorporates firm and industry level factors together with ownership structure to understand further the CS of firms in Indonesia.

3.1 Non Debt Tax Shield (NDTS)

Utami et al. (2021) assert that NDTS should be negatively related with leverage (LEV) as NDTS is the alternative to tax shields in debt financing, in support of Frank and Goyal (2009). Annual depreciation expenses to total asset (Frank & Goyal, 2009) represent NDTS. The hypothesis is that, H_1 : NDTS is negatively associated to CS.

3.2 Size of Firm

Large firms are less affected by information asymmetry problem thus are expected to take more debt. Further, large firms are also more diversified thus less tendency to default. This infers a positive relationship with LEV, supporting TOT (Ramli et al., 2019; Utami et al., 2021). Haron (2016) nevertheless report a significant negative association between size and LEV for Indonesian firms. Log of total asset represents firm size (Haron, 2014; Musallam, 2020). The hypothesis is, H_2 : Firm size is positively associated to CS.

3.3 Business Risk

Firms' business risk relates to earnings volatility and higher earnings volatility may increase the default risk on debt payments (Utami et al., 2021). Hence, debt financing is not an option indicating a negative association with LEV (Haron, 2016; Ramli et al., 2019; Utami et al., 2021). Equity issuance therefore is more preferred for business expansion by firms with high risk. Yearly change in the firm EBIT represents business risk (Haron, 2016; Utami et al., 2021). The hypothesis is, H₃: Business risk is negatively associated to CS.

3.4 Tangibility

A positive association is expected between tangible assets and LEV as firms with high tangible assets are seen as less risky to lenders (TOT) (Moosa & Li, 2012; Ramli et al., 2019). Utami et al. (2021) claim that tangible assets are used to back long-term debt, hence positive effect of tangibility on LEV. POT however explains that high tangible asset firms depend on internal funds that can be generated from these assets, hence a negative relationship with LEV (Haron, 2016; Qamar et al., 2016). Net fixed asset over total asset represents tangible asset (Haron, 2016; Utami et al., 2021). The hypothesis is, H₄: Tangibility is positively associated to CS.

3.5 Liquidity

A liquid firm usually enjoys substantial internal funds thus does not rely on debt financing as they can opt to their huge retained earnings to fund their operations and investments, following POT, hence a negative association with LEV. Current asset to current liabilities represents liquidity (Moosa & Li, 2012; Utami et al., 2021). The hypothesis is, H_5 : Firm liquidity is negatively associated to CS.

3.6 Profitability

Highly profitable firms prefer internal financing, being the cheapest funds compared to external financing (Myers & Majluf, 1984). Profitability is anticipated to affect LEV negatively as explained by POT (Haron, 2016; Rajan & Zingales, 1995). EBIT over total asset represents profitability (Alareeni & Hamdan, 2020; Alareeni, 2018a, 2018b; Bunkanwanicha et al., 2008; Haron, 2016). Hence, H₆: Profitability is negatively associated to CS.

3.7 Intangibility

According to Rajan and Zingales (1995) and Haron (2016), intangible assets (such as copyrights, goodwill, R&D costs) influence firms' CS. POT predicts that high intangible asset firms face higher asymmetric information problems, hence rely more on debt to mitigate the problems. This infers a positive association (Lim et al., 2020). TOT and AT however suggest a negative relationship between intangible assets and LEV. Intangible asset to total asset represents intangibility (Haron, 2016; Lim et al., 2020). Thus, H₇: Intangibility is positively associated to CS.

3.8 Growth

High growth firms need substantial funds to grow. According to AT, equity issuance will be the preferred choice of financing to convey signals to investors that underinvestment and asset substitution are not of concerns. The investors will not hesitate to invest leading to greater expansion to the firm, hence suggesting a negative relationship with LEV. In line with AT, POT also suggests a negative association with LEV as high growth firms have huge retained earnings. Growing firms with huge retained earnings comparative to its investments and growth expenses will consequently reduce its debt ratio (Myers & Majluf, 1984; Utami et al., 2021). Equity (market value) over equity (book value) represents growth (Rajan & Zingales, 1995; Utami et al., 2021). Hence, H_8 : Firm growth is negatively associated to CS.

3.9 Age

Long established (aged) firms normally have accumulated huge funds over the years thus less needs for debt financing either long or short-term debt. Aged firms usually have longer and impressive records, which is translated into higher reputational value. Long established firm is expected to consume less LEV (Musallam, 2020; Utami et al., 2021). Conversely, new and young firms may not accumulate enough funds thus may rely on debt for expansion. Years of listing represents firm age (Haron, 2016; Musallam, 2020; Utami et al., 2021). Hence, H₉: Firm age is negatively associated to CS.

3.10 Share Price Performance (SPP)

According to the market timing theory, firm will issue equities when equity price is high, and issue debt if otherwise. Setyawan and Budi (2012) and Haron (2016) record a negative association between SPP and LEV. Yearly change (year-end share price) represents SPP, following Haron (2016). Therefore, H_{10} : SPP is negatively associated to CS.

3.11 Concentrated Ownership (COwn)

In a highly concentrated ownership (COwn) firm, large shareholders (controlling shareholder) have the function to monitor and control managers' actions, and the firm may use debt as a controlling mechanism to control managers (Musallam, 2020).

Furthermore, controlling shareholders prefer debt to equity to evade ownership dilution to ensure control of the firm. Controlling shareholder may also manipulate the use of debt and adopt thin capitalization concept as to reap the interest tax shield from debt (Pratama, 2017). All these suggest a positive association between COwn and LEV (Cespedes et al., 2010; Pratama, 2017).

Contrastingly, COwn can act as disciplinary tool to monitor management activities, as it is much cheaper comparative to using debt (Jensen & Meckling, 1976). A negative association hence can be expected between COwn and LEV. Shareholding greater than 5 per cent represents COwn following Siregar and Utama (2008) and Utama et al. (2017). Hence, H_{11} : Concentrated ownership is positively associated to CS.

3.12 Industry Munificence

According to Kayo and Kimura (2011), munificence refers to the environment of the industry that can sustain a firm in the long-run. A firm operating in a high munificence industry has abundant resources but low competition, therefore reaping high profit. Kayo and Kimura (2011) suggest a negative association between munificence and leverage (POT). To measure munificence, following Kayo and Kimura (2011) and Haron and Adeyemi (2016), we first regress time against sales of an industry (over the 5 years period under analysis) to produce the beta coefficient and second, taking the ratio of the beta coefficient to the mean sales over the same period. Therefore, H_{12} : Industry munificence is negatively associated to CS.

3.13 Industry Dynamism

Haron and Adeyemi (2016) describe industry dynamism as risk since it reveals the magnitude of instability of a particular industry. According to TOT prediction, firms operating in an unstable industry environment would consume a very minimum debt. The more dynamic the industry, the more risky the industry is, hence the lower the debt engagement of the firm. Kayo and Kimura (2011) report a negative association between industry dynamism and LEV. To measure industry dynamism, following (Haron & Adeyemi, 2016; Kayo & Kimura, 2011), we divide the standard error of the munificence regression with the mean sales over the same period. Hence H_{13} : Industry dynamism is negatively associated to CS.

3.14 Industry Concentration

The Herfindahl–Hirshman Index (HHI) can measure the degree of industry concentration. MacKay and Phillips (2005) explain that the higher the HHI, the higher the risk since the industry is less diversified, and the higher the debt consumption (TOT). In contrast, Kayo and Kimura (2011) find a negative association between HHI and LEV, implying firm in a highly concentrated industry does not employ high debt as it may be exposed to high default risk. Following (Haron & Adeyemi, 2016; Kayo & Kimura, 2011; Wang et al., 2018), HHI is measured according to the sum of squares of yearly sales within a specific industry. H_{14} : Industry concentration (HHI) is significantly associated to CS.

4 Data and Methodology

4.1 Data

This study uses unbalanced data of 400 non-financial firms of IDX for 2004 to 2018. Firm data is sourced from the Datastream, while data on ownership is collected manually from firms' annual reports. The 400 sample firms constitute 78% from 515 non-financial firms (as at December 2018) and this percentage is sufficient for generalization. The firms are from various industries (trade and services, industrial, infrastructure and utilities, consumer products, properties, mining, agriculture). The sample firms are detailed in Table 1.

Industry	No. of firms	%
Trade and services	121	30.25
Industrial	63	15.75
Infrastructure and utilities	50	12.50
Consumer products	45	11.25
Properties	55	13.75
Mining	38	9.50
Agriculture	28	7.00
Total	400	100

Note Industry classification is according to IDX listing (http://www.idx.co.id/)

4.2 Methodology

Leverage represents capital structure, equals to total debt to total asset $\left(\frac{TD}{TA}\right)$ and short term debt to total asset $\left(\frac{STD}{TA}\right)$ (Haron, 2016; Utami et al., 2021). A dynamic panel regression (GMM) is employed to estimate the association between firm factors and LEV. GMM is commonly used to control for endogeneity problem (Brahmana et al., 2019; Soetanto & Liem, 2019), as well as to cater for the dynamic nature of the CS study (Haron, 2016; Muchtar et al., 2018). Further, GMM estimator is most suitable when independent variables are known to be not strictly exogenous, there is a presence of individual fixed effects, heteroscedasticity and serial correlation (Alahdal et al., 2020; Brahmana et al., 2019; Soetanto & Liem, 2019). The leverage function is specified as:

$$Lev_{it} = \alpha + Lev_{it(-1)} + \beta_1 NDTS_{it} + \beta_2 SIZE_{it} + \beta_3 RISK_{it} + \beta_4 TANG_{it} + \beta_5 LIQ_{it} + \beta_6 PROF_{it} + \beta_7 INTANG_{it} + \beta_8 GROW_{it} + \beta_9 AGE_{it} + \beta_{10} SPP_{it} + \beta_{11} OWN_{it} + \beta_{12} MUN_t + \beta_{13} DYN_t + \beta_{14} HHI_t + \varepsilon_{it}$$
(1)

where Lev_{it} ($\frac{TD}{TA}$ and $\frac{STD}{TA}$) is the leverage of firm (*i* at time *t*). Firm factors comprise of NDTS (non-debt tax shield), *SIZE* (size), *RISK* (business risk), *TANG* (tangible asset), *LIQ* (liquidity), *PROF* (profitability), *INTANG* (intangible asset), *GROW* (growth), *AGE* (age), *SPP*(share price performance), *OWN*(ownership concentration), *MUN* (industry munificence), *DYN* (industry dynamism), *HHI* (industry concentration), ε_{it} is the error term.

From (Eq. 1), this study performs four regression models (System-GMM) with LEV definitions of $\frac{TD}{TA}$ and $\frac{STD}{TA}$ i.e. Model (1A), (1B), (1C) and (1D). Model (1A): incorporates all the 14 independent variables as in (Eq. 1); Model (1B): includes all the 14 independent variables, controlling for the 2007/2008 financial crisis; Model (1C): incorporates all the 14 independent variables, controlling for the 2007/2008 financial crisis and sub-sectors; Model (1D): includes 11 of the independent variables, controlling for 2007/2008 financial crisis and sub-sectors (the last three related industry variables were removed¹). Following Saghi-Zedek and Tarazi (2015), the period of analysis (2004-2018) is divided according to (prior to the crisis: 2004-2006), (during the crisis: 2007–2008); (post crisis: 2009–2018). Only during and post crisis periods (2 dummies) were included in the related models while the period prior to the crisis is considered as the base period (see, e.g., Cordazzo et al., 2017). Similarly, six sector dummies for the seven sub-sectors (trade and services, industrial, infrastructure and utilities, consumer products, properties, mining, agriculture) are used to control for sector-specific effects (see, e.g. Haron, 2016). Leverage (-1), NDTS, Size, Risk, Tangibility, Liquidity, Profitability and Growth are treated as endogenous following the literature (see, e.g., Getzmann et al., 2010).

¹ The three industry variables were removed to ensure that the findings are robust by removing any similar related explanatory variables with controlling variables.

	NDTS	Size	Risk	Tangible	Liquidity	Pro	ofit	Intan	gible
NDTS	1								
Size	-0.0751	1							
Risk	-0.0337	-0.0122	1						
Tangible	0.2913	0.1736	-0.0438	1					
Liquidity	-0.0773	-0.0699	0.0582	-0.1336	1				
Profit	-0.5696	0.0918	0.002	0.0232	0.0029	1			
Intangible	-0.062	0.1576	-0.0059	-0.1111	-0.0068	0.0	007	1	
Growth	-0.0027	0.1284	-0.0043	0.0102	-0.0146	0.0	0232	0.028	87
Age	0.0192	0.0295	0.0209	-0.0448	0.0138	-0	0.0042	-0.1	177
SPP	0.0044	0.049	-0.0013	-0.0257	-0.0025	0.0	0115	-0.0	004
Ownership	-0.0697	-0.0211	0.0354	-0.006	0.0628	0.0	307	0.009	93
Munificence	0.0437	-0.0022	0.0103	-0.0396	0.0016	-0	0.0322	0.003	30
Dynamism	-0.0344	0.0243	-0.0164	-0.0106	-0.0218	-0	0.0114	-0.0	346
HHI	0.0656	0.0421	-0.0053	0.1434	-0.057	0.0)13	-0.0	541
	Growth	Age	SPP	Ownership	Munificer	nce	Dynar	nism	HHI
NDTS									
Size									
Risk									
Tangible									
Liquidity									
Profit									
Intangible									
Growth	1								
Age	0.1821	1							
SPP	0.1451	0.0494	1						
Ownership	0.0976	0.0168	0.0057	1					
Munificence	-0.0312	-0.0909	-0.0123	-0.2292	1				
Dynamism	-0.0533	-0.0231	0.035	0.0027	0.1747		1		

 Table 2
 Correlation matrix between independent variables

The standard diagnostic tests are performed to confirm the efficiency of GMM (see, eg., Alahdal et al., 2020; Nomran & Haron, 2019; Soetanto & Liem, 2019) i.e. second order serial correlation AR(2) test and Hansen-test. Estimates generated from GMM are only efficient if no second order serial correlation is present in the residuals and instrument variables are valid (Alahdal et al., 2020; Brahmana et al., 2019; Soetanto & Liem, 2019). Multicollinearity problem among independent variables is tested by performing the correlation matrix. The highest correlation (NDTS and

Variable	Mean	Max	Min	Median	SD
TD/TA	0.3892	0.9110	0.0988	0.3456	0.1983
STD/TA	0.2883	0.8530	0.0988	0.2323	0.1824
NDTS	0.0420	0.6225	0.0000	0.0434	0.0425
Firm size	13.2288	18.9870	4.1408	12.7266	1.8824
Risk	-0.0782	29.6000	-28.8822	-0.0456	3.0704
Tangible	0.4124	0.9688	0.0000	0.3812	0.2795
Liquid	2.1986	31.6898	0.1235	1.5290	2.7267
Profit	0.0887	2.9230	-2.9878	0.0745	0.1987
Intangible	0.0201	0.9765	0.0000	0.0000	0.0832
Growth	8.5780	96.4890	0.7233	2.9821	14.3568
Age	19.6810	42.0000	3.0000	18.0000	8.1021
SPP	0.0166	2.9829	-4.9001	0.0080	0.2156
Ownership	0.4886	1.0000	0.0000	0.5800	0.3482
Munificence	0.1688	0.4280	0.0072	0.1632	0.0880
Dynamism	0.0690	0.1621	0.0092	0.0528	0.0428
HHI	0.1532	0.4968	0.0476	0.1022	0.1159

Table 3Descriptive statistics

Profitability) is only -0.5696 as shown in Table 2, hence there is no concern on multicollinearity in the dataset (Soetanto & Liem, 2019).

5 Analysis and Findings

5.1 Descriptive Statistics

Based on Table 3, firms employ LEV of 0.3892 and 0.2883 for $\frac{TD}{TA}$ and $\frac{STD}{TA}$, respectively on average. 48.86% of ownership concentration (COwn) exceeds 5% shareholding (max and min of 100% and 0, respectively). This provides evidence on the highly concentrated ownership among firms in Indonesia, supporting Utama et al. (2017) and Musallam (2020).

5.2 Determinants of Leverage

Bases on Table 5, first, the current CS of Indonesian firms is affected by the previous year CS position (p < 0.05 for all models), confirming the dynamic nature of CS in Indonesian firms. Second, nine factors are found to significantly influence

Table 5 Determinants of leverage: one-step robust system-GMM estimation results	f leverage: one-s	tep robust syster	n-GMM estimati	on results				
Model	1A		1B		1C		1D	
Variable	TD/TA	STD/TA	TD/TA	STD/TA	TD/TA	STD/TA	TD/TA	STD/TA
Constant	0.478** (0.047)	0.094 (0.482)	0.394* (0.060)	0.083 (0.512)	0.367* (0.083)	-0.001 (0.995)	0.392* (0.082)	0.103 (0.507)
TD/TA (-1)	0.495** (0.035)	1	0.507** (0.033)	1	0.512** (0.034)	1	0.526** (0.026)	1
STD/TA (-1)	I	0.574** (0.022)	1	0.565** (0.027)	1	0.587** (0.025)	1	0.641^{**} (0.021)
NDTS	-0.564 (0.574)	0.739 (0.250)	-0.405 (0.696)	0.667 (0.308)	-0.600 (0.578)	0.666 (0.291)	-0.568 (0.601)	0.643 (0.326)
Size	-0.007 (0.606)	0.007 (0.475)	-0.005 (0.730)	0.008 (0.369)	-0.001 (0.957)	0.011 (0.233)	-0.003 (0.849)	0.006 (0.510)
Risk	0.000 (0.606)	0.001 (0.327)	0.000 (0.455)	0.000 (0.385)	0.000 (0.716)	0.000 (0.388)	0.000 (0.701)	0.001 (0.204)
Tangible	-0.317^{**} (0.037)	-0.291^{*} (0.053)	-0.284^{**} (0.034)	-0.294^{*} (0.051)	-0.345^{**} (0.031)	-0.315^{**} (0.048)	-0.298^{**} (0.046)	-0.291^{**} (0.045)
Liquid	-0.001^{**} (0.033)	-0.001^{**} (0.042)	-0.001^{**} (0.027)	-0.001^{**} (0.039)	-0.001^{**} (0.029)	-0.001^{**} (0.039)	-0.001^{**} (0.034)	-0.001^{**} (0.045)
Profit	-0.438*** (0.000)	-0.437^{***} (0.000)	-0.427*** (0.000)	-0.441^{***} (0.000)	-0.448^{***} (0.000)	-0.447*** (0.000)	-0.430^{***} (0.000)	-0.441^{***} (0.000)
Intangible	-0.271^{**} (0.031)	-0.209*** (0.009)	-0.226^{**} (0.045)	-0.210^{***} (0.008)	-0.347^{**} (0.022)	-0.248^{***} (0.008)	-0.308** (0.027)	-0.229^{***} (0.006)
Growth	0.001** (0.024)	0.001* (0.050)	0.001* (0.070)	0.001* (0.061)	0.001* (0.075)	0.001* (0.097)	0.001^{*} (0.071)	0.001^{*} (0.053)
								(continued)

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Table 5 (continued)								
Model	1A		1B		1C		1D	
Age	-0.005^{**} (0.045)	-0.001 (0.636)	-0.003 (0.244)	-0.001 (0.736)	-0.005^{*} (0.088)	-0.000 (0.948)	-0.002 (0.359)	0.000 (0.916)
SPP	-0.016 (0.150)	0.016 (0.456)	-0.011 (0.340)	0.016 (0.458)	-0.005 (0.665)	0.017 (0.436)	-0.012 (0.250)	0.019 (0.372)
Ownership	0.016 (0.333)	0.026** (0.048)	0.037^{**} (0.031)	0.031^{**} (0.034)	0.033* (0.062)	0.033^{**} (0.034)	0.032* (0.075)	0.025^{*} (0.074)
Munificence	-0.108 (0.440)	-0.053 (0.458)	-0.120 (0.337)	-0.055 (0.452)	-0.145 (0.297)	-0.064 (0.487)	No	No
Dynamism	-0.658^{**} (0.030)	-0.324^{*} (0.069)	-0.666^{**} (0.041)	-0.314^{*} (0.090)	-0.809^{**} (0.021)	-0.282 (0.148)	No	No
IHH	0.326* (0.070)	0.230* (0.077)	0.337* (0.074)	0.231* (0.078)	0.398* (0.099)	0.321* (0.090)	No	No
Crisis dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	No	No	No	No	Yes	Yes	Yes	Yes
Hansen test (<i>p</i> -value)	132.790 (0.123)	37.150 (0.173)	135.490 (0.129)	37.460 (0.164)	129.760 (0.149)	37.380 (0.166)	126.210 (0.205)	27.150 (0.564)
AR(1) (<i>p</i> -value)	-1.800^{*} (0.071)	-2.160^{**} (0.030)	-1.810^{*} (0.070)	-2.120^{**} (0.034)	-1.850^{*} (0.064)	-2.170^{**} (0.030)	-1.870^{*} (0.061)	-2.180** (0.029)
AR(2) (<i>p</i> -value)	-0.960 (0.336)	-1.320 (0.187)	-1.040 (0.300)	-1.380 (0.169)	-0.890 (0.373)	-1.330 (0.185)	-1.010 (0.314)	-1.440 (0.150)
No. of instruments	131	46	136	48	139	55	136	51
No. of groups	371	371	371	371	371	371	371	371
No. of observations	2454	2453	2453	2453	2454	2453	2455	2454
<i>Notes</i> Standard coefficients are presented (<i>p</i> -values in parentheses). ***, ** ,* are significant at <1%, 5%, and 10%, respectively; Model (1A): includes all the 14 independent variables, controlling for the 2007/2008 financial crisis; Model (1C): includes	tts are presented in (Eq. 1); Mode	(<i>p</i> -values in par el (1B): includes	rentheses). ***, **, s all the 14 indep	* are significant endent variables,	at <1%, 5%, and controlling for th	10%, respectivel ne 2007/2008 fina	y; Model (1A): in ancial crisis; Mod	are presented (<i>p</i> -values in parentheses). ***, ** are significant at <1%, 5%, and 10%, respectively; Model (1A): includes all the 14 (Eq. 1); Model (1B): includes all the 14 independent variables, controlling for the 2007/2008 financial crisis; Model (1C): includes

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all the 14 independent variables, controlling for the financial crisis & sub-sectors; Model (1D): includes 11 of the independent variables, controlling for the

financial crisis and sub-sectors (the last three related industry variables were removed). Regression output is generated using Stata software v14

LEV throughout the study period (tangible, liquid, profit, intangible, growth, age, ownership, dynamism and industry concentration).

This study finds an inverse association between tangibility and LEV (both $\frac{\text{TD}}{\text{TA}}$ and $\frac{\text{STD}}{\text{TA}}$), consistent for all models, in contrast to the positive relationship as expected in H_4 . Firms in Indonesia with high tangible assets seem to depend on internal funds generated from these tangible assets as explained by POT, hence a negative relationship with LEV (Haron, 2016; Qamar et al., 2016).

Liquidity relates negatively with LEV ($\frac{\text{TD}}{\text{TA}}$ and $\frac{\text{STD}}{\text{TA}}$), consistent for all models, supporting H_5 . Highly liquid firms in Indonesia seem to generate high retained earnings thus reduce their debt engagement. The influence of POT is detected here consistent with Moosa and Li (2012), Haron and Adeyemi (2016) and Utami et al. (2021).

Profitability shows a negative relationship with LEV ($\frac{\text{TD}}{\text{TA}}$ and $\frac{\text{STD}}{\text{TA}}$), consistent for all models, H_6 is thus supported. Implying the existence of POT, highly profitable firms in Indonesia choose retained earnings to finance their investments, supporting Bunkanwanicha et al. (2008), Moosa and Li (2012), Haron and Adeyemi (2016) and Utami et al. (2021). The negative relationship reported reflects the after effect of the financial reformation in Indonesia, which have encouraged firms to turn to retained earnings rather than purely relying on loans from banks for financing.

Intangible asset also shows a negative relationship with LEV ($\frac{\text{TD}}{\text{TA}}$ and $\frac{\text{STD}}{\text{TA}}$), consistent for all models, nevertheless, rejecting H_7 . The negative association is not consistent with past literature especially on the developed market. It is worth noting that intangible assets are not recognized as collateral to secure debt from lenders by the Bank Indonesia (the central bank) (Soewarno and Tjahjadi, 2020). Furthermore, intangible assets are without collateral value if firms face bankruptcy (Myers & Majluf, 1984; Soewarno & Tjahjadi, 2020). The value of these assets is not easy to measure and being so would be difficult to value and anticipate the risk to the bank (Lim et al., 2020). These justify the negative relationship between intangibility and LEV.

Nevertheless, though this result is not in support of the stylized fact of the effect of intangible asset on CS, it is worth noting that intangibility should be recognized as collateral since intangible asset such as goodwill helps to increase firms' access to debt (Lim et al., 2020). Other countries sharing similar economic landscape could consider this finding in devising their policy.

Growth shows a positive relationship with LEV ($\frac{\text{TD}}{\text{TA}}$ and $\frac{\text{STD}}{\text{TA}}$), consistent for all models, in contrast to H_8 (negative relationship). Explained by AT, rapid growing firms take on more short-term debt to tackle any underinvestment problems (Myers, 2003) thus explains the positive relationship. Growth firms might also prefer debt against equity to take advantage of interest tax shield. This might also reflect the thin capitalization concept discussed earlier. Engaging with higher debt level to benefit from interest tax shield (TOT) may be the tax planning strategy by firms in Indonesia. This is since the government postpones the implementation of thin capitalization rules thus does not limit the amount of the interest tax shield. This positive relationship is also reported in Haron and Adeyemi (2016) and Ramli et al. (2019) on Indonesia.

Long established (aged) firm relates negatively with LEV ($\frac{\text{TD}}{\text{TA}}$), supporting H_9 (Model 1A and 1C). This finding supports the argument that aged firms are able to accumulate huge funds over the years and thus need less debt in their CS. Utami et al. (2021) state that aged firms normally have sufficient retained earnings thus need less debt. The negative relationship between age and LEV reflects the influence of POT in the CS of Indonesian firms.

Concentrated ownership (COwn) positively relate with LEV ($\frac{TD}{TA}$ and $\frac{STD}{TA}$), as evidenced in most of the models, supporting H_{11} , in line with Driffield et al. (2007) and Haron and Adeyemi (2016). The relationship explains the use of debt as disciplinary mechanism by majority shareholders over managers (AT). Such finding may also be due to large controlling shareholders wanting to avoid ownership dilution via equity issuance thus opts for debt consumption instead. This situation could be a good inference to countries having similar ownership structure in modeling their corporate financing. Moreover, again the thin capitalization concept can perhaps be one of the justifications of the positive association. Controlling shareholders are taking advantage of the interest tax shield (TOT) since the implementation of thin capitalization rules are still being put on hold during most of the period understudy thus firms are taking the fullest advantage by engaging maximum debt level.

In term of industry level determinants, dynamism relates negatively with LEV ($\frac{\text{TD}}{\text{TA}}$), as evidenced in most of the models, hence supporting H_{13} . The concept of dynamism is interpreted as risk (Haron & Adeyemi, 2016) is reflected in this finding. Apparently, firms operating in a highly dynamic environment avoid high debt to reduce risk. In addition, based on the TOT prediction, firms operating in an unpredictable industry environment would consume low debt (Kayo & Kimura, 2011). Industry concentration (HHI) is found to positively influenced LEV ($\frac{\text{TD}}{\text{TA}}$ and $\frac{\text{STD}}{\text{TA}}$), consistent for all models, hence supports H_{14} . This finding is in support of MacKay and Phillips (2005) where the higher the HHI, the higher the debt consumption (TOT). In relation to this, IIMA (2018) reports that highly concentrated industry in Indonesia such as mining consumes high LEV since 2010 up to 2018 seems to support this finding.

However, NDTS, size, risk, share price performance and industry munificence have no impact on the CS of Indonesian firms during the period understudy, despite them being recorded as significant factors in previous studies. Table 6 summarizes the findings while Fig. 1 displays the two-quadrant diagram representing high level of determinant and debt.

6 Conclusion

This study investigates the factors affecting CS of Indonesian firms using a dynamic panel model. The results are robust to the different definitions of leverage, heterogeneity, autocorrelation, multicollinearity and endogeneity concern. The study provides evidence that tangibility, liquidity, profitability, intangibility, growth, age

Variable	Hypotheses	(Supported/Not supported)	Finding	Theories	Robustness (STD/TA)
NDTS	H ₁ : -	Yes			
Size	H ₂ : +	No			
Risk	H3: -	No			
Tangible	H ₄ : +	No	Negative	POT	Yes
Liquid	H5: -	Yes	Negative	РОТ	Yes
Profit	H ₆ : -	Yes	Negative	POT	Yes
Intangible	H7: +	No	Negative	TOT/Agency	Yes
Growth	H ₈ : -	No	Positive	TOT/Agency	Yes
Age	H9: -	Yes	Negative	POT	No
SPP	H ₁₀ : -	No			
Ownership	H ₁₁ : +	Yes	Positive	Agency/TOT	Yes
Munificence	H ₁₂ : -	No			
Dynamism	H ₁₃ : -	Yes	Negative	TOT	Yes
HH Index	H ₁₄ : ±	Yes	Positive	ТОТ	Yes

Table 6 Summary of findings

Determinants and Debt

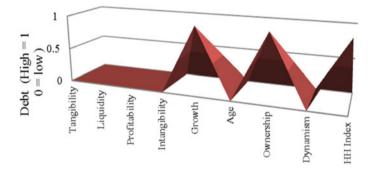


Fig. 1 Two-quadrant (determinants and debt). *Notes* The relationship between high level of determinant and debt e.g., High Tangibility-Low Debt; High Growth-High Debt, etc.

and concentrated ownership significantly affect the CS of firms. Industry level determinants also have noticeable influence on the CS of these firms. Firm operating in highly concentrated industries and in a less dynamic environment is observed to employ higher debt. Rapid growing firms in Indonesia engage with high debt ratio because of low asymmetric information issues. It may also be because these growing firms get better access to bank loans following the competitive banking industry post financial reformation. The firms take advantage of the interest tax shield offered by consuming higher debt (thin capitalization), supporting TOT.

However, long established (aged) and profitable firms with high tangible and intangible assets and high liquidity operating in a high dynamic environment follow

the POT. This is explained by the risk that comes with debt financing thus high level of debt is not an option. Firms in a highly concentrated industry consume higher LEV. The concentrated ownership phenomenon also poses important influence over the firms' CS. The positive relationship may be justified by the concern over ownership dilution by the controlling shareholders thus avoid equity issuance entirely.

This study offers policy implication. Tangible and intangible assets do have substantial influence over firms' CS. The central bank of Indonesia should regulate intangible assets to be accepted as collateral for debt financing. This will help especially the high-tech firms in their financing strategy. This might then encourage policy makers to promote conducive local bond market to attract these firms to engage with debt financing, making the lethargic bond market to be more vibrant and active.

The insights from this study contribute significantly to the CS literature. The inclusion of industry characteristics is novel as it offers new insights on how industry characteristics (environment) can influence CS of firms especially in the emerging market. Policy maker may want to improve on debt policy following the negative relationship depicted in this study relating to industry dynamic and debt ratio and the higher debt consume by highly concentrated industry. One possible way is to increase the size and liquidity of the local bond market. OECD (2018) reports that Indonesian bond market is relatively small and dominated by government issuance resulted firms to have less alternative to borrow except from banks, causing debt financing to be bank centric.

Looking at the ownership structure, other markets with high COwn can infer valuable insights and information relating to debt and ownership. Debt can act as an effective controlling mechanism to mitigate agency problems. Debt can also functions as a protection instrument to prevent ownership dilution to ensure continuous controlling power of the firm. Further, be an effective tax planning strategy as explained by the thin capitalization where firms can reap maximum interest tax shield from debt consumption.

Despite its longitudinal data with high number of firms, this study incorporates only COwn while keeping aside other types of ownership such as state-owned, family-owned, institutional, politically connected and foreign. Researchers may look into other aspects of these ownerships for future studies.

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The Suitability of Gold as a High-Quality Liquid Asset: Empirical Evidence from Volatility Structure Analysis



Kamola Bayram and Anwar Hasan Abdullah Othman 💿

Abstract The 2008–2009 Global Financial Crisis (GFC 2008/9) was a reminder that the majority of commercial banks then lacked adequate liquid assets to survive liquidity risk linked to times of financial pleasure. Hence, in December 2010, the Basel Committee of Banking Supervision (BCBS) announced a pair of novel ratios, the "Liquidity Coverage Ratio" (LCR) and the "Net Stable Funding Ratio" (NSFR) to make sure banks would be adequately supported with "High Quality Liquid Assets" (HOLA) when faced with financial pressure. Gold, on the other hand, to date has not been included as HOLA stock due to high volatility. This paper provides empirical evidence employing GARCH family models to show that Gold has similar symmetric volatility structure as other traditional assets, namely stocks indices, bonds and dollar index in the United State financial market, but, its price volatility is not affected by asymmetric market information (absence of leverage effect) compared with these assets. Thus, gold has a reserved relevance in the financial market for analysing portfolios and managing risks, especially when there is a period of financial distress as it is empowered with the role of hedge or safe-haven and diversification to minimize the risks, which recommended its inclusion in HQLA stock.

Keywords Gold \cdot Traditional assets \cdot Volatility structure \cdot Basel III \cdot High quality liquid asset

1 Introduction

Gold was the major reserve asset before the Bretton Woods system collapsed but became popular again as a strategic asset following the GFC 2008/9), thanks to the

K. Bayram

KTO KARATAY University, Istanbul, Turkey e-mail: kamola.bayram@karatay.edu.tr

A. H. A. Othman (🖂)

IIUM Institute of Islamic Banking and Finance (IIiBF), International Islamic University Malaysia, Selangor, Malaysia

e-mail: anwarhasan@iium.edu.my

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metal's characteristic as a "safe haven asset" and a dependable "store of value." Gold is an extremely liquid, nevertheless rare asset, and never a liability. It is purchased as an item of opulence and at the same time valued as an investment. For many centuries, gold has held its place as an important precious metal and continues to have a specific function as a "store of value," especially during politically and economically c turbulent times (Aggarwal & Lucey, 2007). Gold has been viewed as a significant factor in the emergence and collapse of numerous empires in human civilization. This precious metal is also an item frequently mentioned and discussed in several important religious texts. Thus, some authors have argued that due to the many reasons mentioned above, gold prices could be especially sensitive to the influences of psychological barriers as well. As such, in comparison with the range of available metals in the huge commodity market, gold has a clear lead and in the past few decades of its attractive profitability potential and exceptional risk-avoiding characteristic, the gold market has witnessed much activity. Consequently, the function of the gold market in relation to the huge commodity market, has attracted growing interest among academics and industry circles, while concerned research has also been emerging.

On the other hand, volatility is a very crucial measure in the evaluation of investment risk. It indicates the fluctuation of prices in each period. A greater volatility points to a wider price range. High volatility implies that the asset price can fluctuate substantially in either direction over the short term. In comparison, a less volatile situation suggests a less dramatic fluctuation of the assets value. In contrast, its value is likely to change steadily rather than dramatically. Volatility is not just a theoretical concept. It is an extremely beneficial and significant for risk evaluation but has an important drawback, which is the fact that it does not take into account the manner of the price movement. High volatility can take place when prices are high and also when they are declining steeply. To the investor, high prices would be preferred whereas steeply declining prices, are mostly undesirable. As such, the implication is that that analyzing volatility should be augmented by analyzing other risks in the market such as the factors that are the fundamental drivers.

As has been mentioned earlier, the GFC (2008/9) revealed that the majority of commercial banks were found short in terms of liquidity assets to endure liquidity risk linked to times of financial pressure. In light of this, at the end of 2010, the Basel Committee of Banking Supervision (BCBS) announced a pair of novel ratios, the "Liquidity Coverage Ratio" (LCR) and the "Net Stable Funding Ratio" (NSFR) to guarantee banks would be adequately supported with "High Quality Liquid Assets" (HQLA) in turbulent financial periods. Gold, on the other hand, to date has not been included as a HQLA stock due to high volatility (Bayram & Abdullah, 2015). This study empirically investigates the volatile nature of gold compared to other traditional financial assets that have been included in the basket of HQLA stock such as stocks, bonds and fiat money as measured by the dollar index.

2 Literature Review

Empirically, he existing evidence if on volatility in major financial asset markets, namely stocks, currencies and bonds, indicates regular patterns of volatility both on a daily as well as weekly basis. Financial Market Microstructure Theory (FMMT) (Ali et al., 2018; El-Halaby et al., 2018) posits that "this pattern happens because of traders' price discovery actions." Mishra et al. (2010) studied the gold price movement and the factors that influenced domestic gold prices and stock market returns in India from 1991 to 2009, employing monthly data on the defined time series from the database of the Reserve Bank of India. Their findings state that "there exists long run equilibrium relation between gold prices and stock market returns and the evidence of feedback causality running between the gold prices and BSE 100 Index based stock returns in India." Therefore, every individual variable has a degree of importance that is employable for predicting the other.

Aggarwal and Lucey (2007), studied the gold market psychologically, using several statistical procedures. Their pioneering study investigated mean and variance impacts of psychological barriers in the gold market and reported that "psychological barriers at the 100's digits (e.g., price levels at US\$200, US\$300, etc.) are present in day-to-day gold prices, but for high frequency gold prices, the evidence is less strong." The authors found indications of variables in conditional means surrounding psychological barriers and displayed significant deviations in the varying returns in the region of and when crossing (from above) psychological price barriers in gold markets. Xu and Fung (2005) employed a bivariate asymmetric GARCH model to study the forms of across-market information movements for gold, platinum, and silver futures contracts transacted in the U.S. and Japanese markets. Their findings showed that transmitting the pricing of these precious metals contracts was robust throughout both markets, with information flowing apparently from the U.S. Market to the Japanese market for returns. Volatility spill over feedback impacts were strong in the two markets and their effects appeared to be alike. They also noted indications that intraday pricing data disseminated across the mentioned US and Japanese metals futures markets was fast, because offshore transaction data can be absorbed in the domestic market within one trading day.

Batten and Lucey (2010) described the volatility structure of gold trading as a "futures contract" on the Chicago Board of Trade (CBOT). Their results indicated important volatility differences in both the daily and weekly trading, which have only a slight correlation with tick-count: a proxy for information. The stochastic characteristics of volatility in the gold market show consistency with the multifaceted relationship of price sensitive information from other asset markets instead of the price discovery activities of traders in the gold market itself. Therefore, derivatives portfolios must be regularly reviewed to cope with the dynamic nature of these short-term price relations with different asset markets. Sopipan et al. (2012) conducted a study to forecast of gold price volatility employing Markov Regime Switching GARCH (MRS-GARCH) models to determine if MRS-GARCH models are an enhancement of the GARCH type models for modeling and forecasting the gold price volatility.

Reportedly these models permit volatility to be dynamically varied based on unobserved regime variables. Findings suggest that the MRS-GARCH is the optimal performance framework to determine GPV in a number of loss functions and they predict closing prices of gold for trading future contracts. Accordingly, MRSGARCH has the most aggregated returns similar to the GJR model.

Dooley et al. (1992) investigated how gold prices and exchange rates were related. The authors applied monthly data from January 1976 to December 1990. It involved the currencies of the US, UK, France, Germany and Japan. The outcomes of VAR analysis indicated the equivalence of US\$ and other national currencies which carried a strong explanatory character for gold price changes. Harmston (1998) examined how the prices of gold, wholesale prices and purchasing power were related in the UK, US, France, Germany, and Japan from 1596, 1796, 1820, 1873, 1880 to 1997 respectively. He found that regardless of the variations in gold prices at times of regional or universal crises, over time it serves as "a store of value" as it is able to keep its purchasing power in the long term. Smith (2001) attempted to determine how gold prices have a relationship with the stock market indices in the short-term by examining day-to-day, week-to-week and month-to-month, data from January 1991 to October 2001. The research captured four gold prices and six stock market indices. The outcomes indicated that they were related in the short- term. Furthermore, Sjaastad (2008) employed forecast error data to investigate empirically and theoretically, how the leading exchange rates and gold prices were related. He commented that "floating exchange rates, and the consequence of collapse of the Bretton-Woods system, were the main factors that destabilized the process." As gold is priced in US\$, any fluctuations in US\$ would significantly affect the metal's prices in other currencies. Additionally, Sjaastad (2008) maintains that "exchange rates of the world's main gold producers (Australia, Russia and South Asia) do not significantly impact the global price of gold."

Notwithstanding the significance of gold in Central Bank reserves and its worth to investors as "a store of value" which can potentially diversify risk, there is a lack of studies that examined the suitability of gold to be included in the basket of High-Quality Liquid Assets (HQLA). This study therefore tries to bridge the gap by examining the volatility structure of the gold price compared to other market prices of traditional assets that are considered by Basel III as HQLA.

3 Method and Data Analysis

In this study, we employ daily return series data in U S. Dollar for Gold index, stocks indices (including the Dow Jones Index (DJI), Nasdaq Composite Index (NDI), and the Standard & Poor's 500 Index (S&P)), bond and Dollar Index in United State financial market. The time period of gold was from the first day of 2000 to the last day of 2017, and involving a total of 4,567 observations, while stock markets data were arranged from 1st January, 2005 to 29th December, 2017, with 3,052 overall observations, while the data of three-month Treasury Bill rate ranged from

3rd January, 2005 to 20th December, 2017, with, 234 overall observations. The U.S. Dollar Index data ranged from 1st February, 2007 to 31st December, 2017, with total of 2,822 observations. The Dollar index defined as "the measurement value of the US dollar related to a basket of foreign currencies such as Euro (EUR), Japanese yen (JPY), Pound sterling (GBP), Canadian dollar (CAD), Swedish, krona (SEK), and Swiss franc (CHF) in the fiat money system." All variables' data are obtained from the respective websites of https://www.investing.com/. The return series of the variables is computed using the following equation:

$$r_t = \log\left[\frac{p_t}{P_{t-1}}\right] * 100$$

where

 r_t is the logarithmic daily return on each index for time t,

 P_t is the closing price at time t, and

 P_{t-1} is the corresponding price in the period at time $_{t-1}$.

4 Method of Analysis

This study applied different conditional heteroskedastic for estimating the volatility structure and stability of gold return series compared to the volatility structure of U.S. traditional assets classes that are agreed by Basel III as high equality liquid assets such as Stock indices, bonds (3-month Treasury Bill rate), and U.S. Dollar Index. Before examining the symmetric and asymmetric information persistence, several preliminary tests were conducted to ensure the characteristics of the data were of optimal fit for the GARCH family models. This included descriptive statistics (i.e., mean, standard deviations, minimum, maximum); normality distribution of the data (i.e., skewedness, kurtosis and Jarque–Bera test); Volatility Clustering; stationarity using unit root tests (i.e., Augmented Dickey Fuller (1979) (ADF) and the Phillips-Perron (1988) (PP)); and autoregressive conditional heteroscedasticity (ARCH) effect employing Lagrange Multiplier (LM) test.

4.1 Symmetric Measurement (Long Memory)

This includes the ARCH model suggested by Engle (1982). The volatility (σ_t^2) in the basic ARCH (1) model is defined by the following equation:

$$\sigma_t^2 = w + \alpha \varepsilon_{t-1}^2$$

where w > 0 and $\alpha \ge 0$ for σ_t^2 to be positive, the ARCH (1) model can easily be extended to the ARCH (q) model.

$$\sigma_t^2 = w + \sum_{i=1}^q \alpha_i \varepsilon_{t-1}^2$$

However, ARCH models may need several lags for an adequate representation of the dynamic evolution of the conditional variances. To avoid the problems of computational optimal lag length, the General Autoregressive Conditional Heteroskedastic (GARCH (1,1)) was proposed by Bollerslev (1986) allowing much more flexible lag structure to measure suggested volatility structure of financial assets. The GARCH (1,1) model is mathematically presented by the equations below:

Mean equation:
$$r_t = \mu + \varepsilon_t$$

Variance equation: $\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$

where

 σ_t^2 refers to the conditional variance at time t,

 ω denotes the intercept (constant),

while α denotes the past value effect and

 β refers to past information effect.

 α and β define the short-run dynamics of the volatility time series,

while ε_{t-1}^2 is the ARCH term that calculates the effect of recent news on volatility. These parametrise of $\omega > 0$, $\alpha \ge 0$, and $\beta \ge 0$ for σ_t^2 are restricted to be positive at all times.

4.2 Asymmetric Measurement (Leverage Effect)

As has been indicated by pervious financial literature, the ARCH and the GARCH models could denote the symmetric volatility clustering, but, they failed to react asymmetrically to rise and fall in the returns of the financial assets, meaning, they did not measure the leverage effect (Alberg et al., 2008). To address this issue, we employed Exponential GARCH model by Nelson (1991), APGARCH by Ding et al. (1993) and Threshold GARCH (Zakoian, 1994) to capture the asymmetric volatility structure of financial asset under study.

i. The Exponential GARCH (1,1) Model: is based on the logarithmic expression of the conditional variability, which is presented in the following equation:

$$\ln(\sigma_t^2) = \omega + \beta_1 \ln(\sigma_{t-1}^2) + \alpha_1 \left\{ \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| - \sqrt{\frac{\pi}{2}} \right\} - \gamma \frac{\varepsilon_{t-1}}{\sigma_{t-1}}$$

The Suitability of Gold as a High-Quality Liquid Asset ...

where

 $\ln(\sigma_t^2)$ refers to the log of the conditional variance,

 γ indicates the coefficient of asymmetry information or leverage term.

The existence of asymmetry information or leverage effects can be examined by the hypothesis that $\gamma < 0$. However, we hypothesize that the effect is symmetric if $\gamma \neq 0$.

ii. The specification of Asymmetric Power ARCH Model (APARCH (1,1) for the conditional variance is presented by the equation below, which can express the Fat tails, Excess kurtosis, and Leverage Effects:

$$\sigma_t^{\delta} = \omega + \sum_{j=1}^q \alpha_j (|\varepsilon_{t-j}| - \gamma_j \varepsilon_{t-j})^{\delta} + \sum_{i=1}^p \beta_i (\sigma_{t-i})^{\delta}$$
$$\varepsilon_t = \sigma_t z_t \sim \mathcal{N}(0, 1)$$
$$k(\varepsilon_{t-1}) = |\varepsilon_{t-j}| - \gamma_j \varepsilon_{t-j}$$

where

 σ_t^{δ} indicates conditional variance,

 γ_i refers to the leverage effect, and

 ε , ω , α_i , β_i and δ are the estimated parameters,

while a positive γ_j indicates negative news (market shock) and has greater effect than the positive news on the assets price volatility then.

iii. The generalized specification of the T-GARCH (1,1) model for the conditional variance is presented by:

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \gamma d_{t-1} \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2$$

where

 σ_t^2 refers to conditional variance,

 γ represents the coefficient of leverage effect.

In this approach, bad news (market shock) ($\varepsilon_{t-1} < 0$) and the good news ($\varepsilon_{t-1} > 0$) have differential impact on the conditional variance. Bad news impacts $\alpha_i + \gamma_i$, while good news (shock) affects α_i . Therefore, if γ is statistically significant and has positive sign, the bad news in the market more greatly affects σ_t^2 compared to the good news and vice versa if the other way around. The limitations of all GARCH specified models above are approximated using quasi-maximum likelihood method by Bollerslev-Wooldridge (1992), which assumes the Gaussian normal error distribution.

Besides, different criteria have been utilized to identify the best asymmetric model, including Maximum likelihood (ML) estimation, the Akaike information criterion (AIC) of Akaike (1974) and the Schwarz Information Criterion (SIC) of Schwarz (1978). The asymmetric effect is further validated graphically through applied News Impact Curve (NIC) analysis, in which case, the NIC examines the relationship between the current news and future volatility for asset returns. Based on Bauer (2007), the NIC is applied to examine conditional variance at time *t* and the shock term (error term) at time t_1 , with the constant information dated t_2 and earlier. This is mathematically obtainable by the following formula of The Engle and Ng (1993):

$$E(\sigma_{t+1}^2|\epsilon_t)$$

where an expected conditional variance E of the next period is conditional on the current shock ϵ_t .

5 Results and Discussion

5.1 Descriptive Statistics

The descriptive statistics in Table 1 exhibit the characteristics of the day-to-dayto-day market returns indices of the gold and traditional asset in the U.S financial market. The series exhibit that the average daily returns of the gold is 3.3%; compared to average daily returns of 2.7%, 2.6%, -1.60%, 0.2% for Dow Jones Index (DJI), Standard & Poor's 500 Index (S&P)), 3-month Treasury Bill Rate and Dollar index respectively, while, the average daily returns of the Nasdaq Composite Index (NDI) is 4.5%, which is slightly higher than the gold daily average returns of 3.3%. This indicates that overall investment in gold markets is more profitable compared to other traditional assets with only one exception of NDI in the U.S financial markets. Furthermore, the standard deviation for the gold is 1.131, which indicates that gold return series are characterized by less volatility compared to the return series of

Variable	Mean	Std. dev.	Min	Max	Skewness	Kurtosis	Obs
XAU-USD	0.033	1.131	-9.821	8.643	-0.211	8.772	4567
DJI	0.027	1.116	-8.201	10.508	-0.268	13.103	3052
NDI	0.045	1.329	-11.115	11.849	-0.335	10.667	3052
S&P	0.026	1.211	-9.470	10.957	-0.492	13.673	3052
TBR-U.S	-0.016	23.209	-333.221	203.688	-0.567	31.121	3234
US. Dollar	0.002	0.517	-2.739	2.368	-0.021	5.037	2822

 Table 1
 The descriptive statistics on the logarithmic differences of gold price and traditional assets in the U.S financial market

Nasdag Composite Index (NDI), Standard & Poor's 500 Index (S&P) and 3-month Treasury Bill Rate in U.S financial market, where their standard deviations are 1.329 and 1.211, and 23.209 respectively. However, the average daily risk of 1.131 for the gold is slightly higher compared to 1.116 for Dow Jones Index (DJI). Further, return series of gold exhibits high volatility relating to return series of Dollar index of 0.517. In addition, the descriptive statistics demonstrate a large gap between the minimum and maximum return series for all variables except with the U.S Dollar index. This indicates variability in the U.S financial market returns as a wide range of positive and negative values appear with small time durations. In addition, the third and fourth moments as recorded by skewedness and kurtosis show asymptotic and leptokurtic (fat-tailed) behavior with the degree of asymmetry distribution in the region of the mean for all variables under study ranges from -0.021 to -0.567, which does not exceed the rule of thumb of the -1 to +1 normal distribution. However, the skewedness values of all variables are negatively skewed, which indicates that investors might incur losses in the U.S financial market in the near future. On the other hand, the kurtosis values for all variables range from 5.037 to 31.121, which is higher than the typical standard of 3.0, indicating that the return series of all variables under study are fat tailed and may exhibit the presence of volatility characteristics in their return series behaviours.

Figure 1 presents volatility clustering in return series of the Gold, U.S Stock Markets, U.S 3-month TBR and US Dollar Index for the duration of the study period,

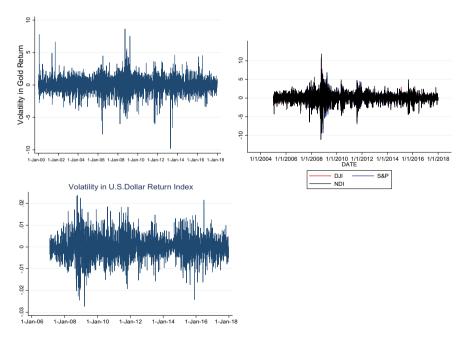


Fig. 1 The clustering volatility in the return series of gold, U.S Stock Markets, U.S 3-month TBR and US Dollar Index

Variables	Normality test	Unit root test results		ARCH-LM Test Statistics
	Jarque–Bera	ADF-Test	PP Test	
XAU-USD	6374.226***	-68.2428***	-68.2532***	74.14851***
DJI	13,038.456***	-42.9321***	-61.024***	46.6286***
NDI	7545.697***	-42.253***	-58.383***	20.81076***
S&P	14,634.291***	-43.145***	-61.041***	175.0929***
TBR-U.S	103,615.409***	-39.273***	-104.4850***	219.6388***
US. Dollar	488.1145***	-53.266***	-53.266***	13.60204***

Table 2 Normality, heteroscedasticity and unit root test results

resulting from the fact that characteristically, a duration of high volatility is followed succeeded by a lengthy duration of high volatility, and a duration of low volatility tends to be succeeded by a lengthy duration of low volatility, which confirms the volatility clustering feature as mentioned by Madelbrot (1963) and Fama (1965). In other words, the return series in all indictors varies in the region of the constant mean but with changes in variance over time.

Moreover, it is notable that, when the study applied residual diagnostic tests, the normality test by Jacque-Berra does not accept the null hypothesis of normal distribution for all variables under study at significant level of 1% as shown in Table 2. ADF and PP of unit-root tests also have been implemented to address the issue of non-stationarity and their results indicate the existence of unit root in the return series of all variables as shown in Table 2. The result in Table 2 also indicates that the null hypothesis of heteroskedasticity test or ARCH-LM test is rejected at 1% significance level. This suggests the persistence of ARCH effect in the residuals and confirms the residual is conditionally heteroskedastic and can be represented by ARCH and GARCH models, hence, the results permit he estimation of GARCH family models.

5.2 The Estimation Results of Symmetric Measurement (Long Memory)

This section illustrates the findings resulting from fitting symmetric GARCH models to the return series of gold and other traditional assets considered in this study. Tables 3, 4, 5, and 6 report the estimated findings obtained by GARCH (1,1), TGARCH (1,1), EGARCH (1,1) and APGARCH models. Specifically, in the conditional variance equation the estimated coefficient of ARCH (α) and GARCH (β) parameters for Gold daily returns exhibit positive and highly statistical significant effects at 1% significant level in all GARCH family models, in which case, α denotes a first order ARCH term which records the current or short-term impacts of news on

	Symmetric inform	nation	Asymmetric i	nformation				
XAUMUSD	Coefficient	GARCH (1,1)	T-GARCH (1,1)	E-GARCH (1,1)	APARCH(1,1)			
	Mean							
	μ (constant)	0.03628**	0.0387**	0.0489***	0.042***			
	Variance	Variance						
	$\boldsymbol{\omega}$ (constant)	0.02756	0.0265	-0.0829**	0.0257			
	α (Arch effect)	0.046369**	0.05121***	0.11841**	0.055408**			
	$\boldsymbol{\beta}$ (Garch effect)	0.93139***	0.93224***	0.97672***	0.93257***			
	γ (Leverage effect)		-0.00921	0.009772	-0.07745			
	$\alpha + \beta$	0.97778	0.98345	1.09513	0.987978			
	Log likelihood	-6735.791	-6735.2159	-6745.512	-6732.171			
	Akaike Info. Criterion (AIC)	2.9515	2.9517	2.9562	2.95080			
	Schwarz Info. Criterion (SIC)	2.9571	2.9587	2.9632	2.95925			
	ARCH-LM test statistics Prob. Chi-square	0.386440 0.53420	0.553882 0.45677	2.02163 0.15514	1.1943535 0.274510			

 Table 3
 Estimated result of GARCH (1,1), T-GARCH, EGARCH (1,1) and APGARCH (1,1)

 models for XAUMUSD during (2000–2017)

Note *** and ** denotes significance at 1% and 5% significance level

gold volatility, while β denotes the coefficient of autoregressive component of conditional variance that can be understood to be the persistent coefficient that records the effect of the old news on volatility or the first order GARCH term and the magnitudes of the factors α and β confirm the volatility in time series. The estimated coefficient of β parameter in GARCH, (1,1) model = 0.93139, TGARCH, (1,1) = 0.93224, EGARCH, (1,1) = 0.97672, and APGARCH, (1,1) = 0.93257 is considerably greater than coefficient of α parameter in GARCH, (1,1) model = 0.046369, TGARCH, (1,1) = 0.05121, EGARCH, (1,1) = 0.11841, and APGARCH, (1,1) = 0.055408, indicating that the memory of the gold market extends beyond a single period and that volatility is greater sensitivity to its lagged values than it is to novel surprises in the market values. Further, the sum values of these parameters' coefficients ($\alpha + \beta$) are 0.97778, 0.98345, 1.09513, and 0.987978, for GARCH (1,1), TGARCH (1,1), EGARCH (1,1) and APGARCH models respectively are near and above unity in such specification, which indicate that the volatility will continue to several future periods in the gold market.

Similarly, Tables 4, 5, and 6 show that the estimated coefficient of ARCH (α) and GARCH (β) parameters for other traditional assets such as DJI, NDI, S&P, 3-month TBR and dollar index in U.S financial market have statical significance

	Symmetric info	rmation	Asymmetric information					
U.S. DJI stock return	Coefficient	GARCH (1,1)	T-GARCH (1,1)	E-GARCH (1,1)	APGARCH (1,1)			
index	Mean							
	μ (constant)	0.066534***	0.031764**	0.033335***	0.029092**			
	Variance			1				
	$\boldsymbol{\omega}$ (constant)	0.021510***	0.020712***	-0.111199***	0.028086***			
	α (Arch effect)	0.119630***	-0.022298**	0.132823***	0.089454***			
	$\boldsymbol{\beta}$ (Garch effect)	0.858563***	0.891776***	0.972604***	0.901066***			
	γ (Leverage effect)		0.209142***	-0.152519***	1.000000***			
	$\alpha + \beta$	0.978193	0.869478	1.105427	0.99052			
	Log likelihood	-3842.145	-3773.393	-3770.817	-3757.011			
	Akaike Info. Criterion (AIC)	2.52041	2.476011	2.474323	2.465276			
	Schwarz Info. Criterion (SIC)	2.528304	2.48588	2.484191	2.475144			
	ARCH-LM test statistics	2.753031	3.573354	2.655126	4.383966			
	Prob. Chi-square	0.0971	0.0588	0.1033	0.1117			
U.S. NDI	Mean							
stock return	μ (constant)	0.085318***	0.045178**	0.037430**	0.035923			
index	Variance							
	$\boldsymbol{\omega}$ (constant)	0.032959***	0.043711***	-0.099947***	0.0438***			
	α (Arch effect)	0.096461***	-0.013134	0.140201***	0.083278***			
	$\boldsymbol{\beta}$ (Garch effect)	0.881461***	0.878574***	0.96479***	0.893409***			
	γ (Leverage effect)		0.204721***	-0.1491***	0.999986***			
	$\alpha + \beta$	0.977922	0.86544	1.104991	0.976687			
	Log likelihood	-4624.988	-4569.173	-4567.732	-4554.96			
	Akaike Info. Criterion (AIC)	3.033413	3.007361	2.996548	2.988833			
	Schwarz Info. Criterion (SIC)	3.041307	3.001039	3.006416	3.000675			

 Table 4
 Estimated result of GARCH (1,1), T-GARCH, EGARCH (1,1) and APGARCH (1,1)

 models for U.S stock market return indices during 2005–2017

(continued)

	Symmetric info	rmation	Asymmetric information			
	ARCH-LM test statistics	0.208065	1.893094	2.253482	1.645562	
	Prob. Chi-square	0.6483	0.0922	0.1051	0.1444	
U.S. S&S	Mean					
stock return index	μ (constant)	0.060350***	0.022522	0.020905	0.017006	
muex	Variance					
	$\boldsymbol{\omega}$ (constant)	0.020578***	0.022533***	-0.101037***	0.027554***	
	α (Arch effect)	0.111507***	-0.024469	0.126573***	0.091342***	
	$\boldsymbol{\beta}$ (Garch effect)	0.870123***	0.892252***	0.975817***	0.903495***	
	γ (Leverage effect)		0.216286***	-0.160818***	0.9999999***	
	$\alpha + \beta$	0.98163	0.867783	1.10239	0.994837	
	Log likelihood	-4025.848	-3957.779	-3952.757	-3943.07	
	Akaike Info. Criterion (AIC)	2.640792	2.596841	2.59355	2.587202	
	Schwarz Info. Criterion (SIC)	2.648686	2.606709	2.603418	2.59707	
	ARCH-LM test statistics	2.656594	2.544564	2.213426	2.98747	
	Prob. Chi-square	0.1032	0.0787	0.1095	0.0506	

Table 4 (continued)

at 1% significance level. The sum of these parameters ($\alpha + \beta$) is near unity and in such cases above unity, which indicates that the estimated conditional variance can be an combined with IGARCH. Therefore, this suggests that the persistence of volatility and a shock has unspecified impact on the volatility level. In other worlds, the symmetric volatility of traditional assets may take a long time to attenuate in U.S financial market. Thus, the overall findings suggest that gold and other traditional assets have almost similar symmetric volatility structure and their symmetric volatility have long term persistence and impact in the U.S financial market.

	Symmetric infor	mation	Asymmetric in	Asymmetric information				
U.S 3-month	Coefficient	GARCH (1,1)	T-GARCH (1,1)	E-GARCH (1,1)	APGARCH (1,1)			
treasury	Mean			·				
bond	μ (constant)	0.000216	-2.82E-05	-0.000672**	-6.27E-05			
	Variance							
	$\boldsymbol{\omega}$ (constant)	0.00000517***	0.000005***	-0.41289***	0.000023			
	α (Arch effect)	0.232475***	0.18463***	0.34244***	0.225988***			
	$\boldsymbol{\beta}$ (Garch effect)	0.798204***	0.804259***	0.97733***	0.814779***			
	γ (Leverage effect)		0.085641	-0.064975**	0.112101			
	$\alpha + \beta$	1.030679	0.988889	1.319775	1.040767			
	Log likelihood	8255.552	8261.634	8250.936	8263.586			
	Akaike Info. Criterion (AIC)	-5.071636	-5.07476	-5.068184	-5.075345			
	Schwarz Info. Criterion (SIC)	-5.064153	-5.065406	-5.05883	-5.06412			
	ARCH-LM test statistics	3.824578	3.03116	1.326752	1.906938			
	Prob. Chi-square	0.0506	0.0817	0.064	0.0899			

Table 5 Approximated result of GARCH (1,1), T-GARCH, EGARCH (1,1) and APGARCH (1,1) models for bond market indices during 2005–2017

5.3 The Estimation Outcomes of Asymmetric Measurement (Leverage Effect)

The asymmetric or leverage effect was examined by TGARCH, EGARCH and APGARCH models employing robust standard errors proposed by Bollerslev-Wooldridge (1992), which is referred to as "Quasi Maximum Likelihood" (QML) since the conditional distribution in the residuals of the estimated models was non-normally distributed. Table 3 shows the estimated coefficient of γ parameters which are -0.00921, 0.009772, and -0.07745 for EGARCH (1,1); APGARCH (1,1); and TGARCH (1,1) model respectively were determined to be of statistical insignificance in all cases, which indicated that asymmetry or leverage effect does not persist in the gold market. However, the sign of estimated coefficient of γ was positive in EGARCH (1,1) and Negative with TGARCH (1,1) and APGARCH (1,1) models, suggesting that a size effect of good news is slightly stronger than for bad news on the gold returns' volatility. This finding therefore confirms that gold has a distinct role in the financial market for analyzing portfolios and managing risk as its return is not affected by market risk, which may create a possibility for investors to use it as a

	Symmetric infor	mation	Asymmetric	information	
U.S. Dollar Index	Coefficient	GARCH (1,1)	T-GARCH (1,1)	E-GARCH (1,1)	APARCH (1,1)
	Mean				
	μ (constant)	-0.00088	0.00171	0.003215	0.00215
	Variance				
	$\boldsymbol{\omega}$ (constant)	0.000832***	0.00068***	-0.05786^{***}	0.00108**
	α (Arch effect)	0.03172***	0.03722***	0.06684***	0.03122***
	β (Garch effect)	0.9655***	0.9695***	0.9951***	0.9696***
	γ (Leverage effect)		-0.0183**	0.01854**	-0.20143
	$\alpha + \beta$	0.99722	1.0067	1.06194	1.00082
	Log likelihood	-1923.218	-1919.603	-1920.158	-1919.205
	Akaike Info. Criterion (AIC)	1.36585	1.36399	1.36439	1.364426
	Schwarz Info. Criterion (SIC)	1.37428	1.37453	1.37493	1.37706
	ARCH-LM test statistics Prob. Chi-square	2.179375 0.13998	2.30798 0.12882	1.30186 0.2539	1.931919 0.16465

Table 6 Estimated result of GARCH (1,1), T-GARCH, EGARCH (1,1) and APGARCH (1,1) models for U.S. Dollar index during (2007–2017)

hedging asset against such market risks especially when there is financial turbulence or economic slowdown. The result is similar to Baur (2011) who found that positive shocks raise the volatility beyond just negative shocks in the gold market and that it is attributed to "safe haven" property of the gold. Baur and Lucey (2010) found that gold has the same hedging capacities in the United Kingdom against the market risks.

Even though the asymmetric parameters of EGARCH (1,1), TGARCH (1,1) and APGARCH (1,1) models provide evidence of the lack of leverage effect in gold market returns, however, the graph (2) of News Impact Curve validates the gold volatility response to shocks, and finds that future volatility in gold returns responses more to negative news than it does to the same magnitude of positive news (Fig. 2).

Furthermore, Table 4 exhibits the estimated coefficient of γ parameters for T-GARCH (1,1), EGARCH (1,1) and APGARCH (1,1) specification in U.S Stock Market over the period 2005–2017. The results indicate the persistence of leverage effect in U.S stock markets as the estimated coefficients of γ parameters are statistically insignificant. For example, the estimated coefficient of γ parameters for DJI returns series are 0.209142, -0.152519, and 1.00 for TGARCH (1,1), EGARCH

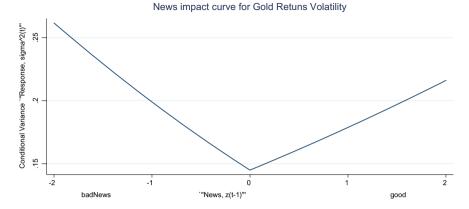


Fig. 2 The conditional variance of gold returns market response to shocks

(1,1) and APGARCH (1,1) models respectively, which are statistically significant at 1%. Similarly, the estimated coefficient of γ parameters for NDI returns series which are 0.204721, -0.1491, and 0.9999 for TGARCH (1,1), EGARCH (1,1) and APGARCH (1,1) models respectively which are of high statistical significance at 1%. Further, the estimated coefficients of γ parameters for return series of S&P are 0.216286; -0.160818 and 0.999999 and of statistical significance at 1% level of significance in TGARCH (1,1), EGARCH (1,1) and APGARCH (1,1), models respectively.

The leveraging effect in the U.S stock market is also expressed in graphic form by a "news impact curve" (NIC) in which the NIC plots news circumstances for both negative and positive news on the horizontal axis against the assets-conditional variance or volatility. Figure 3 shows the NIC for the U.S stock return indices and displays that the negative side of the curve is steeper than the positive side. This confirms that the asymmetric impact is present in U.S stock market, whereas the future volatility in stock market returns react more significantly to negative news than it does to the same magnitude of positive news.

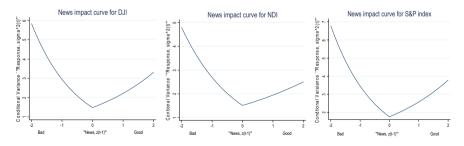


Fig. 3 The conditional variance of the U.S stock market retunes response to shocks

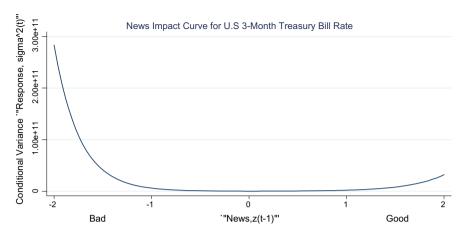


Fig. 4 The conditional variance of the U.S 3-month TBR retunes response to shocks

In addition, the study estimates asymmetric GARCH-family models to elucidate conditional variance and the clustering of volatility for a three-month Treasury bill rate in U.S financial Market. Table 5 shows that only the EGARCH (1,1) model reports that negative news affects volatility to a greater extent than positive news, which indicates that asymmetric effects are present in the US bond market. This is due to the fact that the estimated coefficient of γ parameters for E-GARCH (1,1) mode which is -0.064975 was found to be of statistical significance at 1% level of significance.

The asymmetric reaction in the U.S bond market is also confirmed through news impact curve analysis in which the bad news side of the curve is steeper compared to the good news side as illustrated in Fig. 4, indicating that variances in volatility of the U.S bond market are generally greater in case of "bad" news.

Table 6 reports the findings for testing asymmetries in volatility of returner series of dollar index. The findings show that the estimated coefficient of the γ parameters values of -0.0183, and 0.01854 for T-GARCH (1,1) and E-GARCH (1,1) specifications are of statistical significance at 1% level of significance. The EGARCH (1,1) specification shows a positive and significant γ parameter, thus suggesting that past good news shocks more greatly affect subsequent volatility in the Forex Market than bad news shocks do.

Likewise, the outcomes of the NIC analysis in Fig. 5 display that the curve lies to the right side, indicating that the positive innovations would suggest an elevated following duration of conditional variance compared to negative innovations of the same sign, which confirms that future volatility in return series of dollar index is more influenced by past positive news.

Finally, to ensure the variance equations of the all models are well specified and their residuals are free from Autoregressive conditional heteroscedasticity (ARCH) effect, diagnostic test of the Lagrange Multiplier (LM) test was performed for all GARCH specifications, in which case the null hypothesis of the LM test was that

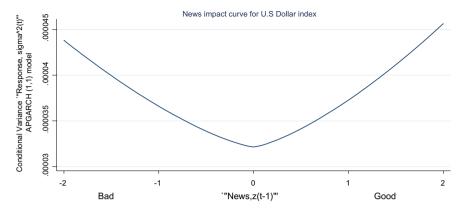


Fig. 5 The conditional variance of the U.S Dollar retunes index response to shocks

"there is no heteroscedasticity present in the residual" (Engle, 1982). According to the test results in Tables 3, 4, 5, and 6 it appears that the null hypothesis is not rejected at 5% significant level, which indicates that the variance equations were well specified for all the markets.

6 Conclusion and Discussions

This empirical work examined the volatile nature of gold returns series related to return series of other traditional assets in the U.S financial market such as Nasdaq Composite Index (NDI), Standard & Poor's 500 Index (S&P) and 3-month Treasury Bill Rate and the Dollar index. In other words, this study endeavor4ed to examine the possibility of including gold in the HQLA for Basel III's HQLA basket requirement to guarantee that commercial banks have sufficient liquid assets that can eliminate liquidity risk especially during crisis and economic slowdown periods. The symmetric limitations of GARCH family models show the evidence that gold and other traditional assets have almost similar symmetric volatility structure and their symmetric volatility has long term persistence and a shock has uncertain effect on volatility outcomes..

On the other hand, the asymmetric parameters of TGARCH (1,1); EGARCH (1,1); and APGARCH (1,1) specifications revealed the lack of leverage effect in the gold market, which provides financial institutions and individual investors with the benefits of "safe-haven" especially in turbulent financial times. Further, the asymmetric parameters of GARCH family how the existence of leverage effect in the U.S stock market, bond market and Forex market, however, with different responses or magnitudes of positive and negative shocks. For instance, stock and bond market returns show higher responses to negative news than it does to the same magnitude of positive news, which means a likelihood among time series for lower volatility

when returns go up and rise when returns decline. With shocks in the forex market, return series show greater sensitivity toward positive news than negative news. Thus, financial institutions and individual investors should pay attention to the effect of news while forming expectations on their portfolio investments. For example, gold did exhibit hedging capabilities against the stock, bond and dollar index suggesting that the intense nature of gold trading results in appropriate circumstances for such benefits of hedging, diversification, and safe-haven.

In conclusion, gold has similar symmetric volatility structure with other traditional assets in U.S financial market, however, its price volatility is not affected by asymmetric market information (absence of leverage effect) compared to other traditional assets. Thus, gold has a distinct place in the market for analyzing portfolios and managing risks, especially during periods of economic slowdown or financial crisis as it is empowered with the role of hedging or "safe-haven" and diversification in minimizing risks. As such, gold should be added to the list of HQLA under Basel III's liquidity risk requirement.

Compliance with Ethical Standards

- 1. Disclosure of potential conflicts of interest: This study was not funded by any grant fund, and both Authors declare no conflict of interest.
- 2. Research involving human participants and/or animals: This article does not contain any studies with human participants or animals performed by any of the authors.

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The Impact of Artificial Intelligence on the Banking Industry Performance



Abdulrahman Rashed Abdulrahman Mohamed Husain, Allam Hamdan, and Sayed Mohamed Fadhul

Abstract Artificial intelligence (AI) is an advance technology which has positioned itself as one of the revolutionary technology. As a result of increased adoption of new technical advancements, the artificial intelligence industry has grown at an unprecedented rate and is now being implemented in a wide variety of fields. Artificial intelligence systems have the potential to alter the banking industry's whole operations and to enhance the banks' performance. They are referred to as (AI) and are met with excitement owing to their capacity to make human-like judgments and avoid human-like mistakes. While artificial intelligence has been implemented more broadly in certain sectors than others, the banking industry is one of the few that has shown a reasonable degree of acceptance and implementation of this technology. This literature review defines artificial intelligence, explains how it is being used in banks and specifies the impact of it on banks' performance.

Keywords Artificial Intelligence · AI · Robotic process automation · Banking industry · Impact · Performance · Fintech

1 Introduction

As long as banks have existed, they've played an important part in the economy. Because of this, the public is constantly interested in hearing about what the banking sector is up to. The commercial bank has taken significant steps away from manual data processing, paper book systems, and manual jobs, all of which have been gradually replaced by computer-based processes over the internet. As a consequence of the digital transformation brought on by the Fourth Industrial Revolution, the financial sector, and the banking industry in particular, have seen significant shifts.

A. Hamdan · S. M. Fadhul Ahlia University, Manama, Bahrain

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A. R. A. M. Husain (⊠) College of Business and Finance, MBA, Manama, Bahrain e-mail: allamh3@hotmail.com

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The fourth industrial revolution is characterized by a convergence of physical, digital, and biological technologies (Tien & Tang, 2020). Essentially, technology revolution will be used to transform the present manufacturing mechanism via the use of advanced technologies such as digitalization, automation, artificial intelligence, and the Internet of Things (IoT). A new age of electronic commerce, cashless transactions, and a myriad of other services that complement and ultimately replace human labor have been ushered in by advances in digital technology. From transaction histories and customer records to consumer activity on the bank's website, commercial banks have long accumulated vast amounts of data. This trend is inevitable and will be facilitated by the widespread use of mobile banking, electronic banking, and artificial intelligence (Srivastava & Gopalkrishnan, 2015). Today's banking sector uses of artificial intelligence include automation of customer care, tailored customer service, increased security, sample identification, and fraud detection. Process optimization, participation in the credit risk management process, customer feedback analysis (Vives, 2017).

The commercial banking system benefits significantly from the rapid growth of AI. AI not only assists in updating services and increasing internal management quality, but also assures business efficiency at the lowest possible risk and cost, therefore assisting banks in their sustainable growth (Alzaidi, 2018). Since then, these technologies have evolved into a critical and essential resource capable of generating a competitive edge for any firm, particularly as client requirements grow more complicated (Kaya et al., 2019). Although there are many advantages of using AI, there are disadvantages as well such as lack of supervision and security threats (Alzaidi, 2018).

This research gives a brief explanation of artificial intelligence and robotic process automation technologies. It explains some of the AI applications that have been adopted by banks. Also, it explains the impact of adopting these technologies on banks' performance.

2 Literature Review

2.1 Artificial Intelligence

"Artificial intelligence is the use of computer science and data analytics to solve problems. It also includes the subfields of machine learning, natural language processing, optical character recognition and deep learning, which are usually cited in connection with artificial intelligence. These fields are made up of AI algorithms that aim to develop expert systems that make predictions or classifications based on input data and build decisions based on this analysis" (IBM, 2021). AI is widely used to describe the process of building systems that exhibit human-like intellectual abilities, such as the capacity to reason, discern meaning, generalize, and learn from experience (Abusalma, 2021). Ever since the 1940s, when the first digital computer was invented, it has been shown that computers can be trained to do very complex tasks with extraordinary abilities. Examples of this include discovering proofs for mathematical theorems and playing chess. The ability of computers to match human adaptability across a wider variety of disciplines or in occupations requiring a large amount of common knowledge is still unmatched, despite ongoing developments in computer processing speed and memory capacity. However, some programs have surpassed the performance levels of human experts and professionals in specific tasks, and as a result, artificial intelligence in this limited sense is used in a wide range of applications, including medical diagnosis, computer search engines, and voice or handwriting recognition (Copeland, 2021).

The term intelligence is used to describe this technology because of the ability of this technology to learn new things, analyze the situation, solve the problem, percept and communicate the results.

- Learning: When it comes to AI, there are plenty of various ways to learn. The easiest way to learn is through doing. When solving mate-in-one chess situations, a basic computer program could randomly attempt moves until mate is discovered. The answer could then be stored with the location, such that the computer would remember it the next time it faced the same situation. Using a computer, routine learning is the basic act of remembering certain things and procedures is a straightforward process. Generalization, on the other hand, is a far more difficult issue to solve. A generalization is a way to apply what you've learned in the past to new circumstances that are similar. The past tense of a term like "jump" can only be formed by a computer that can generalize, but an application which learns the past tense of standard English verbs by routine learning cannot construct the past tense of a word like "jump" unless it has previously been presented with the word (Copeland, 2021).
- Analyzing: analyzing the situation is based on the input that the machine is getting and the logic that have been set to handle the situation (Copeland, 2021). For example, a person may be at either the museum or the café at the same time. He is not at the café, therefore he is at the museum, and it is at the museum that he is because prior incidents of this kind were caused by instrument failure, and this accident was caused by instrument failure as well, as previously said. While there are some similarities between these two types of reasoning, the most significant difference is that in a deductive situation, true premises guarantee true conclusions; in contrast, true premises provide credence to a conclusion without providing complete certainty in an inductive situation. As a result of the finding of anomalous evidence, inductive reasoning is widely used in scientific research, where data is collected, and tentative models are constructed in order to explain and predict future behavior until the model is forced to be adjusted. Complicated frameworks of irrefutable theorems are constructed in mathematics and logic out of a small number of basic axioms and principles (Copeland, 2021). There has been a lot of progress in teaching computers to make conclusions, particularly deductive inferences. True reasoning, on the other hand, entails making conclusions that are

pertinent to the solution of the specific task or circumstance. This is one of the most challenging difficulties that AI faces.

- Problem Solving: It is possible to characterize search as a systematic search through a collection of potential activities in order to reach a specified target or solution, which is particularly true in artificial intelligence. There are two sorts of problem-solving methods: those that are specific to a situation and those that are more generic. A special-purpose strategy is one that is adapted to a particular issue and that often makes use of characteristics of the situation in which the problem is en-trenched that are quite peculiar to that setting. A general-purpose strategy, on the other hand, may be used to address a wide variety of difficulties and can be used across several domains. One general-purpose artificial intelligence technique is means-end analysis, which is a step-by-step, or incremental, narrowing of the gap between the current state and the ultimate goal of the system. It selects actions from a list of possibilities, which may contain options such as moving to the left or to the right, as well as moving back and forward. for example, in the case of a primitive robot AI systems have been used to deal with a broad variety of problems. In certain cases, such as finding the winning move (or sequence of plays) in a board game or constructing mathematical proofs, or manipulating virtual objects in a computer-generated environment, computational thinking is required (Copeland, 2021).
- Perception: Perception occurs when the world is scanned by a large number of sense organs, whether real or artificial, and the scene is broken down into distinct objects with varying spatial connections (Thomas, 2021). The fact that an item might seem differently depending on the angle from which it is seen, the direction and intensity of light in the picture, and how much the object contrasts with the surrounding field makes it more difficult to analyze the situation. Right now, artificial perception is powerful enough to enable optical sensors to distinguish persons, autonomous vehicles to drive at highway speeds, and robots to navigate their way around structures. The University of Edinburgh's Freddy robot, which was built between 1966 and 1973 under the direction of Donald Michie, is an example of a stationary robot with a moving television eye and a pincer hand that was mentioned by Copeland (2021). Freddy was one of the first systems to combine perception and action, as mentioned by Copeland (2021). It was possible to train Freddy to manufacture simple artifacts from a random collection of components, such as a toy car, by recognizing a broad variety of objects and programming him to identify a wide range of items.
- Communication: "language is a set of signals that have meaning based on tradition" (Copeland, 2021). A person's ability to communicate in this way does not have to be restricted to the spoken word. Traffic signs, for example, serve to build a mini-language, with the phrase "danger ahead" being a matter of convention in certain places. Languages are characterized by the fact that linguistic units have meaning by convention, and that linguistic meaning varies significantly from natural meaning, as shown by words such as "language is a system of rules." Those clouds signal rain, and the dip in pressure implies a malfunctioning valve, according to the forecast. When compared to the development of birdcalls and

traffic signals, the generation of full-fledged human languages is an important characteristic. A productive language can create an infinite number of sentences, but a nonproductive language cannot. The development of computer programs that seem to be capable of replying fluently in a human language to questions and statements under highly constrained conditions is very straight forward. These indications, which are utilized for both directions of communication between the human and the computer, are an important component of machine intelligence (Copeland, 2021).

2.2 Robotic Process Automation

Robotic Process Automation (RPA) is the use of software or an application to mimic repetitive activities performed by humans in order to reduce time spent on these procedures, make them more efficient (Romão et al., 2019). For example, RPA systems may be used to calculate an organization's performance, then save these calculations in various documents. It can then upload these documents to an email, format the email content, and send it to several recipients at the same time. All of these stages are carried out by the system without the involvement of a person (Aguirre, 2017). RPA is used to automate the repeated tasks and studies on these technologies found that RPA systems will lead to enhance the customer experience by reducing the time of the activities (Aguirre, 2017). According to this study (kumar, 2017), Customers want reliable and timely service. AI and RPA can deliver immediate service solutions 24/7 throughout the year. As a consequence of eliminating the constraint imposed by a person, RPA will remove or lessen challenges caused by time zone differences, cultural and language barriers. The customer experience will be enhanced as a result of the consumer's ability to get bank services whenever and wherever they want, according to their own preferences. According to the same study, dependability and availability had the greatest impact on customer experience as a result of RPA adoption. Integrating control, intrinsic motivation, and emotion into the technology acceptance model are the aspects that influence early evaluations of a new system's ease of use. Security and privacy, followed by human-like interactivity is ranked as a second aspect impacting the use of RPA technology. Customers' perceptions of banking services are shifting as technology advances and changes. The banking sector must fulfill and comprehend consumers' expectations in order to improve their entire experience. Customers expect tailored goods, timely services regardless of location or time constraints, guarantee of security and protection of their personal data, and cheaper costs without sacrificing service quality. As a result, it is critical for banks to consider these elements and improve the customer experience while adopting and deploying new technologies such as RPA across banking activities and procedures (kumar, 2017).

2.3 AI and RPA Applications in Banks

AI can be implemented in multiple activities and functions which banks are performing such as:

- Chatbot: customers having inquiry or issues are usually interacting with banks using the normal channels including calling the call center or visiting the bank. In the recent years, banks have provided live agent chat as part of their websites in which customers can interact with the agent by chatting online. Most of the inquiries that the customer is having are similar and repetitive such as finding the nearest ATM and branch, inquiring about the deposits and finances rates, and asking about the bank working hours. Also, most of the issues are similar in nature such as transaction dispute, reporting a fraud, and reporting of a nonworking service. A Chatbot solution is using natural language processing (NLP) technology and machine learning to chat with the customer by analyzing the customer inquiry and provide the relevant information in which the chatbot is trained to identify. Also, Chatbot can take an action by performing specific transaction such as activating a new issued card based on the customer request and after doing the necessary authentication of the customer. This service enhances the customer experience and save the customer time by having this service online and instant without the need of doing the call or visiting the bank (Satheesh & Nagaraj, 2021). Over time, a team of specialists with expertise in algorithms, platforms, and customer service has built a large and multi-layered volume of chatbots to help enhance the performance of chatbots. Chatbots offer a number of benefits in the banking industry, with the most significant being the expansion of customer relationships, the development of new products, and the promotion of extra services from mobile banks. Enhance the customer experience by including interactive elements such as people into the mix. Customers' knowledge will be retained when a Chat-bot engages with them. Banks will build a question resource, and the Chatbot's ability to reply will be strengthened when dealing with more sophisticated enquiries. As the number of customers and businesses expands, it is necessary to reduce expenditures while maintaining or enhancing customer service standards. Job satisfaction is increased when customer service professionals are given the opportunity to focus on higher-value activities (Tien & Tang, 2020).
- Planning and Financial Management (PFM): Various sectors have begun to use cutting-edge technology to improve their operations, which is a significant advantage for corporate operations. Augmented reality, which helps people by expanding perception and making communication easier, provides virtual assistance to ease complicated real-world situations by revealing additional facts. Many industries, from healthcare to gaming and media, have already used augmented reality to improve current procedures. This program may be used for company growth in industries with high-cost operations and high-risk participation. Banking and finance organizations employ augmented reality to assess and display client performance and offer the best recommendations to improve

consumers' spending habits. Banks are providing PFM for their customer through online channels. PFM allow the customers to set their financial goals and analyze customer transactions and behavior to provide the customer with set of recommendations to meet their financial goals (Satheesh & Nagaraj, 2021). As per MOVEN, which is one of the AI PFM platforms providers, Banks are encouraged to use the data that they have related to their customers to build a personalized customer experience (MOVEN, 2020). PFM can assist every department in a financial institution in being really competitive and adding real value to the business:

- Marketing: Building a good set of AI-driven PFM solutions is a wonderful approach to distinguish from rivals and get industry recognition by putting a bank's brand at the forefront of financial technology innovation. Banks with their own data scientists may submit their own findings to Strands' PFM system, boosting brand consistency and personalization (MOVEN, 2020).
- Channels: When PFM is developed with responsive design, engaging UX, and gamification, online banking becomes immediately more appealing, and adoption rates begin to rise. PFM users not only use online banking twice as often as non-users, but they also spend twice as much time there owing to the increased number of touchpoints (MOVEN, 2020).
- Customer service: A bank that provides PFM is far more likely to become a customer's main bank. According to industry data, more than 80% of consumers are satisfied with PFM and want to use it on a regular basis in the future. Retention rates among employees might exceed 98%. Following the implementation of PFM, certain banks saw a 50% reduction in closed accounts (MOVEN, 2020).
- Sales: PFM may assist attract new clients whose present bank does not have the tool, as well as drive sales to existing customers. Cross-selling and upselling possibilities are particularly plentiful when tailored offers are included into PFM solutions, ensuring that the correct product is provided to the right consumer at the right time. In fact, PFM users buy up to four times more financial products than non-users, and 25% of PFM users indicate they are less inclined to transfer banks (MOVEN, 2020).
- Alarm and Access System: In terms of enhancing banking system security from thefts in banks and ATMs, artificial intelligence outperforms a traditional emergency button warning system. This mechanism functions in three stages: To obtain the characteristics, artificial vision first captures a picture for image processing. An artificial neural network (ANN) classifies the event based on the discovered pattern and assigns a status to the warning messages. The output class is established based on the neural network's categorization. If the output is positive, the alarm should be activated, and a warning message delivered using GSM technology. In addition, AI has provided more advance security alternatives through the covid 19 pandemic by authorizing the access based on facial recognition technology (Satheesh & Nagaraj, 2021).

- Mobile Banking: the mobile banking applications were available for a while. As per the study (Satheesh & Nagaraj, 2021), 65% of one-hundred-member organizations utilize it, and the majority of individuals use mobile payment. Most clients have good thoughts regarding online payment systems, which pull users away from traditional card transactions and help to improve banking services by increasing revenue production. This user experience transformation aids in the collection and analysis of user-generated data in order to provide better service to each client based on the patterns or insights drawn from that data. Mobile devices provide mobile banking services, which clients prefer owing to their comfort and convenience, and they are also favored by financial institutions in order to preserve excellent relationships with them. However, ninety-one percent of participants in a recent KMPG research reported that they had never used their mobile phones to perform financial transactions. The study's findings clearly suggest that clients should be separated based on their preferences. Customers should be categorized in order to understand what motivates them to utilize mobile banking services and what sort of expectations they have in their perspective. Along with the easy services provided by mobile devices, banks may also use the supplied service to better serve their customers. This gadget, which banks may utilize to install customer relationship management, is controlled for the benefit of the customers.
- Risk Assessment:
 - Credit Risk: The introduction of credit cards might be regarded a significant enhancement in the banking industry's services. Customers who wish to use this card must be approved for a credit limit depending on their financial capability and credit risk. The historical data source serves as the foundation for credit evaluation for customers, however the credit rating methodology is conventional in that it is based on credit risk and a history database. Non-bank lenders, such as fintech firms, are employing AI solutions to reduce costs, which raises the financial industry's rivalry (Lee, 2020). The historical data source serves as the foundation for credit assessment; however, the credit rating model is based on credit risk and the historical database in the conventional approach, which is inefficient. Non-bank lenders, such as fintech firms, are utilizing AI technologies to enhance this, raising the financial industry's rivalry. The most crucial stage in credit risk management is detecting credit risk. Credit score analysis, created by Edward Altman, is the most widely used conventional approach for quantifying credit risk. This approach is now more sophisticated thanks to artificial intelligence (Tien & Tang, 2020).
 - Operational Risks: The identification of fraudulent conduct is one area of operational risk where artificial intelligence (AI) has the potential to make a significant impact. Banks are prioritizing the minimization of fraud in their operations. Human-written rules tools and other traditional fraud detection measures account for just a small proportion of all fraud events, according to the National Fraud Prevention Center. In order to identify the vast number of scams that individuals need, a variety of traditional fraud detection methodologies are used. Banking institutions employ artificial intelligence to improve their predictions,

identify real-world events, and remove erroneous forecasts. In fact, artificial intelligence technologies have been hailed as the most successful method of identifying fraud in financial institutions (Tien & Tang, 2020).

- Liquidity Risk: Cash flow forecasting is a crucial aspect of liquidity management. AI's analytical capability can discover and anticipate future outcomes based on current transaction data influencing a bank's liquidity. AI then triggers automated reaction procedures to assist in the resolution of such incidents (Tien & Tang, 2020).
- Cross Selling: in the recent years, Cross selling has developed into a significant source of revenue for banks. The bank is able to design these cross-selling solutions because it possesses information about the customer's financial status, prior spending history, and investment portfolio. AI may assist banks through a digital campaign, especially digital marketing groups that undertake product exclusions, employing customer relationship management lists to identify the best items. Indeed, clients might come across a variety of goods, which can create complexity for banks when it comes to counseling them on the best options. AI assists banks in resolving this issue by identifying the optimal product based on available data. AI aides in the improvement of comprehension and learning over time by using data from social media activities. The bank can then see trends and relate them to past findings in order to generate new insights and take action. This characteristic of AI provides several benefits to banks, including the introduction of new products to current clients and the ability to make tailored consumer choices. Increase client satisfaction by introducing new sales channels. Increase bank income and client retention (Tien & Tang, 2020).

2.4 The Impact of AI on the Banks' Performance

AI impacts the performance of banks from different perspectives as it impacts their financial performance, customer satisfaction and their operational works.

• Customer Experience: To satisfy client expectations, the financial services sector has undergone considerable changes. Previously, customer services were restricted to conventional goods and services; however, consumers today want more creative and relevant offerings in the digital era. "Traditional banks began to embrace digital transformation by using AI systems to acquire insight into their customers' wants and preferences, enabling them to better tailor their services and expand their potential to attract new clients" (Hasheminejad & Reisjafari, 2017). "Banks employ AI to customize goods and advertisements to individual clients based on their transaction history, past requests, geolocation, and search history. and even social networking websites" (Tien & Tang, 2020). By comprehending consumer needs, AI provides the greatest financial services. AI is capable of analyzing a variety of various forms of data in order to get insight into client habits and interests. Historical data is critical for determining the purchasing

habits of consumers required to deliver the anticipated bank goods and services (Castelli et al., 2016). The majority of conventional banks continue to maintain primary transaction relationships with their clients via the provision of deposit and payment services. By storing a client's information and analyzing it using AI algorithms, banks may provide personalized recommendations for financial goods to each consumer. One may argue that through encouraging "personalization," AI is boosting consumer ties by allowing customers to communicate using natural language (Tien & Tang, 2020).

- Financial Performance Impact: Artificial intelligence is used to automate the majority of the time-consuming and error-prone tasks connected with client data import from contracts, forms, and other sources. Improved handwriting recognition, natural language processing, and other technologies are increasingly being employed in office operations to manage bank processes, in conjunction with intelligent process automation systems. Reduce the number of employees managing operations. Additionally, by automating formerly manual procedures, banks may implement regulatory and regulatory restrictions that were before unattainable. Banks may reallocate human resources to higher-value duties such as delivering new services to clients or enhancing customer satisfaction by replacing humans with intelligent, automated assistants (Ris et al., 2020). Historically, banks decreased expenses via a variety of fundamental actions. When technology advanced and AI improved, banks were able to minimize operating expenses by allocating less time and resources to an expanding number of procedures. Additionally, banks often depend on internal units or outside professional legal services organizations to establish the application of rules and to identify discrepancies between legal requirements and internal policies and procedures. However, several banks are already using AI to do this function, as well as to monitor ongoing regulatory compliance. Additionally, AI has an effect on bank processing times, particularly on the processing time for individual clients. The AI collects critical data from loan applications in seconds through automated processing. For loan activities, the conventional technique of reading papers manually is still used, however physical documents may be digitized using AI employing optical character recognition (OCR). The cost of alternative data for people, hence lowering expenses and improving bank operating efficiency (Tien & Tang, 2020).
- Risk Management: AI enables banks to make more lucrative and secure credit and lending choices. "Many banks are still prohibited from utilizing credit scores, credit histories, customer references, or financial transactions to judge the trust-worthiness of a person or business (Frederica & Murwaningsari, 2019). AI supports banks in tackling these issues. Additionally, AI-powered loan decision algorithms may take into account a customer's past behavior and patterns in order to analyze his or her credit history. Artificial intelligence systems can analyze and organize enormous amounts of unstructured data in order to derive insights that may be used to enhance bank credit risk assessments, among other things. These ramifications are beneficial to chief financial officers, credit risk management directors, and chief compliance officers, and they offer value to the board of directors, senior management, and regulators as a result (Tien & Tang, 2020).

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• Impact on Bank's Compliance: Banking operations must adhere to a plethora of requirements to guarantee money laundering prevention and information security. Banks may deploy intelligent AI assistants to constantly support transactions, follow consumer interactions, and analyze the log of activities conducted. There are many different approaches to govern the back information for compliance systems. Additionally, by focusing on client behaviors and models rather than particular laws, AI-based solutions may assist banks in meeting regulatory requirements while mitigating typical risks (Tien & Tang, 2020; Awwad & Razia, 2021).

3 Conclusion

The research has explained the AI and RPA technologies and has demonstrated the use of these technologies on the banking industry. AI is being used by banks from different perspectives to achieve different objectives. AI is being used by banks to enhance customer experience and one of the measure tools to achieve this is to use chatbots to interact with the customers in more efficient ways. Also, digital banking and PFM are other applications that are being used to provide personalized experience for all customers while earlier PFM service was limited to wealthy customers as it requires designated financial analyst to review the customer portfolio and provide them with the necessary recommendations.

At the same time, AI is playing major role to enhance the financial performance of banks by reducing the operational expenses on the banks, reducing non-compliance penalties on the banks, and allow the banks to become more proactive in their sales by applying cross selling techniques to their customers. In addition, AI is supporting banks in risk management including liquidity risk, operational risk, and credit risk.

This research was generic for all banks in the world and not specific for a region and hence the adoption will differ from one region to another depends on the technology advancements and adoption in the region. It is suggested to do a specific study on the impact of AI on banks performance in the middle east and kingdom of Bahrain region as future research.

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Social Media, Communication and Its Effects on Society and Business

In Influencers We Trust? A Model of Trust Transfer in Social Media Influencer Marketing



Maryam Husain Almahdi, Noor Alsayed, and Amani Alabbas

Abstract This study is designed to investigate whether customers' trust in social media influencers translates to them trusting the brands endorsed by said influencers. It, additionally, explores the role of brand liking and ad enjoyment in this model of trust transfer. Data was collected from 354 respondents who were asked to complete online survey questions after watching video adverts featuring social media influencers endorsing different brands. The dataset was then analyzed using PLS-SEM techniques. Based on the analysis, influencer trust was found to positively affect brand trust, brand liking, and ad enjoyment. Brand liking was also found to positively affect customers' brand trust. However, there was no support of ad enjoyment's effect on customers' brand trust. The results lend support to the theory of trust transfer in the context of social media influencer marketing. The findings from this study are useful for social media influencers, as they highlight the importance of nurturing a trusting relationship between them and their audience. This trust is expected to transfer to customers' trusting in and liking of endorsed brands and therefore contribute to the success of the social media influencer business model. This study adds insights to the still growing research on social media influencer marketing, specifically shedding light on the effects of customers' trust in influencers, a much-discussed area of late.

Keywords Social media marketing · Trust transfer · Social media influencers

1 Introduction

As the internet and social media technologies grew dramatically in recent years, a new type of customer has emerged. One that is empowered by the interactive capabilities of the internet to speak up and share their opinions and views on everything from politics to brands (Almahdi, 2021; Turban et al., 2016). As these technological advancements democratized communication (Kietzmann et al., 2011), they have also

M. H. Almahdi (🖂) · N. Alsayed · A. Alabbas

Ahlia University, Manama, Bahrain

e-mail: malmahdi@ahlia.edu.bh

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given way to new entrepreneurial opportunities and contributed to the creation of the phenomenon that is known as the social media influencer (SMI) (Wilkinson, 2019).

1.1 Social Media Influencers

According to Hearn and Schoenhoff (Hearn & Schoenhoff, 2016), a social media influencer is an individual who "works to generate a form of "celebrity" capital by cultivating as much attention as possible and crafting an authentic "personal brand" via social networks, which can subsequently be used by companies and advertisers for consumer outreach" (p. 194). SMIs facilitate a variety of social media platforms (including but not limited to YouTube, Facebook, Instagram, Snapchat, and TikTok) to endorse products and brands to their social following, in return for receiving some sort of reward from the endorsed party (Freberg et al., 2011; Liljander et al., 2015). Rewards can vary from getting exposure by the endorsed party to receiving sample products, gift cards, or monetary compensation (Liljander et al., 2015). By employing social media influencers, marketers aim to revamp the way that they connect with their end consumers and grow their relationship with them by associating with people who are of interest to them (Glucksman, 2017) and who are already trusted by them (Kim & Kim, 2021).

Examples of social media influencers include Ryan Kaji, a nine-year-old American YouTuber, who unboxes toys on video to his 30.5 million subscribers in return for financial compensation by toy brands, and Khaby Lame, a Senegalese-Italian TikTok sensation with more than 117 million followers, who promotes brands such as Boss and Dream 11 through his social channels. Some influencers even advertise their own brands through social media. For example, when Kylie Jenner, a beauty and lifestyle influencer with 277 million Instagram followers, released her own brand's lip gloss kit for sale in 2015, it got sold out in less than a minute (Holmes, 2015).

Social media influencers have been compared to traditional celebrities in prior research (Glucksman, 2017), as both influencers and traditional celebrities often endorse products and brands in exchange for compensation. In a research paper contrasting the two, Schouten and colleagues (Schouten et al., 2020) found that customers trust social media influencers more than they do traditional celebrities, as they find the first more similar to them as everyday people than the latter. The customers are, therefore, more influenced by influencer- (rather than traditional celebrity-) advertising (Schouten et al., 2020). Similarly, Djafarova and Rushworth (Djafarova & Rushworth, 2017) found that non-traditional celebrities, such as vloggers, bloggers, YouTubers and 'Instafamous' celebrities are more influential, more relatable, and more trustworthy than traditional celebrities.

Marketers are increasingly realizing the importance of this marketing method and dedicating a growing part of their budgets to it (Influencer Marketig Hub, 2021). Indeed, influencer marketing has reached a reported worth of \$13.8 billion globally in 2021 (Influencer Marketig Hub, 2021). Still, influencer marketing is a nascent research area (Glucksman, 2017; Kim & Kim, 2021), riddled with questions about

its contribution to return on investment (ROI), its role in influencing customer buying decisions and attitudes (Wynne Lockhart, 2021), and the nuances of customer trust in SMIs (Kim & Kim, 2021). The question about customer trust in SMIs is gaining more urgency as customers' views toward this marketing method have recently been clouded with suspicion and skepticism (Kim & Kim, 2021). This can be attributed to customers' increasing awareness of manipulative marketing practices, knowledge about well-publicized transgressions by some social media influencers, and eventually the rise in influencer fatigue and cancel culture (Field, 2021; Open Influence, 2020; Shaw, 2019; Singh et al., 2020).

1.2 Trust and Social Media Influencers

The concept of trust has always come to the forefront when researching influencers in prior research, as it can be regarded as the backbone of this business model (Freberg et al., 2011; Friedman et al., 1978; Jin et al., 2021; Kim & Kim, 2021; Liljander et al., 2015; Lim et al., 2017; Pop, 2021). Indeed, customers view the recommendations they receive from social media influencers in the same light they view the recommendations they receive from friends and family, which is more trustworthy and credible than the advertisers' messages (Liljander et al., 2015; Osatuyi & Turel, 2019). Trust is especially important in digital marketing environments, because of their highly uncertain nature and lack of a tangibility (Chen et al., 2019).

Mayer and Colleagues (Mayer et al., 1995) define trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (p. 712). Humans use trust as a way to navigate the overwhelming complexities of their social environments and predict other people's future behaviors toward them (Gefen & Straub, 2004).

Ohanian (1990) is one of the earlier researchers to shed light on the vital role of influencer trustworthiness in changing customer attitudes. Along the same lines, Djafarova and Rushworth (2017) cite the importance of source credibility, including their trustworthiness, to explain the effect of Instagram influencers on the purchase decisions of young females. Similarly, Freberg and colleagues (2011) link the trustworthiness of social media influencers to customer behavioral intentions, while Chatzigeorgiou (2017) outlines number of followers and attractive personality as antecedent to trust in social media influencers. Additionally, while investigating the concept of influencer marketing, Lou and Yuan (2019) introduce a model of social media influencers as a main factor of said model, as they link it to important outcome variables such as brand awareness and purchase intentions (Lou & Yuan, 2019).

Still, there is more to learn about the mechanisms, magnitude, and marketingrelated outcomes of trust in social media influencers (Chatzigeorgiou, 2017; Freberg et al., 2011; Liljander et al., 2015). This is especially important as the consumers of today are more informed about marketing practices than they ever were and hence are

getting more skeptical about marketing techniques such as product placement and influencer marketing (Liljander et al., 2015; Statista., 2018). Moreover, the authenticity and trustworthiness of social media influencers has also come into hot debate in recent years (Mannheim, 2021; Singh et al., 2020; Watson, 2019), and the Fyre Festival controversy brings to light the public's disillusion with social media influencers. In the 2017 incident, about 400 world-famous social media influencers were enlisted to promote a huge new music festival, called the Fyre Festival. This new festival was promised by those influencers to be a luxurious, exclusive affair set in a private island in the Caribbean. Consequently, tickets to the event were sold out in 48 h (Shaw, 2019). However, the festival eventually turned out to be a scam and hundreds of attendees ended up stranded on an island with no food, no accommodation, and no festival in sight. Although the doomed festival's organizer ended up in prison, the public started wondering whether influencers can be held responsible to what they promote, whether they can even be trusted anymore (Smith & Fyre, 2019), and if they were trusted, whether this trust still transfers to products and brands they promote.

2 Conceptual Model and Hypothesis Justification

A lot of questions about the trustworthiness of social media influencers and the effectiveness of this mode of marketing comes to light (Mannheim, 2021; Singh et al., 2020; Watson, 2019). Do customers still trust influencers? Is influencer marketing still a successful way of transferring goodwill from influencer to brand? Does liking the brand play a part into this transfer of trust? What about enjoying the content made by the influencer as a means of advertising? These are some questions that we are aiming to answer through the study's model (Fig. 1). The items in the model

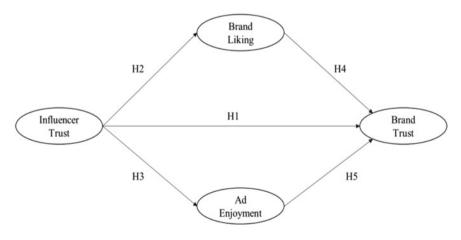


Fig. 1 Conceptual model

were produced based on focus groups of young-adult social media users who were questioned about possible factors that affect their responses to influencer marketing on social media.

To better understand the effectiveness of trusting a social media influencer and if it translates to trusting a brand, the theory of trust transfer is considered in this research. This theory manifests when an audience start trusting a specific party (i.e., a person, brand, or product) because it has been associated with or endorsed by a party that they already trust (Hu et al., 2019; Stewart, 2003). Smith (2004) explains the theory in terms of a transfer of meaning, highlighting that trust can transfer between an endorser to the endorsed product or even between two brands through co-branding. It was also found that trust can transfer from a seller to the product they are selling (Zhao et al., 2019). Along the same lines, it is expected that the theory of trust transfer applies to the relationship between the social media influencer and the brand or product they are endorsing. Therefore, we hypothesize that:

H1: Customers' trust in SMIs positively affects their trust in the brands they endorse.

Customers' trust in a social media influencer is similarly expected to influence the customers' brand liking, or the customers' positive attitude toward a brand based on their perception of its care about them (Boutie, 1994). Indeed, based on an understanding of the signaling theory, it can surmised that trust in a recommender influences customers' attitudes toward the product they are recommending, especially when there is a lack of information available about it (Chen et al., 2019). Indeed, Chen and colleagues explain that trusted recommenders (i.e. influencers) use informational cues to signal trustworthiness and differentiate the products that they are endorsing from others, and consequently influence the buyers' feelings and behaviors toward the endorsed products (Chen et al., 2019). This relationship can be further explained through the social learning theory, which indicates that people tend to pick up on certain behaviors by noting and then following the expected successful behaviors of influential others (Bandura, 1971; Glucksman, 2017). Therefore, if a social media influencer is behaving positively toward a brand by recommending it to their followers, those followers could end up behaving positively toward the brand and liking it. Therefore, we hypothesize that:

H2: Customers' trust in SMIs positively affects their liking of the brands they endorse.

Along the lines of discussing the effects of influencer trust is a suggestion in prior research that the more credible the communicator is, the more interesting their message will be perceived by an audience (Nurhandayani et al., 2019). Indeed, research findings have highlighted that when a consumer trusts a party (i.e., the influencer in this situation), it means that they believe that this party will take their best interest in mind, and this can free the consumer from concern and allow them to pay attention to and enjoy what this party is offering (i.e., the advert) (McKnight et al., 2002). Moreover, Wu and Chang (2005) have found that in the context of online interactions, predictability is connected to enjoyment. Since predictability is an important facet of trust as discussed earlier (Gefen & Straub, 2004), we hypothesize that:

H3: Customers' trust in SMIs positively affects their enjoyment of the adverts they make to endorse brands.

As discussed earlier, a connection between liking and trust exists, where trust of an influencer leads to brand liking. But does liking a brand lead to trusting it? Nicholson et al., (2001) explain that liking, a favorable emotional connection, grows feeling of trusts in consumers, because "more favorable motives are assigned to liked people" (p. 5). Indeed, likability is comprised by a number of characteristics, including sincerity, thoughtfulness and consideration, which are all connected to trust in the literature (Lau & Lee, 1999). Doney and Cannon (1997) explain the significant relationship they found between liking and trust from the perspective of the prediction process. Indeed, if a person likes someone, they will be more likely to trust their own predictions about the way that this person will behave in the future (Doney & Cannon, 1997). Applied to the context of this study, liking a certain brand means that you trust that the people behind it will treat you well by selling you products and services that are in your best interest. Therefore, we hypothesize that: H4: Customers' liking of a brand positively affects their trust in it.

When discussing the connection between enjoyment and trust, Hampton-Sosa and Koufaris (2005) suggest that perceived enjoyment of a communication channel can influence customers' trust in the party that owns it through the mediating role of appeal. This shows that enjoyment of an online marketing channel (in our research context, the influencer's ad) can transfer to trust in the party that controls this channel (in our research context, brand trust). A relationship between enjoyment and trust in a communication channel is further supported by Friedrich and colleagues (2019). The flow theory can be used to understand this relationship further, as flow is a deemed a concept conceptually close to enjoyment. Indeed, it is suggested that when people are in the flow state, they are totally engrossed in the task at hand which will make them exclude other thoughts or factors around them, reducing attention to feelings of risk and uncertainty which will ultimately lead to increasing feelings of trust (Csikszentmihaly, 1990). Therefore, we hypothesize that:

H5: Customers' enjoyment of the influencer's advert endorsing a brand positively affects their trust in the brand.

3 Materials and Methods

3.1 Data Collection

The 354 participants in this cross-sectional study are university students studying various academic disciplines in a medium-size university in Bahrain. The students received a link to the online questionnaire by their instructors to be completed in class using their digital devices (i.e., smartphones, tablets, and computers). The students were asked to watch videos of social media influencers endorsing different brands and then answer survey questions.

3.2 Measurement

The questionnaire was created by adapting well-cited scales to reflect the variables in the conceptual model. The measurements for Influencer and Brand Trust were adapted from Cyr et al. (2005), Cyr and Trevor-Smith (2004), and Gefen and Straub (2003). The Brand Liking scale was adapted form Guillory and Sundar (2014), while the Ad Enjoyment scale was adapted from Cyr et al. (2009). All of these questions were measured using a five-point Likert scale and adapted to fit the context of this study.

3.3 Data Analysis

As a start, descriptive statistics were run in SPSS 23. To test the proposed model, the partial least square structural equation modelling (PLS-SEM) techniques were implemented using Smart PLS software. This technique is deemed most appropriate for analyzing models with various relationships and constructs in them. Additionally, the existence of both reflective and formative indicators in the model, made it necessary for PLS-SEM analysis techniques to be used (Hair et al., 2016).

4 Results

In this section, the descriptive statistics will be first outlined, followed by reliability and validity analyses for the model's constructs. Due to the existence of both formative and reflective variables in the model, different reliability and validity tests were conducted for variables of each type. An estimation of the overall model using the bootstrapping technique follows, presenting the hypothesis results.

4.1 Descriptive Statistics

This survey was completed by 354 adults between the ages of 18 and 65 years old, however, most of the participants were young adults between the ages of 18–24 years old (72.6%). The percentage of females (57.6%) was slightly higher than that of males (42.4%) in the sample. When it comes to time spent on social media platforms, 39.3% of the participants said they spend more than 3 h a day using various social media platforms, 22.6% said they spend 2–3 h and the rest of the participants said they spend less than 2 h a day on social media. As to participants' favorite social media platform, Instagram came on top (35.6%), followed by WhatsApp (29.1%)

and Snapchat (17.5%). Around 70% of the survey respondents indicated that they trusted social media influencers.

4.2 Reliability and Validity of Measurement Models

In this section, we discuss the reliability and validity of the reflective and formative measures in the conceptual model. Three reflective measurement models (i.e., Influencer Trust, Ad Enjoyment, and Brand Trust) and one formative measurement model (i.e., Brand Liking) were assessed. According to Hair Jr et al. (2016), the difference between reflective and formative measures lies in the fact that the constructs in reflective measures can be interchangeable, whereas formative measures are not (i.e. the variable itself is a combination of the constructs).

Reflective measurement model assessment

Following the recommendations of Hair Jr et al. (2016), the reflective measures in this model were examined in terms of (1) convergent validity (2) composite reliability, and (3) discriminant validity. To examine convergent validity, the outer loadings of the indicators are evaluated to ensure that they are significant, exceeding the threshold of 0.708. The outer loadings of all the model's reflective constructs exceed the threshold as shown in Table 1, suggesting convergent validity. Convergent validity is further confirmed, as the average value extracted (AVE) exceeds the suggested threshold of 0.500 (Table 1). Additionally, composite reliability is confirmed as it is above the suggested threshold of 0.800 for all of the variables (Table 1).

To examine discriminant validity, the cross loadings of the indicators are evaluated. As highlighted in table 2, the outer loadings of each construct's indicators are larger than all of the other construct indicator loadings, thus indicating discriminant validity.

Latent variables	Indicators	Outer loadings	AVE	Composite reliability	Discriminant validity?
Influencer	INF_TRUST1	0.8887	0.7935	0.9202	Yes
trust	INF_TRUST2	0.9161			
	INF_TRUST3	0.8669	_		
Ad enjoyment	AD_ENJOY1	0.8969	0.8294	0.9511	Yes
	AD_ENJOY2	0.9197			
	AD_ENJOY3	0.9199			
	AD_ENJOY4	0.9062			
Brand trust	BRAND_TRUST1	0.8866	0.776	0.9202	Yes
	BAND_TRUST2	0.8943			
	BAND_TRUST3	0.8616			

Table 1 Results of reflective measurement models

Indicators	Ad enjoyment	Brand trust	Influencer trust
AD_ENJOY1	0.8969	0.4897	0.6244
AD_ENJOY2	0.9197	0.4625	0.6446
AD_ENJOY3	0.9199	0.4719	0.6609
AD_ENJOY4	0.9062	0.4618	0.6347
BRAND_TRUST1	0.4341	0.8866	0.512
BAND_TRUST2	0.4906	0.8943	0.5238
BAND_TRUST3	0.4446	0.8616	0.4898
INF_TRUST2	0.6718	0.5538	0.9161
INF_TRUST3	0.58	0.5084	0.8669
INF_TRUST1	0.6261	0.4777	0.8887

 Table 2
 Cross loadings of indicators

The Fornell-Larcker criterion was additionally used to confirm the discriminant validity. As highlighted in Table 3, the square roots of the AVE for each construct were found to be larger than the correlation coefficients between the construct at hand and all of the other constructs in the study's model, thus confirming the discriminant validity.

Formative measurement model assessment

The formative measures were examined for (1) collinearity and (2) significance of the outer weights of the indicators according to the recommendations by Hair Jr et al. (2016). To detect any collinearity issues, the variance inflation factor (VIF) values were measured. As depicted in Table 4, the highest VIF of the formative indicators is 2.9468 which is well below the suggested threshold of 5. Therefore, collinearity is not an issue in the formative constructs and is not expected to negatively affect the estimation of the model.

Table 3 Fornell-larcker criterion	Construct	Ad e	enjoyment	Brand trust	Influencer trust
cincilon	Ad enjoyment	0.91	07		
	Brand trust	0.51	77	0.8809	
	Influencer trust	0.70	41	0.5774	0.8908
Table 4 Variance inflation faster (VIII) Image: Comparison of the second seco	Construct		Indicators		VIF
factor (VIF)	Brand liking		BRAND_LIK1		2.2603
			BRAND_LIK2		2.9468
			BRAND_	LIK3	2.2348
			BRAND_	LIK4	2.7976
			BRAND_	LIK5	2.699

Table 5 Significance of	Indicators	t-value	p-value
outer weights	BRAND_LIK1	6.2542	0
	BRAND_LIK2	0.4826	0.6296
	BRAND_LIK3	7.6808	0
	BRAND_LIK4	3.3593	0.0008
	BRAND_LIK5	3.8514	0.0001

As shown in Table 5, the outer weights' p-values of all but one of the indicators are significant at the 1% level. The remaining indicator (i.e., BRAND_LIK2) is insignificant, however, since its outer loading is significant, it will be kept in the model.

4.3 Hypothesis Testing

The first step of testing the model is to examine each set of independent variables separately in each relationship in the structural model for collinearity issues. As shown in Table 6, all of the VIF values are all below 5. Therefore, collinearity is not deemed an issue in this structural model.

The significance of each hypothesized relationship in the model is then assessed using bootstrapping techniques. All of the hypothesized relationships in the model are significant at the 1% level, except the relationship between ad enjoyment and brand trust, which is insignificant as shown in Table 7.

Moreover, the explanatory power of the independent variables (R2) ranges from approximately 36% to 58% (Table 8), with brand trust being the most explained by its predictor variables (57.79%), followed by ad enjoyment (49.58%) and brand liking (36.19%). The R square value for ad enjoyment is especially interesting, as this construct is only predicted by one variable (i.e., influencer trust) in the study's model.

Finally, when running post-hoc mediation analysis it was found that brand liking partially mediates the relationship between influencer trust and brand trust.

Table 6 Collinearity assessment of the model	Construct	Ad enjoyment	Brand like	Brand trust
	Ad enjoyment			2.2051
	Brand liking			1.7423
	Influencer trust	1	1	2.1973

H#	Hypotheses	p-values	Accepted or rejected?
1	Influencer trust positively affects customers' brand trust	0	Accepted
2	Influencer trust positively affects customers' brand liking	0	Accepted
3	Influencer trust positively affects customers' ad enjoyment	0	Accepted
4	Brand liking positively affects customers' brand trust	0	Accepted
5	Ad enjoyment positively affects customers' brand trust	0.9928	Rejected

 Table 7 Findings from partial least-squares structural equation modeling

Table 8 R² results

Construct level	\mathbb{R}^2
Ad enjoyment	0.4958
Brand liking	0.3619
Brand trust	0.5779

5 Discussion

This study contributes to the literature by empirically investigating social media influencer marketing and its impact on customer perceptions of the brand. It specifically sheds light on the role of trust transfer between SMIs and the brand they are endorsing, in addition to mediators of this transfer. Indeed, influencer trust is still a nascent research area and the papers investigating its nuances are generally limited (Kim & Kim, 2021). However, investigating the customers' trust in social media influencers is of increasing importance, as consumers are getting more and more skeptical of this marketing method with time (Mannheim, 2021; Watson, 2019). Therefore, the researchers, first, aimed to uncover if social media influencers are still trusted by consumers. Indeed, based on our descriptive statistics, it turns out that 70% of the survey respondents trusted social media influencers. Additionally, we aimed to find out if this trust transfers to trust in the brands endorsed by the influencers, and if brand liking and ad enjoyment mediate this relationship.

In our model, we hypothesized a positive relationship between the customers' trust in a social media influencer and their trust in the brand that they are promoting and found significant support for this relationship (H1). This is consistent with the propositions of the trust transfer theory, which suggests that an individual could trust a party if they are associated with another party that they already have trust in Stewart (Smith, 2004; Zhao et al., 2019; 2003). The consumers trust in an influencer has also been found to lead to brand liking (H2), which consistent with both the signaling theory (Chen et al., 2019) and the social learning theory (Bandura, 1971; Glucksman, 2017). These two findings reflect that despite some consumers' skepticism toward

social media influencers, influencers do still influence their followers and affect their perceptions toward brands, whether in terms of trust or liking.

An interesting finding from this paper is the impact of the influencer's trust on ad enjoyment (H3). Indeed, our results indicate that almost half of the ad enjoyment sentiments in the study's sample can be explained by influencer trust. This is an important finding, because trust is usually linked in research to customers' behaviors and intentions and very rarely to their affective responses. Therefore, for influencer trust to have this high explanatory value to ad enjoyment is a novel finding. It is important to bear in mind, however, that only video adverts were shown to the respondents in this study, so customers' enjoyment of other ad formats could be different.

Through our results, it was found that brand liking is significantly connected to brand trust (H4). This is the first study that links these two constructs in the field of influencer marketing, although significant relationships between salesperson liking and trust was found in prior research (Doney & Cannon, 1997; Nicholson et al., 2001). Finally, no significant relationship was found between ad enjoyment and brand trust (H5). This means that the ad itself, even if very enjoyable, does not necessary send signals of brand trust to the consumers.

The findings from this research highlight that social media influencer marketing can still be regarded as an effective tool in a company's digital strategy. However, it is necessary that marketers pick influencers that are trustworthy to their audiences in order for such marketing efforts to succeed. Our results are especially useful for social media influencers, as they highlight the importance of nurturing and growing a trusting relationship between them and their audience. If they do not achieve such relationship, they then will not be able transfer trust to the brands they are promoting, whether they their own or other companies' brands.

For future research, it would be interesting to find out, through a longitudinal study, if trust in the influencer transfers to short-term or long-term trust in the brand and what affects the persistence of this trust. Another interesting future research subject would be about the effect of cancel culture on trust in influencers and brands.

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The Usage of Artificial Intelligence in Journalism



Abdulsadek Hassan and Akram Albayari

Abstract The study aims to identify the techniques of the Fourth Industrial Revolution, in many new technologies produced by that revolution, which will form artificial intelligence journalism. The dependence of some media on a "robot" in newsrooms or media institutions, which represents open data journalism, big data journalism, blockchain journalism, cloud journalism, and other tools that constitute the era of artificial intelligence journalism. The results also revealed that the provision of big data for press and media content seems astonishing, if the right moment comes to expand it, the press of artificial intelligence based on big data can provide contents that are difficult for human effort to come up with the same effort, time and cost.

Keywords Artificial intelligence · Journalism technology

1 Introduction

The media in the current era is witnessing a shift towards the techniques of the Fourth Industrial Revolution and artificial intelligence techniques, and artificial intelligence journalism is concurrent with the technological revolution, and it is the next future of journalism, as dealing with coverage of events and issues around the world changes in terms of using various tools and mechanisms, dozens of times faster and more accurate (Visvam-Devadoss et al., 2019). From social media, reliance on the latest satellites, whose Internet speed exceeds a thousand megabytes, and relies on robots to cover events and issues around the world, especially in areas of conflict and crises, wars, space, fires, and others (Calvo Rubio and Ufarte Ruiz, 2021).

This technology leads to the restructuring of the media, so the total dependence of the media on the technologies of the Fourth Industrial Revolution, meaning that

A. Hassan (🖂)

Ahlia University, Manama, Kingdom of Bahrain e-mail: aelshaker@ahlia.edu.bh

A. Albayari Al-Azhar University, Gaza City, Palestine

e-mail: a.baiary@alazhar.edu.ps

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the robot plays the role of journalistic work without human intervention, and this is considered a small part of the tools of artificial intelligence journalism (Lu et al., 2018), as some major press institutions have now become Robots and other tools are used in their newsrooms, and this causes changes in the mechanism of work and management of media institutions while eliminating the human element (Helberger, 2019), and this contributes to reducing cost and speed of production, which will positively affect media institutions (Saad & Issa, 2020).

Therefore, journalists today are required to keep abreast of these editorial and technical developments, and to work on acquiring multiple skills, to be able to produce media material that requires many skills at the same time, and to master a variety of media to keep pace with these developments and the continuation of the human element in the media field (Fletcher et al., 2020).

AI will have a massive impact on the media sector, and it has already started. However, it is difficult to predict exactly how AI will affect this field because there are many possibilities that arise from this technology. Some of these opportunities for AI journalism are exciting and innovative, while others may seem more troubling (Wu et al., 2019).

AI journalism is a real thing as it has already been used in many news organizations around the world. In 2017, journalists from the Associated Press used artificial intelligence to write more than 2,400 stories about quarterly corporate earnings reports (Goni & Tabassum, 2020). The Associated Press's use of artificial intelligence is an important step forward for journalism as we know it (Ford & Hutchinson, 2019).

The economic fallout from the COVID-19 pandemic has created an unprecedented crisis in journalism that could wipe out news organizations around the world (Jones & Jones, 2019).

Perhaps the survival and continuity of the press lies in its adoption of the concepts of flexibility, sustainability, coexistence with uncertain conditions, and the transition to the new normal, which expresses the massive changes accompanying the Covid 19 crisis, including the acceleration of the adoption of advanced technologies such as artificial intelligence (Saad & Issa, 2020).

Artificial intelligence refers to "machines that can learn through experience, simulate human intelligence in performing tasks, and their ability to develop themselves automatically based on the information they collect, examine, mine and extract patterns from Lewis et al., 2019b.

Some scientists went even further. Hans Morvik and Ray Kurzweil mentioned that it is technically possible to copy the brain directly in hardware and software, which is the so-called artificial brain technology, which Neuralink, owned by Elon Musk, is conducting experiments and tests, with the aim of enabling coexistence between humans and artificial intelligence (Ford & Hutchinson, 2019).

When looking at the concept of AI Journalism that has emerged recently, we find that it can be defined by the rich possibilities offered by advanced technologies, such as machine learning, deep neural networks, natural language processing, natural language generation, automatic summarization, computer vision (Biswal & Gouda, 2020), and others, So that news organizations can take advantage of AI techniques to automate many of the tasks that make up the AI chain, including data mining,

data mining, proofreading, and producing stories and infographics, using sorting, selecting, filtering and prioritizing, and tagging articles automatically (Weber et al., 2018).

2 Defining Artificial Intelligence Journalism

A new era of media industry development, fully compatible with the technologies of the Fifth Industrial Revolution, where media institutions will disappear in their traditional form and turn into millions of information centers spread all over the world, with the spread of seventh generation networks that cover every point on the globe and under the sea with Internet networks. It works without interruption (Dörr & Hollnbuchner, 2017).

Seventh generation journalism will depend on individual contributions and direct communications between humans via electronic chips, in the absence of television and radio stations, news platforms, and smart phone applications, to be replaced by images and automatic content broadcast from central stations and multiple satellites (Lewis et al., 2019b), and works via smart electromagnetic waves that the audience picks up via the electronic chips installed by each individual, and through the Internet of bodies, which will be the best means of communication at that time (Wright & Doyle, 2019).

3 Artificial Intelligence Journalism and Robot Journalism, What is the Difference Between Them?

The concept of artificial intelligence journalism is new, as I began to formulate its meaning by looking at many foreign articles and studies, which focused primarily on robot journalism. on the technologies of the Fourth Industrial Revolution. At the beginning (Wölker & Powell, 2018), there were previous efforts a year or more ago that dealt with the phenomenon of "robot journalism," which is meant for the robot to play roles in media work, and here is a big difference between the two terms. The robot is just a tool of artificial intelligence journalism (Salazar, 2018).

It can be said that there are many tools that the fourth industrial revolution will provide and play a major role in shaping the concept of artificial intelligence journalism (Thurman et al., 2019), such as: (Internet of things platforms, high-definition mobile devices, location detection technology, advanced human–machine interaction, authentication and fraud detection, 3D printing, smart sensors, big data analysis and advanced algorithms (Dörr & Hollnbuchner, 2017), multi-level interaction with customers and information gathering, reality augmentation/wearable devices, blockchain technology), and each of these technologies has significant roles in driving AI journalism (Ford & Hutchinson, 2019).

4 Smart Interaction in the New Press

Many newsrooms and news agencies have, for some time, entrusted sports news, weather, the movement of financial markets, as well as corporate performance topics to computers (Veglis & Maniou, 2020). Often attributing their story to a single source, digital programs are able to import data from several sources, identify trends and patterns, use natural language processing technology, contextualize those trends, and synthesize flowery sentences that include adjectives, metaphors, and analogies (Jones & Jones, 2019).

Intelligent machines can increase the momentum, creativity, and ability of journalists' reporting by following data models and programmed to "learn" changes in them over time. Algorithms can help journalists arrange, sort, and craft texts at previously unimaginable speeds. It is able to organize data in order to find the missing link in any journalistic investigation (Ali & Hassoun, 2019).

It can also identify trends and detect dissonance among the millions of data points that may be the beginning of a great journalistic scoop. Today, for example, the media can feed public procurement data to Al-Khwarizmi, who in turn is able to review the data and compare it with companies located at the same address and may improve this (Ali & Hassoun, 2019). The system provides reporters with many hints that may lead them to the root of corruption in a particular country (Lewis et al., 2019a).

Smart computers not only analyze vast amounts of data to help finish investigations quickly; It also helps to find sources, fact-checking stories from the public to see if contributions are trustworthy according to a 2017 report by the Tow Centre, many US media outlets are currently using artificial intelligence to verify facts. Reuters, for example, News Tracer is used to track breaking news on social media, and to verify the integrity of what is posted on Twitter (Veglis & Maniou, 2020). On the other hand, the Brazilian group Serenata de Amor, which includes a number of journalists and tech enthusiasts, is used to track down every refund alleged by the country's People's Assembly, and to shed light on some of the suspected public expenditures (Ali & Hassoun, 2019).

There are many other ways that algorithms can help journalists, from making raw videos, to recognizing voice patterns and detecting the identity of faces in a group of people that can be programmed to chat with readers (chat bots) and answer inquiries (Biswal & Gouda, 2020). This process is impossible without a human journalist asking questions about the data, with a goal in mind. Reporters and editors must quickly learn how to operate these systems, and how to allow them to use them to improve their journalistic work (Helberger, 2019).

Most of the world's journalists do not have access to a team of programmers and data scientists to help them design and build their projects Collaboration is the answer small newsrooms and freelance journalists can make up for the lack of resources by collaborating with digital software developers, to help build an ever-increasing and ongoing collaboration. Their insight into the many open source research and analysis tools available (Yanfang, 2019).

Communication between journalists and technologists is not self-evident. It requires a lot of learning from both sides, and some trial and error. According to continuous technical development, journalists have an ever-expanding toolkit that allows them to hold power to account thanks to this increased ability to listen to their communities, and getting to know their needs, it can be a pity not to try (Goni & Tabassum, 2020).

5 From Voice to Text

Perhaps one of the most prominent uses of artificial intelligence is through the use of speech to text software. Recently, Zack Seward, Editor-in-Chief of Quartz News, gave a speech at a conference organized by the tech giant "Tencent" in China, and this speech was distinguished in that it was transformed directly into a journalistic story (Jones & Jones, 2019), through a performance collaboration between AI-based voice-to-text software, Automated Transcription techniques, and an automated news writing program called Dreamwriter. And this Dreamwriter, according to Niemann Lab, produces about 2,500 news articles on economics, technology, and sports every day (Thurman et al., 2017).

6 Advantages and Disadvantages of Applying Artificial Intelligence Journalism in News Organizations

Employing artificial intelligence journalism in news organizations provides multiple advantages, including supporting routine press assignments, by providing alerts about events, automated scheduling of content, and the generation of stories and news articles (Lu et al., 2018) such as (the natural language generation algorithm GPT-3, which the British Guardian newspaper used in cooperation with a company Open AI, in writing a news article convincing humans that robots hold the olive branch of humanity, a symbol of peace, as the GPT-3 algorithm excelled in analyzing 45 terabytes of data, and 175 billion parameters, and thus was able to open new horizons by generating more in-depth narratives than generating algorithms traditional language) (Dierickx, 2019).

Moreover, AI technologies can perform complex actions based on massive amounts of data, expand media coverage in areas that a journalist cannot reach (such as war and conflict areas, and hazardous climatic environments such as floods, volcanoes, and earthquakes) (Calvo Rubio and Ufarte Ruiz, 2021), and improve real-time news coverage. Actual, (such as providing real-time health news about the Covid-19 epidemic, provided by some international news organizations such as The Washington Post, CNN News, and many major tech companies such as Google), and providing the audience with news content according to their interests and preferences based on an algorithm Research, recommend, and others (Túñez-López et al., 2019).

On the other hand, the efficiency of these techniques requires the quality of the data entered, as the principle of Garbage Input and Garbage Output (GIGO) in computer science states that if the garbage input data is defective or illogical, it will produce illogical outputs, and without accurate and reliable inputs, it is impossible to obtain on accurate and reliable outputs (Jones & Jones, 2019).

The automation of journalistic production methods is not limited to generating texts only, but also goes beyond it to the artificial intelligence-based voice technology that converts text articles into speech, and read them aloud, (as implemented by BBC News on its site (Carlson, 2015), where the channel collaborated with Microsoft To create a new software for voice and artificial intelligence, using deep neural networks to produce artificial voice, natural tone, and clear expression of words, the tool is able to recognize user behavior patterns and prioritize content based on their preferences) (Veglis & Maniou, 2020).

In addition, news organizations have employed an automated video system to produce news reports based on artificial intelligence, such as that launched by Reuters news agency in cooperation with Synthesia, where the system creates a fully programmable virtual presenter by integrating video footage of a human presenter with artificial intelligence (Helberger, 2019). The robot host provides news summaries by mining images and reports available on the Reuters website, and then takes action and adds essential comments without human text, editing, or production (Lewis et al., 2019a).

On the other hand, news organizations face several major hurdles related to the adoption and development of AI technologies: cultural resistance associated with job losses, business process changes, and high development costs, which explains why major news companies and organizations have access to them (Caswel, 2019).

7 The Use of Artificial Intelligence Systems in Newsrooms in Three Areas

While searching for news: AI is used to program audio-to-text interviews, monitor events as they unfold, translate foreign news sources, gather relevant posts from social media, and search archived stories, reports, and records to find additional information (Thurman et al., 2017).

A journalist sits at his desk while writing an article using a computer with multiple windows and sources on the screen (Veglis & Maniou, 2019).

During the article writing process: AI technologies help check news, suggest grammatical corrections and phrasing improvements, and customize articles for a variety of different audiences by monitoring things like local crime events, education and housing statistics (Xu & Lan, 2020).

During publishing and distribution: AI techniques are applied to analyze news and automatically tag important news by category news topics so that readers who usually follow similar topics can find content that interests them (Lewis et al., 2019a).

8 The Most Important Modern Practices

Recently, several areas for employing the use of artificial intelligence in journalistic work have emerged (Visvam-Devadoss et al., 2019). The Associated Press is considered one of the first media organizations to use artificial intelligence techniques in journalistic work. It has employed artificial intelligence techniques in producing quarterly economic reports on financial income, and the result was Impressive in terms of quantity and quality together, the new technology has contributed to the completion of more than 3000 economic reports instead of 300 reports that took journalists a lot of time and effort, and more than that, these reports include expert advice, and the numbers and facts contained in these reports accurate (Calvo Rubio and Ufarte Ruiz 2021). The agency is now using "bots" that perform basic news tasks such as writing two to six paragraphs of sports results and quarterly earnings reports. Also, Heliograph, the correspondent robot for the American newspaper "Washington Post", was able during one year (mid-2016–2017), to complete 850 press articles, starting with 300 reports on the Rio de Janeiro Olympics (Fletcher et al., 2020), and after this successful experiment the newspaper was used "The Robot" has covered the US Election Day race and the Washington high school football league, as well as producing many different stories and tweets (Saad & Issa, 2020). Also, The New York Times has employed a new technology for artificial intelligence in two ways: The first method simplifies the journalistic process through the use of tags, the computer has learned to recognize keywords indicating the main features in the text, which helps users in speeding up searches, and extracting Information and news check (Jones & Jones, 2019). The other way is to use artificial intelligence to manage readers' comments; Because the Reader Comments section is managed by a staff of 14 editors who are responsible for reviewing approximately 11,000 comments per day. But the new technology Perspective API developed by Jigsaw enabled the management and organization of readers' comments effectively, thus users were able to read readers' comments by swiping a bar from left to right, and the right part of the bar indicates topics with negative comments, and this is a good way for users to read and interact with comments they like and avoid comments with hostile views (Salazar, 2018). The Guardian has published articles written by ReporterMate, a bot that converts data into text reports ready for publication. According to the New York Times, nearly a third of the content published by Bloomberg is done through automated systems without the need for a human element. All of this is accompanied by expectations that artificial intelligence will be able to write 90% of the total news by the year 2025 (Túñez-Lopez et al., 2019). There are other well-established news platforms that are working on advanced technical projects to develop the process of extracting news content and writing stories and press news, such as: The Washington

Post, which developed the concept of journalism Automated Journalism. These techniques were used to analyze news related to the Rio de Janeiro Olympics in Brazil. CNN also uses a chatbot or automated chat system to send a daily report to your Facebook Messenger account on the most important news that interests you based on your interests. The Guardian newspaper does the same (Zhou & Liao, 2020). The New York Times is also reducing the process of building stories and news through the Editor Project, which analyzes and understands content through artificial intelligence and machine learning (Salazar, 2018).

9 Newsletter Journalism

Creating a website newsletter is an effective way to re-attract readers and keep them in touch with the latest news and developments. Newsletter helps website visitors come back to them frequently. Newsletters are essential in taking media marketing to the next level. They open up your newsletter to increase understanding and knowledge of your material (Visvam-Devadoss et al., 2019). They broaden horizons and give your audience a broader picture. Including helpful links and visual descriptions can attract more readers. One of the most famous newspapers that is distinguished in its mailings is "Times" newspaper, which has 13 million subscribers to more than 50 newsletters via email (Túñez-López et al., 2020), "which means that the Times has a channel of communication with its users that cannot be touched by neither Facebook, nor Google, nor the giants of advertising revenue (Zhou & Liao, 2020). When users receive an email and click on the link, they are automatically directed to the Times website and the newspaper's advertisers, and it means that people who sign up for free mailings have more direct and long-term relationships with the publisher (Schapals & Porlezza, 2020). Direct communication translates into some economic results: email newsletter subscribers are twice as likely to become subscribers as regular Times readers (Caswel, 2019). They also read twice as much as a regular Times reader during a month. This relationship allows the publisher to develop larger revenue streams (Saad & Issa, 2020). Email is an excellent way to interact with users and create a true two-way communication route. So far, a large number of digital news organizations are not making efforts to develop and own a relationship with users (Biswal & Gouda, 2020), that relationship with loyal users that allows the media organization to develop several revenue sources, and it is the key to achieving continuity, and on top of this, today's newsletters can be managed, manufactured and directed based on artificial intelligence (Jones & Jones, 2019). Completely without human intervention, the reader's interests can be chosen, handouts and formatted also in unique templates, providing the publisher with accurate statistics about interactions to continuously improve the experience (Kieslich et al., 2021).

10 Big Data and Journalism

AI has a powerful ability to instantly interact with data and connect it to the outline of a story. Whereas writing quarterly reports-performance reports, etc.-used to take weeks of effort by the press team to draft, now AI can prepare them in just seconds! (Jones & Jones, 2019). It has become natural to rely on the robot to analyze huge data, which may sometimes amount to millions of (gigabytes) of data, which can be analyzed in order to issue documented and in-depth press reports that operate 24 h a day continuously and accurately, saving time and effort (Salazar, 2018). For example, the Panama Papers took many months to analyze its data in order to come up with data through press reports, while artificial intelligence techniques can analyze data that exceeds the size and difficulty of the topics of the Panama Papers, in a short time. The most prominent example of this is the experience of Bloomberg News Agency (Xu & Lan, 2020), which employed artificial intelligence robots to analyze trends in large data sets and sends alerts to journalists when a trend or shift appears in this data; To help them analyze the markets in the required professional manner, according to a balanced and impartial economic vision (Fletcher et al., 2020). What big data can provide for press and media content, seems amazing, if the right moment comes to expand it, the press of artificial intelligence based on big data can provide contents that are difficult for human effort to come up with with the same effort, time and cost (Whittaker, 2019).

11 Robots and Write Press Articles

According to experts at Forbes, the benefits of artificial intelligence can be limited to four areas.

11.1 Speed of News Transfer

Robots get things done very quickly. In 2014, the Los Angeles Times reported that an earthquake occurred three minutes after it occurred. The company used a "software bot" called "Quake Bot" to write automated articles based on the data collected. Give it to the robot (Jones & Jones, 2019).

Speed is the most important factor in journalism, especially breaking news. Media institutions that are able to access news faster will be able to obtain the greatest amount of privilege and follow-up. The use of robots will increase the speed of news transmission that serves the press in general (Saad & Issa, 2020).

11.2 Changing the Quantity and Cost of News Production

There are many artificial intelligence tools to discover trends or topics circulating on the Internet and social media, as it determines the trend of individuals and what they want to watch, and based on that you create the content (Caswel, 2019).

The issue of using robots will reduce the cost for media institutions, because instead of having a large number of journalists following the news, they adhere to specific working hours (8 h or more) (Kieslich et al., 2021).

With the help of robots, a very large number of journalists will be dispensed with, and the number of working hours will increase. These features will certainly reduce costs (Carlson, 2015).

11.3 Detecting Literary Theft

Artificial intelligence is used to detect plagiarized articles through data mining and identification (Parratt-Fernández et al., 2021). Plagiarism is a threat to the journalism industry, and a plagiarized article can lead to the collapse of the journalist's career and undermine the reputation of the news agency in the market (Túñez-López et al., 2020).

The algorithms can quickly search and search for stolen clips or articles, a task that can be very daunting for human journalists (Caswel, 2019).

11.4 Detecting Fake News

I systems are able to identify the true sources of news content from fake sources. Identification of fake news is critical in spreading false news (Helberger, 2019).

This is what we are witnessing today on the communication platforms, which have made a very great effort to expose fake news regarding the Corona virus in terms of treatments and vaccines (Thurman et al., 2019).

12 Challenges Facing Some AI Journalism Techniques

Despite the development of these technologies from time to time at varying speeds, some of them still face challenges that prevent the maximum benefit from the possibilities that these technologies are supposed to provide, in two areas:

12.1 I—Writing Articles and Reports

Where those articles and reports prepared by these algorithms are subject to criticism in their credibility, and artificial intelligence journalism lacks the principle of transparency, and that it is just algorithms that may be affected by human bias by its programmers and based on those biases (Wölker & Powell, 2018). It may produce false or misleading contents, with the importance of its presence in refining the journalistic work and the speed of its completion, provided that this is subject to the principle of journalistic transparency, without which the press loses its credibility (Thurman, 2019).

No matter how advanced they are, and no matter how modern techniques, decorations and forms are used (Broussard et al., 2019). This is in addition to the shortness and limitations of articles and reports written by robots, but this challenge will not remain for a long time in light of the accelerating pace of development of the linguistic capabilities of artificial intelligence, which is witnessed by GPT language prediction software, developed by Open Al, it is a software that has 175 billion variants, which means an unlimited ability to generate texts of high linguistic quality (Salazar, 2018).

The other_ in the use of the announcer robot: as the robot broadcaster cannot read between the lines, nor is he able to identify the simple, subtle or hidden differences in the topics and news stories presented to him, and these are two things that he relies on in building news stories, in addition to the fact that the robot does not He bears responsibility for what he prepares and presents of content, reports and news stories, and this is a matter of moral responsibility, which the broadcaster does not have the robot [45].

The robot announcer will overcome this challenge little by little with the development of his capabilities later, with the speed of self-learning it possesses, in addition to the human supervision of the programmed journalist on the robot, which helps to add a subtle human touch to the performance of the robot announcer (Lewis et al., 2019a).

12.2 Notification of the Near Future

The media of the future will depend entirely on artificial intelligence in creating, presenting and interacting with media content, and journalistic work will require new skills that the journalist did not need before, such as:

1. Dealing with software in design, use and evaluation, as the work of such software in journalistic work depends mainly on data, and here comes the role of the programmer journalist in feeding the software with the required data that meet the conditions of validity and transparency (Visvam-Devadoss et al., 2019), then he continues to perform his programmatic journalistic work in ensuring the correctness of the work of those software As well as correcting its performance

and helping it to self-learning, and finally evaluating the work accomplished by these programs before publishing it. (Lu et al., 2018)

2. Supervising a group of robots that help in collecting and classifying information, and the journalist will direct these robots towards collecting data, photos, videos and graphics required in a specific field, and using them to provide the material that the public wants to access (Segarra-Saavedra et al., 2019).

In terms of display media, media work via satellite channels will decline in favor of online presentation, and with the daily acceleration in Internet speeds globally, satellite channels may disappear (Túñez-López et al., 2019), and television sets have begun to lose followers in favor of the smartphone, and direct broadcasting via the Internet will represent a golden opportunity to liberate media work from government censorship (Wölker & Powell, 2018). And it is expected that the user will contribute to paying the high cost of future media, and will pay that price in waiving privacy in favor of those online channels, which will benefit from them in the advertising field, by selling user data to advertising companies (Biswal & Gouda, 2020).

13 Legal and Ethical Challenges

13.1 Redefining Copyright and Fair Use

New technologies have often challenged copyright laws in the creative industries. Machine learning potentially represents a new conflict, as it involves AI learning from human-created "expressive" works—a data set of articles, paintings or music, for example, that tends to be owned by rights holders—and generating its own output (Salazar, 2018). This would potentially test the legal interpretation of "fair use," where copyrighted material is used to produce new, "transferable" content without permission or payment of royalties [45].

13.2 Ensuring Corporate Accountability

Since AI cannot be legally accountable, human accountability must be included throughout the content value chain. Content distributors such as: Facebook, Google and Twitter have unparalleled power to inform and shape public opinion, because AI algorithms are used to determine the relative value of the content that appears in front of users (Zhou & Liao, 2020). Thus, platforms as owners of the means of production are responsible for preventing the dissemination and promotion of harmful information by the algorithms they have developed (Fletcher et al., 2020). While better measures are needed to ensure that intentional misleading content is stopped from its root, one can question whether false news and misinformation

exist because commercial incentives to increase engagement are too great to resist (Carlson, 2015).

13.3 Exacerbation of Asymmetric Strength

The largest newsrooms are building their own AI, but smaller stores may not have the financial capacity or technical expertise and will have to license private content. The fear is that choosing to "buy" over "build" is fueling an "arms race in favor of AI" that fosters power among a handful of companies (Caswel, 2019). A similar dynamic may appear elsewhere in the creative economy as AI becomes more pervasive—in the same way that it has become more dependent on tech giants for revenue growth, other creative industries may see their operational infrastructure (Goni & Tabassum, 2020).

14 The Dangers of Artificial Intelligence Techniques in the Media Field

Despite the benefits achieved by the use of these technologies in the media field, it has begun to raise some fears in the media community that these technologies will lead to the decline or extinction of the role of the human cadre in the media field, and some forward-looking questions have arisen about the extent to which the human element can be dispensed with (Visvam-Devadoss et al., 2019). In this field, and this was the reason for dividing the opinions of specialists and followers in this regard into two groups:

One: These technologies will lead to a significant decline of the human element in the media field, and only play marginal roles, provided that these technologies carry the largest burden in preparing, publishing and interacting with content and dealing with feedback on the media message (Fletcher et al., 2020). Among those who adopt this proposition is a recent study published by the Institute (The American Future Today) a study that dealt with the threat of artificial intelligence to the press in the future, and that study concluded that the technical development in this field may lead to the dispensation of journalists, as there is no need for them as long as these technologies can prepare reports on journalistic topics such as matches, financial news, and so on. Among other topics and press reports, the development of voice interaction techniques between the computer and users will help (Saad & Issa, 2020). To play its traditional role in controlling and shaping public opinion, we can compare traditional journalism with artificial intelligence in terms of follow-up, analysis and access to knowledge (Túñez-López et al., 2021).

The other direction: The owners of this trend believe that artificial intelligence journalism techniques will not eliminate the journalist's job but will contribute to the development of his performance (Lewis et al., 2019a), and artificial intelligence will help journalists to perform their work better, and it cannot replace them in the media field. This is also the view of Francesco Marconi, a specialist in artificial intelligence journalism and the author of the book (Artificial Intelligence and the Future of Journalism), where the machine will not replace the journalist, and will not reduce the number of journalistic jobs (Fletcher et al., 2020), despite the fact that the machine It itself will carry out about 12.8% of the journalist's work, but the efforts of journalists will be directed towards value-added content in terms of more length, greater prospects, as well as deeper analysis (Yanfang, 2019). However, despite this difference in views among specialists regarding these technologies, the opinions are almost unanimous that there is an imminent change that will occur in the concept of journalists to keep pace with these technical developments in the media field (Caswel, 2019).

15 Benefits of Using Artificial Intelligence Techniques in the Media Field

Artificial intelligence is characterized by high speed in accessing, analyzing and producing data, so it has been used in the media field to achieve many purposes, including:

- 1. Writing reports and news: stories, where the robot can write media content, including the (Washington Post) using a robot called (Heliograph Post), which was able to write 800 reports on the Olympics and the 2016 US presidential elections (Dörr & Hollnbuchner, 2017).
- 2. **Increasing media reports**: by using the efficiency and speed of these techniques in the production of reports, as done by the Associated Press, which increased its reports from 300 to 4,400 reports, in dealing with the profitability reports of some companies, and this significant increase in the percentage of reports She was not able to do it in the traditional way that relies on the human element to write and prepare it (Túñez-López et al., 2020).
- 3. **Fighting false data**: These technologies provide means to find out false data, through the use of smart programs that can identify false data and news from the real, and among these programs is the Smart News program, which compares news with patterns of fake news, and in the light of this comparison it is judged to be false that news or its truth (Lewis et al., 2019a).

It is clear from the foregoing that artificial intelligence journalism techniques have become important due to their great benefits in improving, developing and speeding up journalistic work (Goni & Tabassum, 2020).

16 Disadvantages of Artificial Intelligence Journalism

Artificial intelligence journalism has many advantages, but it is not without flaws and fears that threaten humans, and one of the biggest risks is the decline in human jobs in the field of media because the machine can replace humans (Wu et al., 2019).

But what reduces these fears is the electronic press, which is poor in language and analysis, when telling a story that does not care about the small details that matter to society and that attract the audience to it (Kieslich et al., 2021). It is a machine trained in a traditional style that does not contain feelings or supernatural intelligence, and these are the features of the human brain. of artificial intelligence in thinking and telling stories (Veglis & Maniou, 2020).

Bias is one of the most prominent problems that can surface in artificial intelligence journalism. There is no media coverage unless it is biased. Bias is something that is not available, and objectivity is selected (Carlson, 2015). There is professionalism, yes, but there is no objectivity, because the media coverage in itself is a message, and the message must be directed (Dörr & Hollnbuchner, 2017). The use of robots is a "moral question" that will increase in the coming days; Because part of objectivity's handling of news is due to the arbitration of reason, logic and feeling (Lewis et al., 2019b).

Now the use of robots will lead to maximizing the mental aspect and the absence of the other two sides, and this means that press coverage will be more objective, but in a way that the message or media coverage may lose its content (Jones & Jones, 2019).

The big question here is who will put the algorithms to run these journalistic bots, they are engineers and programmers (Túñez-López et al., 2020).

However, to what degree can these programmers be able to understand and comprehend the logic of journalism's work in order to integrate this logic into algorithms, so that the results come out largely identical to the media reality (Broussard et al., 2019).

Some channels have recently used robots to transmit news, only to transmit without acting on it, and who will determine the morality of the news, the morality of the coverage, etc. (Lewis et al., 2019a).

Biased artificial intelligence systems will create news that contains many fake or biased articles, which will enter us in a new phase of the absence of truth (Fletcher et al., 2020).

Despite the actual applications of artificial intelligence in journalism, there are many problems it faces, which are summarized in: its use in propaganda and misinformation through false or misleading news or data analysis according to certain trends to guide public opinion, and journalists losing their jobs although it allows other jobs that require more skills, and making mistakes, especially with the lack of human intervention (Segarra-Saavedra et al., 2019), in addition to the problem of property rights, and also the digital divide, as there are countries that have made great progress in collecting data about others, such as China, which is a pioneer in this field and bias in writing algorithms, according to the orientations of its programmer, and finally

privacy, one of the most prominent obstacles is also the problem of its application in the Arab world, due to two basic problems, the first of which is Arabization, and the second of funding, in addition to the weakness of the information infrastructure and illiteracy (Parratt-Fernández et al., 2021).

17 Examples of Uses

1/ On March 12, 2014, the Los Angeles Times succeeded in broadcasting an investigation describing the scoop, just three minutes after an earthquake struck California. Including the US Geological Survey, which is preparing ready-made templates that help the robot to produce news in its final form (Helberger, 2019).

2/ In 2016, the Washington Post said that it had started using the Heliograph robot to automatically write short reports for the newspaper's blog and revealed that it was used for the first time during the Olympic Games that were held in Rio de Janeiro, where the robot worked (Lewis et al., 2019b). To provide some information, such as medal results for digital aids, such as the Amazon Alexa assistant, and within a year of its use, the robot was able to publish 850 photos, and helped journalists cover some news related to the US Congress and football games, by providing the results first, and newspaper sources indicate that that, during the 2012 US presidential election, only 15% of what was published in 2016 was published using a robot (Salazar, 2018).

3/ In 2017, a study by Reuters Foundation at Oxford University in America revealed that many publishers rely on stories produced from "machines" in an interesting way, whether in political issues or even social issues (Jones & Jones, 2019).

4/ In 2018, the huge official Chinese news agency (Xinhua) began building a new type of newsroom based on information technology and working in it through joint cooperation between man and machine, and it will pump millions of dollars over five years to artificial intelligence projects (Lewis et al., 2019a).

4/ In Switzerland, a company called "Tamedia" wrote 40,000 news stories about the election results as well, using a text-generating bot called "Tobi." Tobi wrote these articles in about five minutes, using a special algorithm called "Decision Tree." Which included a basic template for a news story developed by journalists, where the robot filled out this form with facts and statistics it collected through the Internet (Thurman et al., 2017).

18 Will the Use of Artificial Intelligence and Algorithms Be the End of Journalism as We Know It, or Will It Save It and Take It to Another Future?

A very complex question posed by Francesco Marconi's book "Newsmakers", recently published by Columbia University Press (Ali & Hassoun, 2019).

Marconi is one of the most prominent American journalists who has spearheaded the development of the Associated Press and The Wall Street Journal's use of artificial intelligence in journalism and has provided a new perspective on the potential of these technologies (Lewis et al., 2019b).

The book explains how journalists, editors, and newsrooms can take advantage of the potential offered by artificial intelligence to develop new ways of telling stories and communicating with readers (Veglis & Maniou, 2020).

Marconi analyzes AI challenges and opportunities through field studies ranging from financial investigations using algorithms to write earnings reports, to investigative journalists analyzing large data sets, to outlets determining the distribution of news on social media (Goni & Tabassum, 2020).

Newsmakers assert that AI can augment—not automate—the industry, allowing journalists to publish more news more quickly while simultaneously freeing up their time for deeper analysis. Marconi draws insights from first-hand experience and media maps transformed by AI for the better (Veglis & Maniou, 2020).

In addition to considering the benefits of these new technologies, Marconi stresses the continuing need for editorial and institutional oversight (Segarra-Saavedra et al., 2019). The book identifies critical questions that journalists and media organizations must consider when incorporating artificial intelligence and algorithms into their workflows (Jones & Jones, 2019).

For journalism students and media professionals, Marconi's insights provide much-needed clarity and a practical roadmap for how AI can best serve journalism (Carlson, 2015).

19 Is It Possible for Robots to Take Over the Journalist Profession?

With the technological development and the age of speed that we are witnessing now, the journalist can take the advantages of artificial intelligence in his work on developing old journalistic mechanisms and techniques to cope with the new market requirements (Kieslich et al., 2021).

Despite these benefits, the human mind cannot be compensated, which is characterized by the ability to analyze and explain information and simplify it to be understandable by the receiving audience, because artificial intelligence lacks the ability to explain its information such as "Why did he write that?" or "How he arrived at a specific conclusion (Thurman, 2019). In addition to the fact that artificial intelligence lacks journalistic ethics, which is one of the most important pillars of the profession, the former director of the newspaper "The Guardian Australia" suggested adding a new clause to the ethics of journalism, because artificial intelligence programs do not collect information in an ethical manner and may lead to wrong conclusions (Schapals & Porlezza, 2020).

20 What is the Future of Artificial Intelligence in Content Production?

These are some of the notable trends and innovations to be expected as AI continues to advance.

Personalization: One of the most important benefits that AI offers to marketers is the ability to customize content. For example, current AI-driven programs can enable companies to modify subtle elements of content such as a salutation or title and customize them according to the reader (Lewis et al., 2019b). The development of artificial intelligence will increase the capabilities of existing programs to analyze audience satisfaction with content and provide perceptions of their behavior and choices, which may then be used to improve the content (Lewis et al., 2019b).

Additional developments will allow for greater content personalization with a soon-to-be-released innovation that tracks readers' eye movements, allowing readers' attention to be measured and identifying content items that capture the reader's most interest (). This technology is also likely to have applications in education to help personalize content for students (Saad & Issa, 2020).

Real-time targeting: Real-time targeting goes beyond personalization beyond consideration of audience choices to context (Wölker & Powell, 2018). AI can provide audiences, based on their real-time data and geographic location, with content for specific needs, this includes, for example, sporting events with the help of AI, marketers can reach audiences at the right time with the right product and in a more accurate way (Jones & Jones, 2019).

Automated visual design: Artificial intelligence can also create visual content, and there are currently several applications based on artificial intelligence in the production of visual content, as websites such as Wix allow the creation of complete websites without the need for great knowledge in programming languages (Túñez-López et al., 2020), and the site can be customized using intelligence Artificial intelligence for multiple purposes, whether the site is for e-commerce or for blogging. Lumen 5 can also be used to create complete marketing videos and provide everything a user needs from videos to messages, audio and even converting a blog post into a video (Túñez-López et al., 2020).

Interactive virtual worlds: With the increasing importance of visual content for content creators, many are turning to creating interactive videos to provide this experience to the user, and the Nevada Corporation has created an artificial intelligence model capable of transforming video into a realistic and interactive virtual world

for the gaming industry (Carlson, 2015), which is also applicable in film industry. Artificial intelligence can also convert video into a 3D hologram, which may affect how sports content is presented, as this technology can allow any sports match to be viewed from multiple angles without the need for a screen (Parratt-Fernández et al., 2021).

21 Can AI Journalism Put New Limits on Media Freedom?

Artificial intelligence journalism, like any new technological technology, can be used by humans for good or evil. Just as there is a free robot that moves transparently and supports the freedom of information circulation, and supports fair or credible media, there is also a robot that speaks, writes and implements the orders of authoritarian parties, capable of suppressing the media and freedom of opinion (Caswel, 2019). Just as there are open data platforms that support the good of humanity, and all reports and data are shared easily and democratically, there will also be open data platforms that support crimes and violence, target countries and destroy the information systems available to millions around the world (Wölker & Powell, 2018).

22 To What Extent Can We Talk About the Use of Artificial Intelligence in the Arab Press?

As for the Arab media, there are initiatives that emerged this year, when Abu Dhabi Media Company hired in May the first Arabic-speaking artificial intelligence broadcaster using artificial intelligence techniques in the world, to provide newsletters in Arabic and English, in partnership with the Chinese company Sogo, and cooperation with the program National Artificial Intelligence (Kieslich et al., 2021). This was followed by the launch in June of the Dubai Media Incorporated, the first broadcaster robot to conduct media dialogues in Arabic, using artificial intelligence algorithms, in a move to activate the role of artificial intelligence techniques in the UAE media sector (Thurman et al., 2019).

There are some newspapers that started relying on data analysis—but in a very simple way—to obtain press or investigative reports (Ford & Hutchinson, 2019).

23 Conclusion

The importance of artificial intelligence has increased in freeing journalists from monotonous routine tasks and making more time for them to work on aspects that require human creativity. Certainly, press and news organizations will benefit from the effects of "artificial intelligence." By automating professional processes and producing routine news, it will contribute to the maturation of professional treatments for news stories.

AI also provides tools to help journalists identify fake news; What gives editors the opportunity to generate reports in a balanced, objective and unbiased manner, based on accurate information analysis and not personal or politicized emotion, and this will have positive effects on those institutions, including—but not limited to—reducing the financial burden on them, and developing their news output to withstand the fierce media competition, The most important thing is to develop the professional performance and capabilities of journalists in line with the requirements of the new future.

The study proved that the future of the news function of the electronic press is affected by a number of factors, some of which are related to the variables related to the news function itself, and others are related to the surrounding societal variables. These factors are first related to the communicators of journalists working in this field and the extent of their response to and work with the digital environment, then the economics of those newspapers and their sources of income and financing, then factors related to the specific legal frameworks regulating the work of electronic newspapers, and then the political and technological factors.

24 Study Recommendations

Within the framework of the findings of the study, several proposals were presented that would activate the role of artificial intelligence applications in journalistic work, especially in terms of developing journalistic contents in a way that does not affect the professional future of journalists. These recommendations came at the forefront of these recommendations.

Expand the use of artificial intelligence applications in all fields in media organizations and make the most of them as they save time and effort, and are characterized by speed and high accuracy in performance.

The need to pay attention to the introduction of artificial intelligence techniques in the required form in press institutions, regardless of the nature of their editorial policy, and to rely on them to collect and edit news and produce them in an appropriate manner.

Enacting legislation and laws regulating how to make optimal use of artificial intelligence techniques to serve the journalistic work and lead to the development of the press institution in general.

Conducting training courses for employees of press institutions; To develop their competence to use artificial intelligence techniques, with the need to focus on the human role related to activating artificial intelligence applications.

Striving to provide material capabilities, introduce more advanced devices and activate them within the journalistic work system, and use them optimally in developing journalistic contents to advance the institution, and make it able to compete with other means.

Using some of the trained scientific expertise in the field of artificial intelligence to work in media institutions and train their employees.

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Societal Partnership in the Fourth Era of Industrial Revolution Between the Media and Civil Society Institutions Aiming to Reducing the Demand for Drugs



Zuhair Hussain Dhaif

Abstract In an initial exploratory attempt, the study sought to identify the features of the work of the media and civil society institutions within the limits of their capabilities in community participation in light of the Fourth Industrial Revolution, aiming to reduce the phenomenon of drug abuse as well as to develop appropriate solutions to combine the efforts of civil society organizations and the media, to deal with the issue as a social issue related to community security. This issue needs urgent solutions that can create an atmosphere for cooperation and effective participation with the media in light of the cultural, economic and technological changes that the world is witnessing and the reflection of drug dangers on the social system of local communities.

Keywords Community Partnership · Industrial Revolution · Media · Civil Society · Drugs

1 Introduction

The high rates of drug abuse among important segments of society as a result of the deterioration of social conditions and the increase in drug smuggling as well as consumption rates, in addition to the globalization of drug trafficking, which is linked to a number of factors, most notably are the social causes related to the economic and life conditions prevailing in society. These factors correspond to the capabilities of the security, legal and legislative bodies that are inseparable from the causes associated with the conditions and way of civilian life. The absence of support from civil society organizations and associations for decision-making institutions, and confusion in the strategies of media institutions, and the absence of moral and religious motivation in light of the communication revolution and open space, which paved the way for openness and unlimited communication between cultures, and the

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Z. H. Dhaif (🖂)

Ahlia University, Manama, Kingdom of Bahrain e-mail: drzuhairdhaif@gmail.com

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processes of replacement and substitution that take place without guidance of values and traditions, which led to a significant change in the standards of community awareness. All of this puts us in the face of great challenges to which the Arab community is subject to standing and sensing the danger of continuing to open up to everything that is marketed to us from other worlds, which increases the threats to societal security, and activates feelings of alienation and the inability to communicate with the system of values and norms prevailing in the Arab and Islamic society.

This study aims to the possibility of establishing solid rules and foundations that can be followed and adopted by civil society institutions and organizations, and the media in general, in order to overcome societal problems caused by drug abuse and addiction. Referring to these institutions makes the media a necessary vessel and a source of social culture for individuals. They are considered as effective cultural institutions that contribute to the formulation of the public opinion's position that is compatible with the cultural nature of society, showing its trends, values and knowledge, and determining the direction of its thinking, in order to train the public, especially the youth. Providing them with the skills of expressing critical views of what is presented to them through traditional and new means of communication, encouraging them to criticize and helping them to properly distinguish between truth and falsehood, between what is good and correct and what is trivial and apparent, and helping them to form an independent personality capable of evaluation and testing for the immigrant cultures and behaviors that do not conform to the prevailing values, norms and behaviors in society, including drug abuse and addiction, which threaten the social fabric and weigh on the future of generations because of the risks and negative effects on the psychological, behavioral, moral and religious structure of drug abusers and addicts.

2 Research Problem

The many changes that the field of media and communication has witnessed and is still witnessing in the past few years have made the media with all its means and channels tight to its control over the world as a whole. It is not possible to expect up to what extent these changes and developments will reach in the field of media and communication and its functions, as the rapid developments of these means occurs almost daily, and the transition to open space and the use of social media has made the media a construction pickaxe, wherever and whenever it is positive, and a pickaxe for destruction if it is used negatively.

Considering the importance of the media, especially in the relationship with civil society institutions and in the field of community partnership that arose with the emergence of human societies, and developed simultaneously with the stages of human development that witnessed a great boom with the emergence of new media, which was interactive and instant synchronization of its most important features, thanks to The Fourth Industrial Revolution and the great technological development, and in light of the active and vital role it has reached today in addressing.

social problems, and what it represents of a comprehensive concept concerned with the method of expression and access to media and media understanding, whether passive or active, and what constitutes the relationship between the media and organizations Civil society is of the importance and critically assessing the role of these institutions, awareness of the capabilities of the media and the cooperation of these means with other relevant civil society institutions to solve and address problems, including the phenomenon of drug abuse and addiction, as these organizations represent important effects in the social fabric and in the trends of their audience, The research problem is limited to two important questions:

First: How do the media and civil society institutions work to reduce negative phenomena such as drug abuse and develop appropriate solutions to them through the concept of social responsibility?

Second: What are the limits of the media's capabilities and their impact in strengthening the community partnership of civil society institutions to curb the spread of drug abuse and addiction?

In this context, we can clarify that in media and humanitarian research, it is necessary for the researcher to rely- according to the accepted scientific research methodology, which is objective and scientific, and which is based on the scientific and knowledge heritage in media or humanitarian academic research - on the research community where the researcher resorts to identifying areas of study to indicate the features of the studied phenomenon in the written, visual or audio media, as well as within the framework of civil society institutions concerned with community partnership. Based on that considering the importance of the topic of the research and its direct relationship to society, it is confined in the media and its relationship with civil society institutions and their role in strengthening the community partnership for the prevention of drug abuse and addiction. This is done by surveying specific materials specialized in the spread of drug abuse and the large number of addicts issue and its negative results as well as its relationship to the use of the media. The role played by institutions, organizations and associations in community partnership and public awareness of its dangers through joint action strategies, and after continuous follow-up to television and radio programs, following up on what newspapers generally publish in the field of drug abuse and its recent spread, in addition; we have tried to rely on the activities and programs of institutions Civil society, considering them as institutions that have a leading role in society, but it did not live up to its programs and activities to the level of challenges posed by the phenomenon of drug abuse, despite the seriousness of the phenomenon and the catastrophic consequences of its spread among individuals, especially among young people, where we did not find sufficient attention that rises to the required level in terms of The danger of drugs and their reflection on social, educational and cultural issues, especially those related to The behavioral phenomena coming through the media, as well as to some official institutions such as the Ministry of Education and Health, which gave a modest space

of its guiding, awareness and media interests, to address the phenomenon of drug abuse and addiction, despite being the point of preventive and curative specialization for this dangerous phenomenon, and it is noted that the interest in community partnership between the media And civil society institutions have not lived up to what is happening in developed countries, in their reliance on scientific and methodological standards in analyzing the magnitude of the phenomenon and its future effects and in formulating joint coordination and interaction plans with the security and governmental authorities that have jurisdiction in addressing this phenomenon.

3 Research Objective

The research aims to find solid rules and foundations, which can be followed and adopted by the media and civil society organizations, in order to strengthen community partnership to overcome the problems caused by drug abuse and addiction, through awareness, education, guidance and direction according to a correct scientific preparation of convincing and influential materials and contents in the receiving audience, up to Building a person aware of his responsibilities in maintaining the elements of societal security, assisting in the quality of media use, forming a culture of interaction with social institutions, civil society organizations and civil associations, and developing innovative, communication and media skills, to reduce drug abuse and addiction, within the framework of the religious and societal values system.

4 Research Approach

The descriptive approach is concerned with studying facts about phenomena, events, and existing conditions by collecting data and information, analyzing and interpreting them to derive their implications and issue generalizations about them based on the basis of abstraction, which means isolating and selecting certain aspects of the phenomenon and studying them, and this does not mean considering the phenomenon separate from other phenomena, but rather It means distinguishing the phenomenon quantitatively and qualitatively, in order to show it or define it more clearly, and then pass judgment on the phenomenon within the framework of the category or sample that has been subjected to the study, and this is what is called the rule of generalization.

The descriptive approach is suitable for such a study to know the inputs and outputs of the research problem, starting with the reasons for knowing its results and the possibility of developing appropriate solutions for it. We have also adopted the method of personal interview to increase gaining the scientific facts that supports the topic and increases its ability to convince in the light of the specialized scientific coverage of the problem and how it is addressed by specialists of experts and researchers aiming to answer the questions raised.

The mutual relationship between media and social systems:

One of the main objectives of the theory of media dependence is to reveal the reasons why the media sometimes have strong and direct effects, and sometimes have indirect and somewhat weak effects.

This environmental theory looks at society as an organic structure, and it investigates how parts of small and large social systems are related to each other, and then tries to explain the behavior of the parts in relation to these relationships. It is assumed that the media system is an important part of the modern social fabric. This system is related to individuals, groups, organizations and other social systems.

Individuals and organizations seek different sources that achieve their goals, and the media is an information system sought by individuals and organizations in order to achieve their goals. The media controls three types of information sources: information gathering, information coordination, and information dissemination. According to the model of "Melvin Devler" and "Sandra Paul Rokich" to express the interdependence between each of the media, other social systems and the public, the strength of the media lies in its control over information sources that individuals, groups, organizations and social systems rely on to achieve their goals, and this dependence relationship is not One-way, but the media also depends on sources controlled by others.

Thus, the political, economic and other systems in modern societies depend on the media to connect or communicate with the target audience, and at the same time, the media control the information and communication resources that political, economic and social organizations need to perform their functions efficiently in complex modern societies.

The flow of events arises from the society, which includes a set of social systems governed by the structural function, and interdependence relationships occur between these social systems and the media. Each society is characterized by a special culture that expresses values, traditions, customs and patterns of behavior, which are transmitted through verbal and non-verbal symbols, which bring about the dynamic processes of spreading culture.

These activities include forces calling for the stability of society and maintaining its stability through consensus, control and social adaptation. There are also other forces calling for conflict and change in society. These processes take place at the level of the overall structure of society or between groups or social centers arranged in ascending order, and this structure includes Formal and informal elements.

The elements of culture and the social structure of society affect the media positively and negatively, and they determine the characteristics of the media, which include goals, resources, organization, construction, and mutual relationships.

These characteristics control the functions of information delivery, which is controlled by the number and degree of centralization of available media, and thus affects the activities of the media or the so-called operating policies.

The elements of culture and community building also affect individuals and contribute to the formation of individual differences, social groups, social relations and the creation of individuals' needs. The interdependence between social systems and media systems determines how people develop their dependence on the media, to satisfy their psychological and social needs, which creates diversity in the effects of media on individuals.

The media covers events that occur within different social systems, and selects focus on some of the issues and topics that make up the messages of the media available to the masses.

The main element in this integrated framework is the individuals, as they are considered members of the audience receiving the media. These individuals have an integrated structure of social reality, shaped by social and religious upbringing, education, affiliation to demographic groups, social conditioning factors, and direct experience. These individuals use the media to complete the construction of social reality, which they do not perceive by direct experience, and the interdependence relationships between the media and other social systems control the formation of information messages to the masses.

When the social reality is defined and understood by individuals, and meets their needs and aspirations before and during the reception of media messages, the media messages will have little effect, except to reinforce the beliefs, values and patterns of behavior that already exist. On the contrary, when individuals do not have a real social reality that allows for understanding, direction and behavior. Therefore, the degree of individuals' dependence on the media must be taken into account, to obtain information that predict the effects of these media means on individuals. Information flows from the media to affect individuals, and in some cases, information also flows from individuals to affect the media and society as a whole.

This is consistent with the scientific perspective of this study in searching for the relationship between the media and civil society organizations, in building and arranging a community partnership to reduce drug abuse and addiction, and establishes the systematic concept of interdependence between the media and civil society organizations to achieve community partnership.

5 Community Participation: Meaning, Indication and Significance of the Concept

The concept of community participation is summarized in the role that individuals play in government processes in terms of representation, consultations, and participation in development processes. Participation as a form of volunteering exists in all countries of the world, but it is more developed in countries that have a large degree of awareness and work in the civil service (Jawhar et al. 2010). Participation takes place outside the professional work situations of the individual, as it is the role that the individual takes or gives him the right to play different roles through his constructive activity in the function of society, and this is usually face to face. The participation of members is described as active if it is linked to an active role in the function of the members of the community or their approval of that (Al-Ajmi

2005). Participation is the process through which the largest number of people have the opportunity to participate in various operations, each according to the type of experience and interest.

The educational dimension of participation has remedial prospects as it addresses the negativity and problems that many societies suffer from, which cannot be treated by providing ready-made services or projects, but by developing citizens' sense of their responsibilities towards their society and their positive contribution that is linked to this sense of responsibility (Yousry 2009). Community participation is the efforts performed by individuals of all categories and civil society institutions in the field of planning, decision-making, implementation, and evaluation of the elements of the process. This participation ensures that the needs of the participants on the one hand are met, and the public interest is achieved on the other hand.

It is the desire and willingness of society to actively participate in the media's efforts, increase the effectiveness of its means, improve its methods in achieving its persuasive function, and increase the interest of community institutions towards the prevention of drug abuse and addiction through participation in supporting and strengthening strategies and programs and contributing to them. So, community participation is the process through which the largest number of citizens and community institutions have the opportunity to contribute with thought, advice, and material and human resources, in order to develop means and methods to reduce and eliminate the phenomenon of drug spread. Community participation is the voluntary efforts undertaken by individuals of all categories, as well as civil society institutions, based on a sense of social responsibility in the planning, decision-making, implementation and evaluation of the elements of the media process.

In a precise definition of the purposes and meaning of the concept, community participation is the contributions and initiatives of individuals and the group, whether financial or in kind. It can also be defined as a social responsibility to mobilize untapped human resources, and a means of understanding and mutual interaction of the efforts and resources of all parties to society and coordination between them in order to achieve the public interest in all areas. different in society.

While what is meant by community participation in the field of drug prevention: it is the efforts made by civil society institutions, None Governmental Organizations and those in charge of their management in cooperation and cohesion with the competent governmental institutions (security, health and educational), through building bridges of relations, cultures and common and reciprocal concepts, which are concerned with upgrading and the advancement of society in a way that ensures individuals their societal security.

Community participation is one of the tools through which society can be promoted and upgraded, and work to improve the level of life of citizens socially, economically, healthily, and security-wise, through the voluntary contribution of the members of society to efforts to combat drug abuse and addiction, whether by opinion, work or funding, and urging others to participate And not to put obstacles in the way of the efforts made by the official and popular community leaders and other matters in a way that enhances the national efforts made to eliminate the hotbeds of drug trafficking and encourage its spread among members of society. The importance of community participation of civil society institutions can be referred through:

- Deepening awareness of the importance of community participation in the success of preventive programs to reduce drug crimes.
- The contribution of civil society institutions in strengthening the strong sense of national belonging to reduce the demand for drugs.
- Achieving cooperation and integration between media, civil and religious institutions to confront the dangers of drug spread.
- Taking the moral responsibility in helping the competent authorities to improve performance to reduce the phenomenon of drug abuse.
- The civil society organizations understanding of the problems and obstacles that society suffers from as a result of drug abuse and an estimation of the size of the achievements and successes realized by the competent agencies in controlling drug crimes.
- Create a general feeling that civil society organizations through community participation must perform the task entrusted to them in serving the community in defense of the social system.
- To develop individuals' spirit of giving and the adaptation of voluntary work to confront threats to social security and to help in achieving a reduction in the demand for drugs.

6 Partnership Between Civil Society Institutions and the Media

Participation between civil society institutions and the media means: all civil bodies and individuals who are exposed to the media and can provide them with support, whether material, in-kind or human, in a way that ensures a better performance of media institutions in society. The relationship is not limited to obtaining support from these parties, but extends to providing support from media institutions to these parties, so that the relationship becomes reciprocal. The Society gains its strength and cohesion from the fact that it includes a group of religious and civil community institutions that can create a climate for cooperation and participation effectively with the changes in the societal context, which includes a diverse group, such as labor and professional unions, business groups, chambers of commerce and industry, and civil and charitable associations.

Among the civil society organizations, the media plays a major role in developing the spirit of citizenship as a guarantor of the transparency of the conduct of state affairs. In democratic societies, they are an integrated part of the socio-political life and have a fundamental position in the public space, but their independence remains the guarantor of a functional nature. Its work, as freedom of expression in democratic countries allows a wide margin for the media to influence and significantly on public decisions, which take into account the national necessities of the state and society (Hassan and Shams 2017).

Some scholars believe that the primary role of the media is to transmit texts, while others focus on the way the media reach people, implant materials in their brains, and use them to obtain specific responses. This is called The Response Chord Theory.

The media constitute one of the components of the social structure of society, or they constitute a social system within the various economic, political and cultural systems of the society, therefore the media process, regardless of its intellectual, political or economic background, did not come from a social vacuum because it is the product of social structure at a stage of society development stages. Therefore, it is not possible to comprehensively understand the media and its functions without addressing the society with its various systems, but rather that dealing with these means in isolation from other social systems from which the social structure is constituted is a departure from the same social system (Mujahid et al. 2008).

It appears that communication and media means have a dominant and increasing role in society in recent years, as well as it appears that the media currently affects all other social, political, economic and cultural institutions, despite the fact that political and governmental institutions have legal authority in determining how the media, especially audio and video, works, but it often seems now that controlling the media in light of the communication and information revolution and the era of the Fourth Industrial Revolution has become an unrealizable goal by official institutions, which requires a realistic understanding of the nature of the media and its role in society (Burger 2012).

7 Community Participation of the Media in Drug Prevention

It is known that media occupy a distinguished position in our contemporary reality, based on the nature of their functions and roles, passing through their impact on the individual and society. In contemporary society, the media plays a major role in the upbringing of individuals, especially that its influence reaches wide sectors of society. What has doubled the influence of the media is the overlap of its functions with the functions of community institutions, foremost of which are None Governmental Organizations and institutions, and civil society institutions. Accordingly, these institutions are among the most important institutions that should realize the importance of the media, and work to benefit from their functions in their community programs that aim to develop individuals' knowledge, and build their attitudes and convictions in a positive way that contributes to the development of society (Abdel-Aty 2017).

The stage of information explosion appeared as an inevitable result of technological development in the era of the Fourth Industrial Revolution, which put its imprint on everything without exception. It surrounded us from every aspect, and the extent and method of its impact varied, and the information was sought in our hands through social media, phones and smart devices, after we were seeking traditional means of obtaining it. These media have become an important and effective tool whose influence cannot be neglected, but rather they are exploited at various levels to communicate with opinion leaders and the public. As is well known, the media in our time is a double-edged sword, and the more we use it and direct it, we reap the desired results from it. Unstudied media form a great danger to the problem that it seeks to address, as some unstudied media efforts in shedding light on the problem of addiction and drug abuse or other problems of society may lead to the complexity of this problem and may exacerbate it, and may shed light on secondary factors, which It leads to the omission of major factors that should not be tolerated and ignored. Thus, most media programs that deal with a serious problem such as drug abuse and addiction, do not have an appropriate scientific evaluation that includes analyzing the results of these media programs, and how they affected the target group, and the media should have a permanent and strong seat in the national committees responsible for formulating the comprehensive national plan To combat drugs, with specific and clear objectives that depend on information bases related to the available resources and activities, and research related to the phenomenon concerned with research and scientific investigation, in a way that adds to the knowledge heritage and human experiences useful and influential knowledge and experiences in dealing with the phenomenon, especially those related to drug abuse and addiction (Ghassan 2019).

Upon reviewing of statistics and reports issued by the United Nations for the year 2017, a quarter of a billion people, or about 5 per cent of the world's adult population, used drugs at least once in 2015. Most worryingly, about 5.29 million drug users in the world's adult population suffer from disorders arising from drug abuse (UNOC 2017).

Drugs are more prevalent among young people, hence the concern for the individual should come at the forefront of priorities for social, cultural, educational, religious, media and security institutions. With the tremendous progress in the media content industry, both quantitatively and qualitatively, the expected jobs for this content have increased and doubled, and the time that individuals allocate to deal with Its implications are to meet many of their needs and gratifications, and in light of the overwhelming behavioral chaos in the symbolic and semantic structure, which is expressed in the various forms and arts of communication and media, the importance of careful review to assess the methods of confronting this chaos; By providing sober scientific treatments that can be adopted to achieve the appropriate measure to address the negative phenomena, including those related to behavioral deviations, especially drug abuse and addiction, and since the media is one of the many different institutions that exist within society, and institutions are a term used by social scientists to serve as Entity and long-term organizations that play an important role in maintaining society. It is one of the most important institutions in modern societies, those that include education, the family, religion and politics, and of special importance to our societies (Burger 2012).

John Merle believes that the media have a clear influence in the field of forming a base of information and setting the agenda for segments of the public, and their impact is also clear in the field of behavior. If we try to focus on the extent to which the media can contribute in the field of community participation, this role depends on the following elements referred to by Merrill (Merle and Lowenstein 1989):

- Extent of the actual existence of these means and their ability to reach the target audience, we cannot predict the role of a media that does not reach the target audience basically.
- The extent of the public's dependence on those means as a source of information: that is, to what extent does the public trust those means and how credible is it with the target audience? How can we talk about the effectiveness of a method whose credibility is weak among its audience?
- The nature of the media messages that these media provide, their compatibility with the audience's needs, their objectivity and honesty, and how close they are to the actual reality of this audience.
- The extent of integration between the means and each other in society, as it is one of the things that may reduce the influence of the media in the process of community participation, the extent of confusion between the means and each other as well as the lack of coordination between them helps to cover the target audiences with messages that fit their needs.
- The appropriateness of the economic social and cultural conditions in society to create a climate that helps bring about community participation. The media is part of the society as a whole and we cannot expect it to play a single role without the help and preparation of other elements of society.
- The extent of the media's success in presenting an objective agenda for the different sectors of the audience and this agenda will not succeed unless these media are able to gain the trust of the target audience.
- The success of the media in advancing the idea of participation in society will only happen by creating immediate or delayed incentives for the public, and what will get it out of the accumulated state of indifference and negativity and the conviction of the importance of its role in society.

Challenges and obstacles to the community participation of civil society organizations to reduce drug abuse and addiction:

Despite the importance of community participation and the belief of all civil society organizations in its necessity to prevent drugs, we find that community participation in these organizations faces many difficulties and challenges that impede their activation sufficiently to benefit from them in the face of this dangerous and threatening phenomenon to social security, so it was necessary.

For all parties to study the reasons and obstacles faces activating community participation in civil society organizations, and finding out how to overcome such challenges, and what are the different roles that each party must exercise to achieve effective and influential community participation in reducing drug abuse. These obstacles ssummarized as follows:

A-Obstacles due to the community itself:

- Lack of societal cultural awareness regarding the importance of community participation in drug prevention. This results in a lack of awareness of the importance of community participation in combating this dangerous phenomenon, as a result of a misunderstanding of the concept of community participation.
- Loss of trust between members of society and civil society organizations, due to the absence of a clear plan or framework for these organizations to be presented and discussed with the different groups and segments of society.
- The low economic and social level of some families and families, which leads to a lack of awareness or a lack of sufficient time for community participation with civil organizations or the NGOs they represent.
- Lack of understanding of the meaning of community participation by some members of civil society organizations especially with regard to combating negative phenomena such as drugs.
- The failure of the media to spread the culture of community participation in a way that enhances understanding and awareness of the nature of the targeted phenomenon.

B-Factors attributed to the civil society organizations themselves

- Multiple and conflicting laws and regulations governing the work of None Governmental Organizations and associations.
- Some leaders are not convinced of the issue of community participation, which leads to a loss of trust and communication between None Governmental Organizations and the community.
- None activating of the principle of decentralization in the work of civil organizations and associations, especially in decision-making and decision-taking.
- The lack of channels and means of communication between organizations, associations and state institutions concerned with controlling and limiting negative behavioral phenomena such as drug abuse.

A number of criteria and indicators for civil society organizations for community participation can be identified to reduce drug abuse and addiction

The first criterion - the existence of a culture that supports the community participation of civil society organizations.

Indicators:

- Civil society organizations activate a plan to raise awareness of the importance of community participation to prevent drug abuse in the light of each organization's vision and mission.
- The organization or association announces the joint achievements between it and the local community to reduce drug abuse.

The second criterion - supporting the civil society organizations for voluntary work to reduce drug abuse and addiction.

Indicators:

- The organization facilitates its members and those concerned with volunteer work to participate in activities and events aimed at reducing drug addiction and abuse.
- The organization activates programs and activities to qualify volunteers from members of the local community, to participate in various activities related to reducing drug abuse and addiction.

The third criterion - the existence of an effective partnership between the organization, government institutions, and the local community.

Indicators

- The organization or association uses its human and financial capabilities in community service to support and assist programs and plans for drug abuse and addiction.
- Civil society organizations support governmental and social institutions to achieve their goals in reducing drug abuse and addiction (Ghassan 2019).

The media bring people together. They shape cultures and contribute to other cultures, strengthening or undermining powers. And the media are located in networks of authorities, but they do not constitute an authority in and of themselves, nor independent entities, and therefore it can be said that media institutions cannot remain independent of the surrounding environment, but they take the form and the social and political structure through which they operate, and there is a close and organic relationship between the institutions. The media and society is represented in the way in which these institutions are organized according to the philosophy of the state and society to which they belong and is reflected in the formation and formation of civil society organizations (Megre 2018).

Building plans and setting priorities to reduce drug abuse by achieving greater community participation between civil society organizations and the media by emphasizing the following:

- That community participation to reduce drug abuse and addiction is a basic principle of community development as real successful development does not take place without the participation of citizens and their bearing of moral and ethical responsibility.
- Citizens realization that reducing the phenomenon of drug abuse and addiction is a societal responsibility.
- The participation of citizens in drug prevention operations leads to their support and caring for the media which makes the media message more stable and more useful.
- Citizens in the local community are usually more sensitive than others to what works for their community, and this can enhance the structure of media content. The problems of drug abuse and addiction have become many, which is making it difficult to discover and work to solve them through media workers and security services only, which requires the participation of civil society organizations more

seriously in a manner that enhances the concerted national efforts to curb this dangerous phenomenon.

- Community participation is considered a real support for building media content to ensure community security.
- Governments 'at the level of their relevant agencies, cannot achieve their goals in this field without popular participation and their supportive and complementary role to the role of governments, which is necessary and essential to achieving the plan to reduce drug abuse and addiction.
- Community participation processes increase the people's social awareness in addition to the media's explanation of the goals and plans drawn to reduce the phenomenon of abuse and urge all citizens to participate and contribute to its success.
- Civil society organizations can play the role of oversight and control which is necessary to help the concerned agencies discover weaknesses and reduce or sometimes prevent delays in the implementation of the duties and tasks assigned to the parties concerned with the implementation of the drawn plans.
- The mass media make citizens' participation more aware of the nature of the phenomenon, the problems arising from it, and the possibilities available to solve them.
- The full societal participation of civil society organizations opens a door for constructive cooperation between citizens and media institutions, and opens sound channels of communication between them.

8 Conclusion

Media has become one of the necessities of life that has greatly affected society and imposed new patterns of behavior on individuals that were not previously known. Media contributed to the diversity of relationships between individuals and social institutions and affected many customs, traditions, trends and ideas, but also to general behavior.

The media occupy a distinguished position in our contemporary reality, based on the nature of their functions and roles, passing through their impact on the individual and society, and the media in contemporary society plays a major role in the upbringing of individuals, especially since its impact reaches wide sectors of society, and this has doubled the influence of the media overlap Its functions are with the functions of community institutions, foremost among which are institutions, NGOs and civil society institutions. Accordingly, these institutions are among the most important institutions that should realize the importance of the media, and work to benefit from their functions in their community programs that aim to develop individuals' knowledge and build their orientations and convictions in a positive way.

The study concluded a number of procedural scenarios in the light of which the social responsibility of the media and civil society organizations is determined. These scenarios depend on the development of the participatory relationship, explaining

the risks related to the phenomenon of drug abuse and addiction, the formation of a culture of interaction between social institutions, civil society organizations, civil associations, the development of communication and media skills to reduce drug abuse and addiction within the framework of a number of standards and indicators regulating community participation between the media and civil society organizations in battle of controlling drugs.

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Artificial Intelligence: Chatbot—The New Generation of Communication



Bushra Altarif and Muneer Al Mubarak

Abstract Marketing tactics have changed in response to the growth of technology and its quick conversion in order to accomplish consumers' requirements. Because of the rapid growth of artificial intelligence, companies and organizations are increasingly utilizing AI-guided chatbots to improve service on their portals (AI). The decline in face-to-face services as a result of the COVID-19 epidemic has hastened this tendency. Because of recent developments in AI and machine learning, as well as broad usage of the internet and messaging platforms, businesses are focusing on chatbots. Chatbots are computer programs powered by artificial intelligence that can communicate with humans and engage in active dialogue. Because they are aware of human capabilities, they are sometimes known as virtual assistants. Chatbot technology is essential for famous product lines to prosper in the coming years. The paper's major goal is to identify chatbots as an AI technology and to find the link between the two terms to determine how they contribute to various industries and marketing tactics, to create a better understanding to be used as a means of customer communication. The paper's findings demonstrate that chatbot technology could be a beneficial technology that enables consumer to communicate, but firms should pay close attention to their customers' perspectives and design chatbots more efficiently by incorporating AI upon their needs and goals.

Keywords Artificial intelligence · Chatbot · Machine learning · Natural language

B. Altarif

M. Al Mubarak (⊠) Ahlia University, Manama, Bahrain e-mail: malmubarak@ahlia.edu.bh

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George Washington University, 2121 I St NW, Washington, DC 20052, USA e-mail: bushra_tarif@gwu.com

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1 Introduction

1.1 Overview

Artificial Intelligence, or AI, is a branch of computer science that deals with the design and creation of intelligent machines. The goal of these intelligent machines is to be able to perform tasks that are only achievable with human intelligence. Artificial intelligence is, without a question, a well-known idea among the general population. There isn't a single field where artificial intelligence hasn't made a difference. We could argue that artificial intelligence is all around us, from self-checkout cash registers in grocery stores to major shopping malls and airports with the best and most powerful security systems. Chatbot is one of the branches of AI. Khan and Das (2018) provide definitions as follow: a chatbot are a computer-assisted conversational agent that mimics human communication, such as allowing users to type inquiries to receive relevant responses. Crutzen et al., (2011) states that chatbot analyzes the material input by the user and connects it to a database of possible responses. While Huang defines Chatbots as a software application with the ability to interconnect with customers or operators and communicate with intended final user in a language that can be describes as natural regarding a certain topic. Regarding the previous definitions, it can be concluded that one of the most fundamental aspects of chatbot technology, it converses with consumers in a language that can be describes as a natural language. When creating a chatbot, the most important thing to remember is to set the natural language function as precisely as possible. Natural Language Processing, according to Liddy (2001), aims to execute some functions in a humanitarian way "language processing on applications and to evaluate naturally occurring texts at a higher linguistic analysis level."

Customer communications must be improved for businesses to increase profitability. According to a Facebook Nielsen poll, 53% of customers prefer to do business with a company with whom they can communicate in real time (Nielsen, 2018). Clients of a firm interact with the market daily and have a viewpoint that differs from that of the company. Their observations on issues such as developing technology and market demands might help predict the next threat or provide early warnings of industry prospects.

1.2 Research Problem

Companies are devising new methods based on technical advantages in order to increase client connections and brand image. Because of this digital transition, a good customer experience in today's fast-paced world is all about meeting customers where they are, the minute they want. Chatbots have become a part of our everyday lives. Chatbots are increasingly being used in a double-sided way, phone and web interfaces. Chatbot industry is anticipated to achieve over one billion dollars \$1.25

in the year 2025 (Morgan, 2021). Because chatbots are critical for the future of the business, the study research seeks finding an appropriate description regarding the way they businesses can add value to the industry's marketing plans and strategies and the way they would be created in order to have the ability to be used efficiently.

1.3 Contributions

This study explains what a chatbot is for a better customer engagement and to improve the business expansion.

1.4 Main Terms Definition

- Artificial intelligence: Nilsson (2009) defines AI as the process of making machines intelligent, where intelligence is defined as the ability of an item to act appropriately and predictably in its environment.
- Chatbot: a conversational agent with artificial intelligence that mimics human communication, such as allowing users to type inquiries to receive relevant responses (Crutzen et al., 2011).

1.5 Context

Kaczorowska-Spychalska (2019) argues that Chatbots have a huge potential to increase user engagement, which might lead to increased conversions and sales for any company. According to Batacharia et al. (1999), the necessity for such chatbots arose as a result of the growing number of personal computers and people's desire to communicate with them. Customers must be communicated with in order for firms to grow profitably and efficiently.

This research focuses on defining the meaning of the main terms related to the paper which are Artificial Intelligence and Chatbot, finding the link between the two terms, and list some of uses in addition to advantages and disadvantages of using chatbots in the business. This research adopted a qualitative research method by revising the related literature that has been done in this field to gain better understanding and help future researchers to get an overview of Chatbots.

2 Literature Review

2.1 Artificial Intelligence

Haenlein and Kaplan (2019) described AI as a system's ability to appropriately learn from external inputs and apply those learnings to specific goals and tasks. Kar (2016) argues that the system's learning can be supervised, semi-supervised, or unsupervised. According to Kumar et al. (2019), AI is a tool that can be used to filter down unlimited possibilities and information to personalized targeting. In a similar vein, (Jarrahi, 2018) defined AI as a set of tools, methodologies, and algorithms used inside an organizational setting to benefit the organization and its stakeholders. Kar (2016) states that artificial intelligence bio algorithms often try to emulate how creatures in nature meet their basic needs, such as finding food through foraging, reproduction, and survival in a changing ecology.

Haenlein and Kaplan (2019) proposed two ways to classify AI: first, based on AI's evolutionary stages, and second, based on an AI system's intelligence type. Artificial intelligence can be divided into three forms based on evolutionary stages: artificial narrow intelligence, general intelligence, and super intelligence. An AI system's intelligence can take the form of cognitive, emotional, or social intelligence. As a result of this intelligence's nature, AI systems might be classed as analytical, human-inspired, or personalized AI. Listed are several AI algorithms:

- Neural networks and genetic algorithms are examples of bio-inspired algorithms (Kar et al. 2016).
- Intuitive swarms (Chakraborty & Kar, 2017).
- Unstructured data analysis algorithms, such as natural language processing, picture processing, and video processing (Grover & Kar, 2017).
- To make sense of such unstructured data, cognitive computing (Gupta et al., 2018).
- While some of the important algorithms share common building components, they differ significantly depending on the data's goals and nature.
- Natural language processing algorithms are programs that help computers understand and analyze human speech.
- Machine learning are algorithms that enable machines to learn from available data and operate in new situations without requiring human input.

2.2 Chatbots

A chatbot is a service tool within the AI context that speaks with people via message apps, websites, mobile apps, and the phone are all options. Hill et al. (2015) looked at how people communicate with a chatbot vs a human. Despite the fact that messages sent to chatbots contain less words per message than those delivered to humans, the study found that people send more than twice as many messages to chatbots than they do to other people. In the fields of AI and natural language processing,

AI-guided chatbots are a significant area of research and application. Chatbots have long been a source of scholarly interest due to their high efficiency and ease. Wallace (2007) mentioned that Richard S. Wallace's chatbot Alice, created in 1995, was formerly thought to be the most intelligent chatbot. Thanks to advancements in deep learning, speech recognition, and pattern recognition, technology in the field of machine learning, chatbot technologies have surged in popularity in recent years. Chatbots created by IT businesses include Siri, Alexa, Google Now, and Cortana. Unlike Siri and other speech-based chatbots, this one does not require you to speak. The knowledge base may contain structured data, free-text, and question–answer pairs, but speech and action orders are not computers that can learn from existing data and operate in new contexts without the need for human contact.

Chatbots are not exclusively adopted by the private sector, but also the public sector has adopted and benefited from this great technology. Following are some examples:

- The Singapore government teamed up with Microsoft to create chatbots for a variety of citizen services. These chatbots are designed to serve as digital agents (United Nations, 2018).
- According to Eggers et al. (2017), the US Citizenship and Immigration Services employs chatbots to accurately answer almost 500,000 questions every month. Chatbots free up the operators' line in government agency, where over 90% of calls are for basic password assistance, allowing them to address more complex and time-sensitive inquiries.
- According to Sun and Medaglia (2019) the Australian Tax Office has adopted a chatbot to assist residents with tax-related issues, which has resulted in an increase in the first-contact resolution rate to 80%, which is higher than the industry norm of 60–65%.

Weizenbaum (1966) states that this technology has been around since the 1960s. The goal was to see if chatbot systems could trick consumers into thinking they were talking to actual people. Initially, developers created and deployed chatbots for entertainment purposes, relying on simple keyword matching techniques to locate a match for a user input. The first chatbot was "ELIZA," which was created in 1966 by MIT scientist Joseph Weizenbaum. ELIZA was created with the intention of acting as a psychotherapist and facilitating human conversations. He could only answer by word matching at the time because the technology was still evolving and depending on the advancement in the artificial intelligence innovation.

The "Turing Test," based on Alan Turing's work, was developed in the 1990s. in this invention an individual communicates with another person as well as a computer. Natural language processing is the most crucial phase in the creation of a chatbot. Artificial intelligence perceives the content in this process, and text planning is accomplished by gathering data related to the process. The wanted phrases are chosen in accordance with the strategy, and the tone of the sentence is established by constructing the sentences. The more precisely sentences and words are coded, the more dependable the results. Natural Language Processing in Chatbots cannot be ignored, Natural Language Processing is not present in ninety percent of the Chatbot technology which is being used now by enterprises in the different segments.

Chatbots have recently grabbed the public's curiosity due to advances in artificial intelligence and machine learning. People now need a helper who listens to them and finds a rapid solution to their problems as a result of the increased usage of texting needs in the different platforms available online, which increased the attractiveness that comes with this useful technology. Mobile messaging solutions allow chatbots to reach the majority of the online population. Likewise, chatbots have evolved as a result of people's need to complete tasks quickly and easily. Today, witness chatbot technology that uses extremely innovative technologies related to AI, thanks to the focus of technological giants like Google, Apple, Facebook, and other. In 2016, Google announced an artificial intelligence-focused strategy with the aid of chatbots, Chatbots have since grown in popularity.

2.3 Classification of Chatbots

Chatbots are categorized into several sorts based on the platform they're running on, the function they're serving, and the technology they're built with. By analyzing their interaction, intelligence, and integration competencies, the following classification divides chatbots into two groups.

- Task-oriented chatbots are one-purpose systems that accomplish a certain task. Artificial intelligence isn't used much in this form of chat bot because there aren't any advanced levels. The customer resumes the chat through selecting an option that appears in a list of other options particular sentences. These chatbots' communication is quite specific and follows a set of rules. Chat robots like this provide content based on frequently requested questions. Even though Natural Language Process (NLP) is used, its function is relatively straightforward. This type of chatbots is the most used nowadays.
- Data-driven and predictive chatbots,
- As virtual assistants or digital assistants, data-driven and predictive chatbots, that can be described as substantially extra complex, collaborating, and modified upon the customers' request than task-oriented chatbots, are frequently present in our lives. These conversation bots are quite aware of their surroundings. this kind of chatbot enhance the (NLP) used. This type of technology gathers and examine the data in order to customize content based on individual end user outline and previous performance. Artificial intelligence has the ability to know what the user favorite with the repetitive usage and make recommendation. They can also use this information to initiate a conversation with customers. this chatbot technology can do more than just translate words and phrases; they can also read textual language, follow the flow of conversation, and answer properly.

2.4 Chatbot Usage

Shawar and Atwell (2007) indicate that Chatbot technology is gaining more popularity in wide range of uses. This technology gives businesses advanced ability toward creating an enhanced business knowledge, boost revenue, and better manage costs. They have shown to be beneficial in terms of marketing and customer service. They can also assist sales representatives or even do sales themselves. People use messaging applications like Telegram, WhatsApp, and Facebook Messenger on a regular basis to communicate with each other, reach out for specific products, making reservations, besides many more abilities. Listed previously are some of many functions available in today's texting apps. Chi (2017) states that Chatbots are used by marketers to provide customer service, deliver content to users, promote, and sell products on these apps.

Chatbot is considered to be possible replacement for traditional customer support. Customers may find that conversing using this technology feels convenient, comparing to dealing with an application because it has the ability to answer queries, take purchase advice, receive delivery updates all through a natural language interface. This technology can act as virtual assistants or stewards, assisting users with specific activities. Also, because of their convenience and immediacy, chatbots are preferable to other forms of assistance, such as a phone call or an online search.

2.5 Chatbots and Marketing

Even though chatbots have been around since 1960, they have just recently been noticed by businesses and employed to improve consumer interactions. Chatbots gradually learn while enhancing their communication abilities through chat interactions, and as a result they build a unique interaction habit. In addition, it has the ability to offer individualized services as part of their professional services. Chatbots have grown into a successful discussion tool that improves human-machine interactions through natural language analysis and protocols. As a result, chatbots can quickly react to questions, provide appropriate solutions, and solve problems while also comprehending the users' objectives.

Although chatbot technology is employed in promotion strategies which can propose ways to perceive and grasp reality, it also may remain effective in brandrelated social media activity. Even though social media management is needed, it causes a time constraint for businesses. To make Chatbots useful, separate time should be set up for updating profiles, responding to consumers, and locating and sharing material. It provides a very quick turnaround to practically all clients and gives timely information. Chatbots are also able to take up the necessary job management, schedule appointments, check emails, pull data for the brand, and, most significantly, provide customers with conversational updates that are done correctly with little likelihood of error. The use of chatbots varies depending on the goals that the business wants to achieve, but it does so in a way that fits the company's image. Chatbots that are powered by data can help clients make better purchasing decisions and boost their brand image. Furthermore, by giving customers time and convenience, a chatbot might put a company upfront the rivals in the market. Also, this technology is considered more interacting, and true-to-life comparing to similar marketing systems, particularly when contacting, chatting, or attempting to form a relationship. Furthermore, clever chatbots anticipate their needs and make product or service recommendations based on previous interactions. As a result, sales are increasing while the brand is being promoted, in response to increasing buyers' expectancies, this technology helps businesses to strengthen their imaginative to gain better selling experience. Furthermore, it can help organizations to avoid up to thirty percent in regards of customer support costs by speeding up response times and addressing up to 80% of enquiries, according to a report published by Invespcro in 2019.

2.6 Chatbots Field of Application

Chatbots can be used in a wide range of situations (Fig. 1), examples are:

- Calendar assistants (e.g., Rhonda).
- Chatbots for reserving or purchasing event tickets are both very popular such as Morph.ai.
- Chatbots are often used to search for and purchase things online (e.g., H&M, and eBay).
- Booking hotels, excursions, and flights like KLM, Swiss Airline.
- Chatbots for news (e.g., CNN, NBC, and BBC News in Facebook Messenger).
- Weather conditions (e.g., Hi Puncho).
- Chatbots for traffic (e.g., Traffic News & Traffic Jam).
- Financial chatbots are among the other fields (e.g., Trading Bot).
- in addition, numerous chatbots are utilized to provide customer and delivery services.

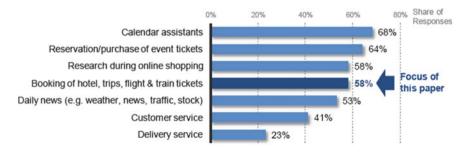


Fig. 1 Chatbot field of application

2.7 The Advantages and Disadvantages of Chatbots

As previously stated, chatbot technology is AI powered application which has the to execute commands excluding any individual intervention. It is among the most innovative solutions, capable of initiating a chat or dialogue with a user via websites, smartphones and texting apps, or the phone on its own. To make it simpler, if an individual is looking on the internet for a product and a sudden popup appears on the monitor offering assistance if needed, or in the case of using spoken orders to make grocery shopping from a supermarket in the neighborhood or get a response regarding orders made online, like cost and estimated delivery time. In each of these situations, you've come across a chatbot.

Chatbots can help businesses streamline processes and respond to enquiries in natural language. As a result, the relationship between humans and machines is simplified. Such software may cause earnings to increase, improve consumer experience, propelling any firm above the competition for an entrepreneur who stays up with the latest innovation and trends. Every firm, on the other hand, has its own set of criteria. So, before any organization decides to automate their customer service, these questions must be considered: "Does the company require a chatbot? Do Chatbot actually increase profitability and lead qualification? Is it worthwhile to get one?" It's critical that management understand the answers and consider the benefits and drawbacks.

Benefits and drawbacks of chatbots that you should consider.

The Benefits:

• Improved Customer Experience

The most significant benefits due to utilizing a such technology is the ability to provide faster customer support and solutions. They, unlike humans, can work nonstop for long periods of time with no signs of tiredness. Buyers do not need to wait for an answer for long time. Chatbots can even handle several consumers with multiple questions at a time, that can be considered impossible for an individual to do.

• Customer satisfaction is higher

Customers appear to be happier when using chatbots. They are satisfied when they obtain prompt and satisfactory responses, as well as a simple interface and faster service; and happy consumers become loyal.

• Affordable

If the business is attempting to save money, look at all aspects of it and consider cutting costs, but customer excellence cannot be scarified. It will be incredibly cost-effective to use chatbots instead of a customer service workforce. You don't need to hire someone; all you need is a chatbot. Additionally, in some cases lower labor costs could mean increased profits.

• Expands Marketing Possibilities

Chatbots can not only answer queries, but they can also notify users about new products or services from the company. It may instantly offer the targeted product or service for marketing to the customer in the middle of a conversation when it appears relevant, and it recalls and tells clients about additional app features and functionalities, as well as special promotions.

• Multiple Applications

Other than customer service, chatbots can be used for a variety of tasks. Chatbot may simplify procedures, arrange meetings, and provide personal finance advice, as well as create and manage sales funnels, advertise, and establish marketing plans, to mention a few applications.

The Drawbacks of Using Chatbots

• Only a few responses are available

Although chatbots are adaptable, they are limited to a set of inquiries and responses. If a question arises that is not addressed in their coded instructions, they either do not respond or respond incorrectly. This implies that chatbots are still unable to fully comprehend natural language and its complexities.

Customer Dissatisfaction Possibilities

Most chatbots are unable to adapt to human speech, which means they are incapable of understanding informal language, especially the one is common between younger customers. Such customer experience difficulties in getting the expected answers. When customers are requested to repeat themselves, it causes dissatisfaction, which contributes to low customer retention.

• Customers feeling and thoughts aren't gained

When you use chatbots to improve customer service, you lose connection with your customers. You don't have a clear understanding of their problems, and you're missing out on the critical comments and insights they provide.

• Bots aren't suitable for all types of businesses

Some company models are too complicated for a chatbot to work with. Similarly, certain clients might be resistant to bots or have a negative reaction to them. So, before you make a decision, think about your industry and your target market.

• Exposed to Mistakes

Bots are unable to interpret undecided people's terms and cannot completely remove the possibility of such error. This means that accuracy will never be perfect, and there will always be mistakes in the form of irrelevant or incorrect responses.

• It Must Be Maintained

Chatbots are programmed to handle a specified quantity of data and must be optimized on a regular basis to ensure that clients receive accurate information.

The Remainder

Chatbots are unquestionably one of the most effective technological tools available to businesses. True, they can respond quickly and are cost-effective, efficient, and adaptable. However, you must properly evaluate the technology's functions and whether they are compatible with your business strategy.

2.8 Previous Studies

According to Bolton et al. (2013), as businesses grow more worldwide within the advanced context of technology specially in the marketing industry and AI, and service agent roles expand, businesses started turning towards the internet technology to gain greater customers' connection. The more AI progresses and marketing becomes crucial, businesses within several industries are successfully employing automatic simulated features that could serve clients via the available technology (Arasada, 2021). Chatbot is considered a communication tool that can be employed within a business strategy and based on artificial intelligence's most current technological developments (Glavas & Letheren, 2016). Customers are increasingly preferring to communicate with brands using chatbots, according to Brandtzaeg and Følstad (2018). The researchers want to study how people react when a chatbot is used to give customer service. As a result, they created an online survey to communicate with customers. According to the findings, "efficiency" is the most preferred incentive. Clients can get the information they need quickly with the help of chatbots. Users frequently describe chatbots as fun, social, and novel. Chung et al. (2020) studied the adaptation procedures of high ranked brands and enterprises using chatbot technology instead of old-fashioned interviews. A multi dimensioned approach was used to assess Chatbots in areas such as customer connection, entertainment, trending topics, personalization, and problem solutions. The Chatbot service, according to the research, is significantly more engaging and has a positive consumer engagement. According to the study, digitalization may also contribute to increasing different levels connections, consumer enjoyment, in addition to the purchasing proficiencies.

Arsenijevic and Jovic (2019) conducted research to show the most significant advantages of adopting a Chatbot system as a marketing tool. To establish the effectiveness of chatbots, they performed an in-depth study with enterprises. The findings imply using chatbot technology in the business can speed the process of gathering the acquired data, but on the other hand it reveals respondents' concerns about chatbots giving erroneous information, which must be addressed investigated. One more study, (Ikumoro & Jawad, 2019) looked at the way this technology has the ability to get utilized for promoting in addition to the degree of successfulness in reaching marketing goals. Chatbots, according to the study, give personalized experiences in real time and increase customer happiness.

A study was undertaken by Völkle and Planing (2019) to better understand how customers feel about chatbots. They looked at how useful chatbots are in a variety of

fields. According to the research, providing clients with a Chatbot service improves their opinion of the brand. Customers think this technology is beneficial for providing an excellent service, also, resolving information search problems. Hildebrand and Bergner (2019) examined if chatbot technology could help a corporation make more money. They identified evidence that incorporating chatbots into shoppers' buying activities leads to more intimate consumer-brand interactions, higher trust, and the potential for upselling. Customers also value the capacity to interact in real-time conversation and even connect with the chatbot's personality. Chatbots can also affect consumer preferences and purchase decisions.

In conclusion, while chatbots are yet unable to hold lengthy conversations, users exhibit a willingness to engage in in-depth dialogues via this type of electronic agents in the coming years.

3 Conclusion

Through the literature it was found that artificial intelligence has been defined by many researchers, but they all agree on the concept that artificial intelligence is an AI-based system that could learn from external inputs and apply those learnings to specific goals and tasks. It was also found that researchers identify artificial intelligence as a group of algorithms that is designed specifically for the needs and goals of the organization. Some of the algorithms are bio inspired, cognitive computing to make unstructured data, natural language processing, and machine learning algorithms and so on. Then the researcher moved to define the term chatbot. Chatbot is widely used and very common in this era especially because of the current situation of COVID-19 pandemic. Chatbot has many definitions also, but most researchers agree that it is a service tool within the AI context that speaks with people via all different apps. Some current examples were identified in the paper to create more relevance to the topic. Furthermore, this research paper also identified some of the countries that has adopted Artificial intelligence through the chatbot technology as evidence that chatbots is not solely adopted by private sector, but also the public sector. Through the literature it was also understood that Chatbot has two classifications, the first is the task-oriented chat bots, the second is the data driven and productive chatbot. Each category was defined to understand the difference between the two concepts. Then, the research moved to illustrate the usage of chatbot, it was found that chatbot is used in a wide range of services and applications and this usage has given the businesses the ability to create a better customer experience which eventually led to boost revenue and better cost management. Usage of chatbot in marketing was discussed with the benefits can provide for both businesses and customers. chatbot can help clients make better purchasing decisions and boost their brand image. Furthermore, a chatbot can put a brand ahead of its competitors by giving customers time and convenience

It was also found that it is a more social friendly and genuine then other marketing programs this can cause an increase in the sales. Fields of chatbot application was highlighted, some of them and which are not limited to often used to search for online purchases, financial and calendar assistant. The next section of the literature discusses the advantages and disadvantages of chatbot. Of course, each aspect of life has two sides, advantages, and disadvantages, but looking into chatbot it could be said that benefits of using chatbot are way more than the disadvantages. The most important note for companies to put in mind, is that they should know and understand the benefits of using chatbot in their organizations, because some companies do not really need the chatbot, but they need to apply other artificial intelligence applications to help them implement the strategies and goals of the organization or company. The last part of the literature discussed the previous studies. As this subject forms a trend I the research field, several studies have been indicated in the section which talks mainly about the need to change in strategies for companies and that chatbots technology can be tailored and specifically designed upon the needs of each company. Chatbot if used in its best ways can help the companies understand the different segments and customers, they are dealing with in beside applying different revolutionary inventions in the context of AI order to reach the maximum profitability.

3.1 Implications

The Chatbot technology is a high-tech technology that is being adopted by many companies in many ways. Chatbot would be very useful when integrated with Natural language algorithm. This can support the business operations and minimize costs. Public sector is advised to adopt this technology, to reduce the time needed in relevance to customer service and to address the communication issues and shortage.

3.2 Limitations and Future Studies

Although this research paper achieved the intended goal of understanding the relation between the application of chatbot through AI, but some limitations need to be considered such as time constraints, and research approach. Future research can build on this research and use quantitative methods and go beyond the country.

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The Relationship Between Food E-Advertising and Children's Obesity in Bahrain



Aalaa Affooni and Allam Hamdan

Abstract E-advertising has become an indispensable tool for companies to advertise their goods and services since social media networks started consuming a substantial portion of people's time. Unfortunately, with the increasing time spent by people on the internet and the lack of movement in general obesity rates in Bahrain are skyrocketing. This paper studies the relationship between food E-advertising and children's obesity and clarifies the effect that advertising can have on consumer behavior. Throughout the related literature, the definition, and reasons of obesity in Bahrain will be established, put forward the history and effect of advertising in general and food advertising in specific.

Keywords E-advertising · Obesity · Children · Food

1 Introduction

Obesity rates in Kingdom of Bahrain have skyrocketed in recent years, making it one of the most significant threats to public health in the country. National estimates for overweight and obesity in Bahrain have reported estimates that among Bahraini children, overweight affects one in every three boys (36%) and about the same percentage for girls (34%). Figures from the school screening program published in 2019 alarmingly indicate that overweight and obesity may be as high as 40.4% in boys and 45.5% in girls between the ages of 10 and 12 (MOH, Obesity in Bahrain, 2020).

Obesity's increasing prevalence is especially concerning as it is now considered as a disease rather than just a body status, it is also associated with more than 195 health problems, and it is considered a major risk factor for chronic illnesses and various types of cancer that can eventually lead to mortality. Aside from the huge

A. Affooni

Ministry of Works, Manama, Bahrain

A. Hamdan (⊠) Ahlia University, Manama, Bahrain e-mail: allamh3@hotmail.com

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financial burden on governments. For example, the estimated healthcare cost of obesity in Saudi Arabia was reported as more than 19 billion Riyals (Balhareth et al., 2019). On top of that, a statement by Centers for Disease Control and Prevention (CDC) asserted that obesity affects children's behavior making them lean towards more sedentary activities and affecting their sleep routine and medication use (CDC, 2021). Children are the future and therefor it is very crucial to protect them from harm.

Regrettably, Children nowadays are spending a lot of time staring at screens for educational and non-educational reasons, these screens includes tablets, mobile phones, television, and laptops. According to studies, about 75% of young children owns tablets, and a large percentage of them starts using cellphones before the age of one (Radesky, 2020). Also, American Academy of Child and Adolescent Psychiatry (AACAP) reported that on average, Children aging from 8–12 in the US spends almost 4–6 h daily using screens (AACAP, 2020), it is possible that this is due to the introduction of online education in 2020, but it certainly shows that screen exposure is rising. This excessive usage is exposing children to many dangerous contents and one of them is manipulative advertising targeted towards them.

In a competitive industry, advertising agencies must capture consumers attention through commercials and sales promotion by using social media channels for E-advertising as it is becoming more popular (Sama, 2019). Companies target children when marketing a product since they influence their parents household spending and stay loyal to a brand over a lifetime. Marketers are increasingly reaching out to children through digital networks by using purposeful, tactical, imagina-tive marketing techniques, along with taking advantage of childrens developmental fragility (WHO & UNICEF, Protecting children from harmful marketing practices, 2020). According to a WHO-UNICEF report, almost 30,000 advertisments are being seen by children on TV only. One of the many markets that relay on advertisment is the food market and in their eyes children and adolescents represents a great market opportunity (Harris et al., 2009).

Children all across the world are being subjected to high levels of unhealthy food E-advertising and Bahraini children are no different. This is concerning because food advertising has been strongly linked to poor diets, malnourishment, and childhood obesity. Overweight or obese appear to be more likely to become overweight or obese adults, increasing their risk of at least 12 distinct forms of cancer (Government, 2020). Based on the high percentage of obesity in Bahraini children, it is crucial to further study the impact of food E-advertisment on children in bahrain and the existing rules and regulations that help monitor these advertisments, along with suggesting new rules and limitations that must be implemented in order to diminish, and hopefully eliminate, the link between E-advertising and obesity.

2 Literature Review

2.1 Advertising

2.1.1 Definitions

Advertising, according to Cohen, is a practice done by businesses in which innovative methods are utilized in developing communication strategies to be used in mainstream media which publicize services, products, and ideas a particular way that is aligned with the success of the businesses aim (Cohen, 1988).

As for E-advertising, it is advertising that promotes and sells goods and services by utilizing the Internet and other types of digital media (Cheadle, 2015).

2.1.2 History of Advertisement

The Origin

The origin of advertising rests thousands of years ago when word of mouth was the conveyor of advertising. Ancient civilizations also relied on wall and rock painting along with town criers which were paid to spread the word around town of availability of goods (Rehman et al., 2019).

Paper Advertising Phase

Although the first hints of paper and printing advertising are believed to go back to the ancient Egyptians in 2000 BC, where they used to use a type of thick paper called papyrus to spread information and create wall posters as an attraction tool. 1472 was the year that William Caxton printed advertisements for a book and hung them on church doors in England, thus creating the first printed advertisement (Quick, 2021).

In the first half of the seventeenth century the conception of newspaper advertisment emerged, a study done in Sweden noted that the number of ads in local papers rose from 27 per month in 1760 to 397 per month in 1790. Also, in the late seventies London Gazette started dedicating a section for ads on fee basis (Danesi, 2015).

Radio and Television Advertising Phase

Advertising became a whole new phenomenon when radio and television advertising were initiated in the early 1900s, advertisements started feeling more personalized since it spoke directly to customers (Quick, 2021).

In the 1922, a BBC radio presenter talked for about 10 minutes on the virtues of living in Jackson Heights, the cost of this advertising slot was \$50, this was the first radio commercial debuted (Quick, 2021).

The next milestone was in 1941 when the first continental ad aired on TV on WNBT, the ad was 10 seconds long and it consisted of a simple graphic of a Bulova watch with a voice over of a man stating that America runs on Bulova time, New York Times newspaper stated that the commercial cost \$4 (Stewart, 1941).

Companies began incorporating characters and celebrities in their commercials to create a closer connection between them and the consumers. Due to the switch to digital advertising and the change in advertising tactics, the period between the 1960s and late 1980s was called the golden age of advertising (Rehman et al., 2019).

E-Advertising Phase

Online Advertising

1994 was the year that online advertising started, it was when a wed magazine named HotWired sold AT&T a banner ad on their website, the number of viewers was the basis that the price of the ad was decided upon, this is a common method of payment called cost per mille which means the cost per a thousand views. A new method of payment was introduced by the company Procter & Gamble when they negotiated with Yahoo to pay based on price per click, this meant that Yahoo gets paid when a user clicks on the ad (Evans, 2009).

The revenue of online advertising started increasing over time. Revenues from the year 2000 to 2008 increased from \$8.1 billion to \$23.4 billion. This is with respect to the online advertising formats like banners, E-mails, Search Engines and more (Evans, 2009).

Table 1 demonstrates the progression of different advertising forms between the year 2000 and 2008. Advertising formats that were preferred in the year 2000 decreased in revenue in the year 2008 and vice versa. A great example is display related formats like the ones used in newspapers and magazines, this type of advertising format contributed to 78% of the total revenue in the year 2000, while in 2008 it reached 33% of total revenue which is almost half what it contributed to eight years ago. On the opposite, search format which meant presenting ads related to search words or phrases entered in the search engine increased from 1 to 45% of revenue contribution. This transition shows that with time companies started to abandon old tactics related to ancient ways of advertising and turned to modern ones.

Social Media Advertising Phase

People's increasing desire to communicate and the advancement in technology lead to the evolution of social media. Cambridge dictionary defined social media as websites and programs on the internet accessed by people using computers or mobile phones to

Advertising format	Share of advertising coming from this format								
	2000	2001	2002	2003	2004	2003	2006	2007	2008
Display related (%)	78	72	60	42	39	34	32	34	33
Banners (%)	48	36	29	21	19	20	22	21	21
Sponsorships (%)	28	26	18	10	8	5	3	3	2
Rich media (%)	2	2	5	8	10	8	7	8	7
Slotting fees (%)	0	8	8	3	2	1	0	0	0
Digital video (%)	0	0	0	0	0	0	0	2	3
Search (%)	1	4	15	35	40	41	40	41	45
Classifieds (%)	7	16	15	17	18	17	18	16	14
Lead generation (%)	4	2	1	1	2	6	8	7	7
E-mail (%)	3	3	4	3	1	2	2	2	2
Interstitials (%)	4	3	5	2	0	0	0	0	0
Other (%)	3	0	0	0	0	0	0	0	0
Total (million S)	8,087	7,134	6,010	7,267	9,626	12,542	16,879	21,206	23,400

 Table 1
 Revenue progression of different online advertising forms

communicate and share information. Some forms of social media are blogs, podcasts, and applications like Instagram, Snapchat, and Facebook (Cambridge, null).

Social media has transformed in less than a generation from direct information sharing to virtual social hub, to a shopping platform, and finally became a critical 21st-century Advertising marketing tool (Maryville, 2021).

Social media networks consume a substantial portion of people's internet time. Therefor, social media have become incredibly appealing to commercial marketing firms. Social media platforms created an interaction opportunity with target audience, as well as increased sales and brand familiarity. They have also become a valuable resource that users rely on when looking for product or brand information (Feijoo et al., 2021).

In a research done by Paw Research Center to track the use of social media by US citizens with ages varing from 18 to 65+ years from the year 2005 to 2020. As expected, the research showed that the percentage of social media use among dults increased exponentially. Figure 1 shows that usage amongst adults of ages 18 to 29 years jumped from 7% in 2005 to 84% in 2021, while ages from 30 to 49 reached 81% in 2021 appose to 6% in 2005, 50 to 64 years old adults usage also increased from 4% in 2005 to 73% in 2020, finally amid dults aging 65 and more the increase in useage increased to 45% in 2021 (PRC, 2021).

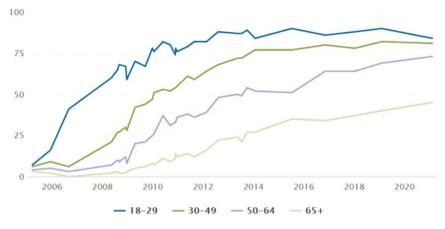


Fig. 1 Percentage of US adults use of social media



Fig. 2 Elements of advertising process

2.1.3 Advertisement Role and Process Model

Role of Advertising

Advertising is about creating product publicity making products recognized amongst many people. Advertising is a method used for raising awareness among customers regarding product's applications and benefits therefore making products accessible for users seeking it, this fulfills the advertiser's goal and boosts their profits (Cohen, 1988).

In brief, advertising serves three goals: improving businesses and increasing company sales, providing quality service to consumers, and ensuring the economic and social well-being of society (Mwakasege, 2015).

Advertising Concept and Process Model

Schramm (1995) stated that advertising is not just a regular message; it is a combination of goods and business representations. Advertising is a five-step process that begins with the sender and ends with the receiver. Figure 2 shows the Elements of advertising process which is explained as follows:

• Sender is the person or business who chooses to send the message and employs a variety of symbols, visuals, sounds, or words to deliver the message, this sender

bears complete responsibility for the entire process of advertising. Also, it is up to the sender to create the message decide what type of information to use for the recipient.

- *Encoding* is in fact a vital step in establishing the message's core. Encoding is the operational phase in which the sender of an advert perceives the effectiveness of the codes in respect to the recipient of that advert.
- *Message* is the idea that has the power to be conveyed. After encoding the message, it is now ready for delivery to the recipient. Using a designated media or a variety of media outlets, the message is conveyed to the audience by the sender.
- **Decoding** is an interpretation of the transmitted messages. It is a process of converting an information into an idea. It is also a vital advertising step as it reflects how well the recipient is perceived the message. If the message was properly designed focusing on the recipient's understanding and knowledge levels, the response may be excellent.
- *Receiver* is the person on the other end of the process, the receiver conveys the information received from the sender to later decide if the goods or services are desired, thereby reacting to it positively (feedback) or misinterpreting the process thereby reacting negatively (noise).

The sender should be well knowledgeable with the target demographic before creating the message The receivers can have diverse preferences or have similar ones, which should be properly analyzed. The adequacy of all the aspects is critical. If the message is inadequate, the amount of the noise can escalate, leading to the failure of advertising.

2.1.4 Advertisements Effect on Consumers Behavior

Advertisements have an impact on consumer perceptions and purchasing behaviors. Businesses utilize advertising to reach out to targeted and potential customers. Companies spend a substantial amount of money to market their goods and services, and every company strives to attract the broadest possible audience. When advertising goods, a company conducts customer research to determine what form of advertising will sway its target demographic (Pal & Pal, 2019).

Advertisement is strongly associated with psychological factors, providing people with a higher level of desire towards enhancing their livelihood. Even when needs are met, people begin to pursue their desires, and this is where advertising play a significant role in indirectly encouraging their desires to overpower and demand (Pal & Pal, 2019).

When it comes to consumer goods, consumers tend to be sensible in their purchases, looking for ways to increase their enjoyment. As a result, consumers are not willing to buy a product where the price of the product is greater than the pleasure gained from buying it. The amount of a good desired is determined by the consumer's pleasure from splurging on the good. Consumers that are sensible will spend until their benefits equal the cost of goods (Ampofo, 2017).

The strategies used when groups or individuals select, purchase, utilize, or discard of goods, services, ideas, or experiences to accommodate their requirements and desires are referred to as consumer buying behavior (Solomon et al., 2013).

Nowadays, consumers have accessibility to unlimited number of advertisements. However, consumers usually prefers engaging, fresh, and interesting advertisements. Ads that are boring are not memorable for consumers. Therefor, it is crucial to create entertaining advertisements to enhance marketing efficiency and help persuade customers into buying the goods advertised (Madden & Weinberger, 1982).

Familiarity created with a brand due to advertisement is one of the major factors that can have an influence on the customers and their buying behavior. In 1991, a study conducted by Macinnis and Park to examine what influence well known and loved songs have on advertising and customer behavior. The results showed that consumers were expressing happiness towards products that were advertised with known songs, therefor a substantial association was established between the degree of the songs popularity and there amiability (Deborah & Park, 1991).

Advertising promotes image and lifestyle along with help in selling services and goods. Consumers are informed about new lifestyles, ideas, and trends through advertisements. It promotes lifestyles and social ideas by presenting consumer's desired position and recommending products (Burns, 2003).

2.1.5 Food Advertisements

Advertisements aim to target a broad range of people and age groups through a variety of sources and channels. Advertisements, especially for teens and children, can significantly impact their eating choices (AHA, 2019).

Food services and products advertisements can be found in a variety of places, including tv ads, magazines, newspapers, radio, restaurants, supermarkets, mail, billboards, mobile phone apps, social media platforms, video games, and online video and music streaming sites (CNS, 2020).

Many techniques are usually used in food advertisements in an attempt to influence consumers. Companies uses eye-catching and vibrant colors and photos. They add popular songs and jingles along with catchphrases and slogans which are mostly companied with celebrities and cartoon characters used as the spokespeople. Health and nutritional claims are also heavily used in food advertisements. Moreover, companies tend to offer free or exclusive prizes and discounted prices on their goods when advertised (CNS, 2020).

A significant amount of time and money is invested by food companies in an attempt to persuade customers into buying their goods. The American Heart Association's (AHA) Fact Sheet demonstrated that more than 20,300 beverage, food, and restaurant companies spent approximately \$13.5 billion on digital advertising in 2016. Furthermore, it is estimated that children view around 4,000 commercials every year. This excludes commercials encountered on mobile phone apps, social media platforms, and video games (AHA, 2019).

2.2 Obesity

2.2.1 Definition and Measurements of Obesity

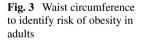
Obesity is a common, progressive, relapsing, and complex chronic condition associated with excess body fat which negatively impacts health (Wharton et al., 2020). It occurs when the total energy consumed by a person through drinking and eating exceeds the total energy burned through daily activities, this excess energy is stored in the body as fat (Sumithran et al., 2011).

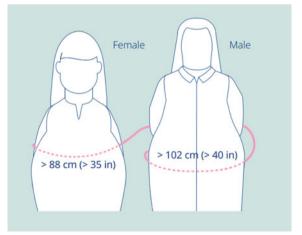
Body mass index (BMI) is the most practical population-level measure of overweight or obesity. BMI is a simple calculation that uses the height and weight of a person. The formula is BMI = (Weight) kg/(Hight \times 2) m² the value acquired is then compared to the BMI range shown in Table 2 (How to calculate Body Mass Index, 2021).

Besides this, circumference measurements of the waist can be used to evaluate a person's risk of becoming obese. Figure 3 shows the minimum waist circumference

Table 2Classification basedon BMI in adults

Classification	BMI range
Underweight	<18.5
Normal range	\geq 18.5 and <25
Overweight	\geq 25 and <30
Obesity	≥30
Obesity, class 1	\geq 30 and <35
Obesity, class 2	\geq 35 and <40
Obesity, class 3	≥40





of men and women, any number more than what is shown in the figure is considered an indication of obesity (MOH, Obesity in Bahrain, 2020).

2.2.2 Facts and Statistics

Obesity rates has almost tripled worldwide during the last five decades Today, millions of adults battle this illness. Obesity causes significant harm to both society and individuals, and the consequences of delayed intervention on obesity preventive measures and regulation will create a massive strain on healthcare and society in the future (WHO, Obesity and overweight facts sheet, 2020; Tukamuhabwa et al., 2021).

Many professional medical associations such as: the European Association for the Study of Obesity (EASO), World Obesity Federation (WOF), the American Association of Clinical Endocrinologists (AACE), the Obesity Society (TOS), and Obesity Canada and the Canadian Association of Bariatric Physicians and Surgeons stated that obesity is more than just a condition and stated that it is identified as a chronic disease because it is a powerful determinant of chronic noncommunicable diseases (NCDs) and a huge contribution in over 195 medical conditions, such as diabetes, cardiovascular disease (CVD), and cancer. Unfortunately, these illnesses are considered the leading causes of deaths and morbidities in Bahrain (WHO, Obesity and overweight facts sheet, 2020). An NCD kills nearly one out of every four adults in Bahrain well before they reach 70 years old. Obesity must be managed if Bahrain is to meet the United Nations Sustainable Development target (SDG) of limiting premature mortalities from NCDs by 2030.

Rates of obesity has tripled globally since 1975, and now it affects well over 650 million adults (WHO & UNICEF, Protecting children from harmful marketing practices, 2020). This rise in obesity rates has been especially significant in GCC countries (Balhareth et al., 2019). Obesity rates in adults in these GCC nations ranges from 27% in Oman to 37% in Kuwait (WHO, World Health Organization Regional Office for the Eastern Mediterranean, 2020).

A high rate of obesity has also been seen among children and adolescents residing in various GCC countries. Obesity is on the rise in Bahrain, particularly among the children under the age of five (WHO, World Health Organization Regional Office for the Eastern Mediterranean, 2020). Obesity in children poses a long-term health hazard. Overweight and obese children often carry this extra weight into adulthood, placing them at a greater risk for several health issues, particularly chronic diseases (WHO, Obesity and overweight facts sheet, 2020).

2.2.3 Causes of Obesity

Obesity is a complicated condition caused by a combination of genetics, emotional and intellectual qualities, and the environment.

A variety of personal, behavioral, and lifestyle habits influence weight. Obesity, which builds gradually with time, is usually the result of unhealthy dietary and lifestyle decisions, many of which are acquired in childhood (Harvard, 2009).

Internal Factors of Obesity

Internal factors are related to the body itself; they are as follows:

• Parental Influence:

A mother's weight and blood sugar levels, particularly during pregnancy, could affect and determine fetus nutrition and health later in life (Harvard, 2009).

• Biological influences:

The genetic make-up of a person, including hormonal markers that control metabolic activity, gut flora, and aging, impacts whether they would lose or gain weight (Harvard, 2009).

• Psychological disorders:

Psychological illnesses, such as depression and other mental disorders, can make it difficult for people to control their eating habits and maintain consistent daily activity (Garvey et al., 2016).

External Factors of Obesity

External factors relates to a person's surrounding environment; they are as follows:

• Early life experiences:

Early childhood experiences such as a lack of breastfeeding, malnutrition, sleep deprivation and low levels of physical activity can all increase a person's risk of obesity later in life (Harvard, 2009).

• Environmental causes:

Environmental aspects, such as access to healthy food options or safe spaces, causes tremendous impact on the behavior of individuals, affecting their nutrition and physical activity daily (OECD, 2017).

• Economic state:

Obesity can be impacted by people's income. People at lower income categories in advanced economies are more likely to become overweight or obese due to the lack of healthy food options (OECD, 2017).

• Societal factors:

Weight gain may be influenced by various societal factors such as the dietary environment, cultural preferences, and social setting (MS & TV, 2006).

• Unhealthy food options:

Processed foods, which are now easily accessible, low in nutritional benefits, full of fat, sugar, and high in calories are being consumed more frequently. Processed food is also substantially cheaper than health food thereby it is more obtainable (MOH, Obesity in Bahrain, 2020). Furthermore, world use of soft drinks which have been highly associated to obesity and overweight particularly among children and adolescents, has increased significantly (Ferretti & Mariani, 2019).

• Lack of physical activity:

Lack of physical activity is considered a common risk factor of obesity and chronic illnesses. The engagement in physical activities in the GCC countries are substantially lower than in many other countries. This has been affected by a variety of factors, including hot temperature (which restricts outdoor activities), a strong reliance on vehicles for transportation, and fewer physically demanding jobs (MOH, Obesity in Bahrain, 2020).

• Marketing unhealthy foods to children:

Processed foods and soft drinks are generally heavily advertised. Children especially are susceptible to messages from television ads, which remains a popular platform. According to a 2011 Bahraini survey, children ages five to twelve preferred television food commercials associated 43% with fast foods, 41% with chocolates and candy, 40% with dairy, and 38% with soft drinks (MOH, Obesity in Bahrain, 2020).

2.2.4 Obesity Impact

Health

People suffering from obesity are more likely to develop other illnesses like type 2 diabetes, CVD, sleeping disorders, high blood pressure, joint problems as well as some types of cancer. As a result, an obese individual has a mortality rate up to ten years earlier than non-obese individuals (Whitlock et al., 2009).

Financial

Obesity costs can be divided into two categories: medical costs and costs associated with obesity-related diseases. Overweight individuals require more healthcare services, they undergo more surgeries, and have more than double the prescriptions that non-obese individuals have. These costs rise in direct proportion to the degree of obesity. Obesity's direct expenses vary by population and location, however estimates range from 2% to 20% of overall healthcare spending, depending on region. Obesity rates and related health care expenses are allegedly comparable in Saudi Arabia to those in other GCC countries, with the government spending more than 19 billion riyals (5.46 billion US dollars) yearly in an effort to tackle obesity (Balhareth et al., 2019). Another example Is the United States which has a shocking 40% obesity

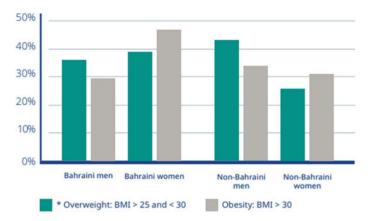


Fig. 4 Overweight and obesity rates among men and women in Bahrain

amongst individuals over the age of 20, therefor US spends over 14% of its healthcare budget on treating overweight and obesity (CDC, 2021).

2.2.5 Obesity in Bahrain

Obesity Among Adults

Obesity has reached epidemic proportions in GCC countries. The region's and, more specifically, Bahrain's, increases in the strain of overweight and obesity are one of the most extreme reported globally. When it comes to the Eastern Mediterranean region, the World Health Organization has classified Bahrain, Egypt, Jordan, Saudi Arabia, Kuwait, and the UAE as the countries with the highest obesity rate (WHO, Obesity, 2020).

Comparable gender-based results have been observed in Bahrain's assessments for overweight and obesity. According to the 2018 Bahrain National Health Survey, one among three Bahraini adults over the age of 18 are overweight, and 42.8 % are obese. These two categories were pooled and for all people surveyed as shown in Fig. 4, it was found that one-third of which were non-Bahraini nationalities, Bahraini nationals had greater levels of overweight and obesity rating 76% versus non-Bahraini citizens rating 65.5% (MOH, Bahrain National Health Survey, 2020).

Obesity Among Children

Obesity has increased in Bahrain among both girls and boys between the ages of 5 and 19 over the last 40 years. According to statistics, one in three boys (rate of 36%) is overweight, which in comparison with the rates in 1975 it is almost double, and approximately a same percentage of girls are overweight. As for obesity, Fig. 5 and 6

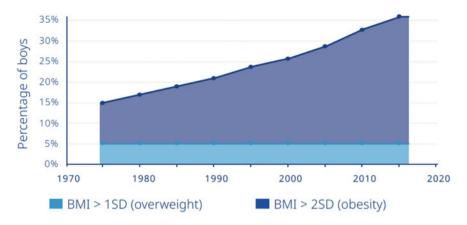


Fig. 5 Rates of overweight and obese boys between 1975 and 2016 in Bahrain



Fig. 6 Rates of overweight and obese boys between 1975 and 2016 in Bahrain. *Source* Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016, 2017

shows that girls' potential of obesity is almost triple what it is for boys with the rate of girl's obesity rising from 6% in 1975 to 16% in 2016 and boys' rates remaining at 5% (Abarca-Gómez et al., 2017). Furthermore, children tend to gain weight as they grow and become adolescents. Rates of overweight and obesity seems to be 40.4 % in boys and 45.5 % in girls between the ages of 10 and 12 (Sabt et al., 2019).

2.3 Food E-advertisement and Its Relation to Obesity

According to American Psychological Association (APA), children nowadays consume various forms of media and spends up to 44.5 h per week in front of computers, tv, and gaming panels instead of doing any other activity in their daily lives besides sleeping. Arguably, as mentioned earlier, the rise of advertising of non-nutritious food have been associated with higher rates of childhood obesity (APS, 2010).

Usually, children under the age of six are unable to differentiate between programs and advertisements, and notably they do not grasp the manipulative intention of the advertisements, therefore advertising targeting children under 8 years old is considered exploitation. Children have an extraordinary capability to remember advertisements content that they were presented. Product selection was proven to arise with as little as one advertising exposure and to increase with continued exposure. Product preference influence children's product purchase demands, which in return influence parents' buying decisions (APS, 2010).

Food advertising to children on the internet is much more complicated because the lines between content and sheer advertising are typically blurrier than on television. Only a limited number of advertisers provide reminders to differentiate content from pure advertising (APS, 2010).

Children find it more difficult to identify ads on the internet than they do on television. According to studies, 6-year-old kids identified only fourth of the internet ads, half of the ads were recognized by 8-year-old Kids, and almost three quarters of the ads were identified 10- and 12-year-old kids (APS, 2010).

A study conducted in the US revealed that playing unhealthy food related advertisements within online games increased children's intake of unhealthy snacks when compared to playing advertisements showcasing nutritious food and non-food advertisement (Harris et al., 2012).

3 Conclusion

The purpose of this paper was to study the relationship between food E-advertising and children's obesity and clarify the effect that advertising can have on consumer behavior. Based on the research conveyed, it can be concluded that there is a relationship between food E-advertising and children's obesity in which E-advertising is contributing to the increasing rate of children's obesity. Future exploration into the ways that this effect can be prevented or diminished could be useful in creating new regulations and rules related to advertising in general and E-advertising in specific.

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Technological Sustainability in the Twenty-First Century



Hamza Hamid and Muneer Al Mubarak

Abstract Sustainability is all about saving the planet for future generations, and technology has become an integral part of its assistance. For the researchers, the use of legitimate secondary sources has reduced the study time and allowed them to analyze data from many authentic secondary sources. The researcher in this study has decided to employ qualitative data to perform the investigation and reached the conclusion that the world needs both scientific know-how and creative thinking to combat today's global challenges. For example, textiles' future growth and use will be profoundly impacted by nanotechnology. Ideas and information must be disseminated by using social media. Nursing education and practice should make use of this potential. Blockchain technology may be used to improve the internet's centralization, transparency, egalitarianism, and accountability. Future emissions and energy usage may be reduced by using electric vehicles in the transportation industry. There are many more dangers and risks linked with artificial intelligence than there are with our existing conveniences. Data transparency may be improved by using the blockchain in an area where sharing information is required. Thus, technological sustainability is not merely a phrase but a purpose to improve the economy, society, and the environment.

Keywords Technological Sustainability · Artificial Intelligence · Nanotechnology

H. Hamid

M. Al Mubarak (⊠) Ahlia University, Manama, Bahrain e-mail: malmubarak@ahlia.edu.bh

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George Washington University, 800 21st St NW, Washington, DC 20052, USA

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1 Introduction

1.1 Background of the Research

The rapid advancement of technology has entirely transformed the usual way of the world and introduced a new system that is entirely technology-based. The present cannot think of passing a day without the use of technology. Hence, technology has become a crucial aspect in the present world (Fawzeea et al., 2019). Technology has the power of enhancing efficiency and productivity and benefit in cost-saving, reducing product waste and helping the organization lessening the impact upon the environment.

The main concept behind sustainability is to preserve the world for the future generation. The high rise of natural resource exhaustion for business, activities, and survival is leading to the depletion of natural resources. Hence, the concept of sustainability has become more contextual than ever (González-Díaz et al., 2021). The term sustainability is no longer a buzzword rather, and it is in the mission to make the economic, environmental world better in an unimaginable way which was never before. In terms of sustainability, technology is playing a pivotal role, and it is benefit-ting organizations to enhance their productivity and efficiency through reducing operational cost, analyzing and tracking organizational progress, and lessening product waste. Therefore, Technology will enable the world to see a better future via recycling, waste minimalizing and changing production process, controlling pollution, and efficiently using the required resources.

1.2 Research Method

Research methods are associated with the processes, techniques, and strategies in the data collection or data evidence to uncover new data or to develop a better comprehension of the topic. Selecting a research method is crucial for research that enables the research to conduct systematically and benefits in collecting data in a particular selected method which makes the data collection more appropriate (Beins, 2017). In this particular research, the data collection has been done via secondary sources. The selection of existing secondary authentic sources has enabled the researchers to research in less time, and it has further benefitted the researcher to evaluate data from multiple authentic secondary sources. Hence the use of secondary data has led the researcher to use qualitative data in the research conduction.

1.3 Research Problem

In the present world, the context of technology is of great significance. Hence, there were many studies have been conducted on the following topic. But there are some things in the research that have been found which are most of the researchers might have discussed in the broader term, but the context of the impact of rapid change of technological transformation has not been highly signified in the past studies. In addition to this, most of the researchers were unable to mention that how multiple professionals, including businessmen; doctors, are facing a challenge in terms of facing technological advancement.

1.4 Research Rationale

Due to the rapid advancement in technology and transformation is taking place every second. In addition to that, due to technological advancement, to gain competitive advancements and to advancement operation of the organization, people are now inclined towards implementing technology more than ever (Lou & Li, 2017). Concerning that, understanding the context of technological sustainability and its significance is contextual. Along with that, it is important to understand the challenges faced by multiple institutions and organizations relating to technological sustainability will enable them to mitigate the challenges and benefit them to make an efficient strategy for the faced challenges, which will help the organizations to sustain the market for the long run. Following the discussion, the context of both sustainability and technology should be of priority in discussion in the twenty-first century.

1.5 Research Aim and Main Terms of the Research

The main aim of the research will be to understand and evaluate the concept and different aspects of technological sustainability in relevance with the twenty-first century.

The key terms of this particular research are,

- Technological contribution to sustainability,
- Evolution of technological sustainability,
- Sustainable technologies in the twenty-first century, and
- Technology and sustainable future.

1.6 Research Context

Without the blessing of technology, the world we are experiencing now could have been termed as an imagination till now. Technology has transformed the world in a way that seemed like an imagination before, now it is a reality for everyone. Due to the emergence of technology, the entire procedure of organisations has altered which have become more efficient in terms of time and money and has become more productive. But it should also be in consideration that everything has positive and negative parts. In the same way, the rapid technological advancement is causing a major shift and due to this, organizations are facing multiple external, internal challenges. As the future will be entirely dominated by technology, the context of understanding the aspects of technological sustainability is of utmost importance in the present era.

2 Literature Review

2.1 Overview

Often, when discussing sustainability, the environment springs to mind first, but economic and social factors are just as essential. Each of these fields is heavily dependent on technology. First, economic and environmental sustainability need social sustainability. This technique includes educating people on the need for recycling, conserving water, and turning off lights when leaving a room. Generally, this involves simplifying the procedure for the user. Now, owing to technology advancements like smartphone apps, all of these gadgets can be operated remotely. Technology may also be used to generate long-term economic progress. Innovations in health, business, and the environment may help organizations and communities by creating new jobs or streamlining operations. Environmental sustainability helps preserve the way of life, as well as social and economic necessities. Green technologies like solar panels and wind turbines may be utilized to replace harmful or resource-depleting activities. Keeping such crucial and critical aspects of the arena of technology and sustainability, this section digs deep into the literary pieces available on the topic of "technological sustainability in the twenty-first century.

2.2 Contribution of Technology to Sustainability

As the world becomes more and more unsustainable, it becomes clear that it is an issue involving many different dimensions and a wide range of stakeholders. There is an ever-increasing amount of complexity to deal with. Barile et al. (2018a, b) have raised a question on how we can account for all of this complexity in our efforts to

create a more sustainable society that is also inclusive and fair. What is needed is a comprehension of the systemic nature of the world, the interconnectivity of natural and human systems, and the direct and indirect effects for individuals and ecosystems depending on a comprehension of the global nature of the world and how local and regional problems are part of the whole. Sustainability and sustainable development are based on the recognition that reality is defined by complex linked processes involving several ecological, social, and economic elements. In order to meet the aforementioned challenge, people will need to make good use of both people and technology.

Kasuga (2021) has opined that complicated problems tend to be reduced to the application of techno-based knowledge and pseudo-solutions focused on particular components of the problems rather than seeking to capture and read its complexity as a whole, according to dominant interpretive and governance methods. With today's advancements in information technology, it is possible to cultivate wisdom in the pursuit of long-term sustainability. Organizational structures that are responsive to changing surroundings and capable of distributing scalable answers from the local to the global are more likely to have effective communication and smart technology. In companies, the use of digital technology is reshaping and expanding their capacity to handle complexity and interactions.

Specifically, Bifulco et al. (2018) explore its function in an urban setting. The three domains of the planet, profit, and people are examined in terms of how technology might help attain sustainability. When looking at ten cities that are moving quickly toward sustainability, technology emerges as a cross-sectoral factor that supports both cost-effectiveness and better economic conditions in addressing environmental issues, as well as the provision of public services, which improve citizens' quality of life. Better use of resources helps manage and steer cities towards more sustainable circumstances, which is why technology's contribution to efficiency is seen as sustainable. Caputo et al. (2018) go from perceiving ICT as the driving force toward more efficient and effective use of resources in the next paper. A major contribution to addressing sustainability may be made, according to the authors, using ICT-based knowledge, and they look at how it might help advance sustainability objectives on this basis. The Smart Grid is being highlighted as an example of a complicated technology contribution to addressing environmental issues. In the perspective of systems thinking, the Smart Grid experience demonstrates the connections between smartness and sustainability and how ICT may broaden the scope of the sustainability "game" and include additional "players".

As per the research of Kasuga (2021), the COVID-19 has made the globe more aware of inequalities and disparities. Human-induced environmental changes, such as rising temperatures and other climatic extremes, must be taken into account as well. Nevertheless, the sustainable development goals (SDGs) are meant to serve as an anchor for the globe toward sustainability, but the COVID-19 epidemic might hold down the SDGs' attainment. Throughout human history, science and technology have been used to provide a safe and pleasant living environment. To combat today's global dangers, the world needs both scientific understanding and creative solutions. Science and technology have also been shown to have spawned a new generation of conflict and warring methods. The authors have also stated that human history has seen the advancement of science and technology, which has improved human health and well-being. Scientific knowledge and cutting-edge solutions are increasingly critical in the face of the new and serious concerns outlined above.

2.3 Evolution of Technological Sustainability in Twenty-First Century

Technological progress is happening at an exponential rate. The main aim behind the evolution of technological sustainability is to make the life of people more convenient, and for sure, technology has made the life of people easier. According to Dosi et al. (2021), around 25 years back, making cash withdrawals or the cash deposit was not be done without visiting the bank or without interacting with the bank teller. But now, it has allowed their consumer to get most of the banking service via online banking. Due to the advent of online banking, customers can easily withdraw their money and can also transact their money just by being at home in their comfortable chairs. Even most people in the world consider online banking as one of the most convenient lifestyles. Thakur (2020) stated more than 69% of European millennials manage their finance via online banking services. From the standpoint of customer experience, technology such include, online banking, online travel booking has made the procedure of transaction easy delivering a Steller consumer experience.

Technology has also contributed positively to the professional life of people. Earlier all the documentation processes were done via paperwork and finding some documents required plenty of life as multiple files needed to bring out to find the right file. Harteis (2017) noted the advent of the computer has made all the procedures simple and easy. Many great experiences have been drawn out via technologies like, Adobe Document Cloud and Adobe Sign, Adobe Scan and Acrobat which save the organisational time and money. In addition, the digital workflow has enhanced both internal and external customer experience.

According to World Economic Forum (2018), the twenty-first century has been considered as the era of colossal technological advancements. Multiple marvels have been produced by multiple researchers and engineers which include personalised hoverboards, self-driving cars and pervasive smartphones etc. which are considered to be an imagination even a decade ago. The rapid evolution of technology has helped to send away the days when VHS tapes were used to watch movies and to listen to music. Presently, those items have become an aspect of nostalgia for people. Even the concept of DVD and CD is on the way to extinction. Presently, the smartphone gives people all the benefits from listening to music to watching a movie, everything can be done via phone. Hence people are more dependent on their smartphones. The growth of devices has become astounding and indicative of the new future. Zimmer et al. (2020) revealed, this opportunity give people the benefit of quick and easy access to PDF, transform manual signatures into automated experiences, digitalise the printed

documents and create searchable, reusable and shareable documents which have benefited in improving customer experience in another level.

In addition to the traditional method of meeting in person, travelling from a far distance have been abolished by the blessing of the advent of sustainable technological evolution. Burke and Maceli (2020) added that team communication tools and project management tools have increased the collaboration and productivity of the workplace, such tools include, Microsoft team, Skype, Google messaging and instant messaging etc. The walk-on technology was very long and going to be a far long walk too. This long walk has ensured an easy and simple life for people's personal and as well as professional life by delivering unprecedented convenience.

Due to the faster evolution of technology, the consumer adoption rate of technology has grown at an exponential rate. Consumers are adopting commercialised technologies in a faster way. Ezenwafor et al. (2020) highlighted, due to increased connectivity, developed infrastructure and instant communication, products and new services are being established which has also increased the reach of products faster in the blink of an eye. The adoption rate of household appliances and products is considered essential over a period of more than 120 years.

The telephone was invented in the year 1876 but after a century landline become part of every household. In this regard, a massive amount of infrastructure is required to be built concerning making the goods worthwhile for the customers. Then, the telephone lines have gone through "last mile issues" in which the logistics get tougher and more costly as most of the users got hooked up to the network.

2.4 Relevant Sustainable Technologies for Twenty-First Century

New technologies including social networking, mobile phones, self-driving automobiles, and autonomous flying aircraft have emerged since the beginning of the new Century. Artificial Intelligence and medical research have also made enormous advances. In the wake of the human genome's discovery, scientists are pondering the implications of biotechnology and gene editing.

Social Media Network

Compound terms like "social media" (SM) and "social networks" (Facebook and Instagram) are used to describe social networking, content exposition, online publishing (e.g. blogging), and wiki-based information dissemination. Olatayo (2019) have opined that social media is a crucial tool for facilitating the exchange of ideas and information with the intended audience. End-user information creation, user opinion, audience response and counter-reaction disclosure and information dissemination to a big audience on the digital terrestrial are all included. One can get their message out to their target audience in the blink of an eye, whether it is across continents, or even across continents and oceans. To improve the quality of patient

care, researchers found that social media is here to stay in the nursing field. This potential should be exploited and incorporated into nursing practice and education.

Additionally, Habes et al. (2018) opined that social media networks contribute to language acquisition by providing translations from one language to another to facilitate communication, which ultimately helps to bridge cultural gaps. Social media marketing is becoming more popular in the digital tourist industry as new ideas emerge, as per the research of Kayumovich (2020). Organisations in the travel and tourism industry are enthusiastic proponents of new technology. Telecommunications and electronic marketing improvements have created fundamentally new tourist business prospects, increased their limits and affected its models.

Nanotech and Fibre Optics

Advanced nanotechnology will have a significant impact on the future development and use of textiles as a whole, including clothing. Expected outcomes include more energy-efficient, cleaner textile production. Nanotechnology will have a significant influence on the manufacture of fibres and dyestuffs. The research of Rijavec and Bukošek (2009) sheds sufficient light on this matter. Ultra-thin fibres having diameters between 100 and 10 nanometers are known as nanofibres. There have only been a few micrometre-sized microfibres made thus far. Filtration, nanocomposites, protective fabrics, biomedicine, sails, and electronics and optics all benefit from these features. Optical sensors may be used to assess temperature, stress/strain, gases, biological compounds, and smells, all of which can be detected using optical fibres. Polymethylacrylate (commercially accessible for around 25 years), polystyrene, and polycarbonates are three common materials used to make optical fibres. It is possible to utilise them for data transmission over short distances (less than ten metres) and to wear them. When optical fibres are combined with electronics and information technology like computers and telephone sets, the creation of intelligent textiles is a foregone conclusion. With the use of sensors in the chest and arms that monitor vital signs such as blood pressure, pulse, and sugar levels, a smart T-shirt may light up in any of 256 colours. In the opinion of Fenta et al. (2021) advancement in high-speed and long-distance communication, huge data transfer, optical imaging, and sensing applications have been made possible by the development of fibre optic cables that transmit light waves guided by total internal reflection during the last several decades.

3-D Printing

As with any other new technology, 3D printing is the outcome of prior ideas and thoughts. The layering approach utilised by today's 3D printers were first used in the late nineteenth century for the production of topographical maps, and 3D printing as we know it only started in the 1980s. While the technology has advanced, Pîrjan and Petroşanu (2013) stated that these devices have gotten more helpful and more economical at the same time. A broad variety of industries are benefiting from fast prototyping today: from medical and military research to building and architecture to fashion and education. 3D printing has had a recent upsurge as a result of the confluence of lower-cost production technologies and open-source software. Car components and bridges, ballet shoes, and even artificial organs are all being made

using the technology today. Health care is one area where 3-D printing is being employed. Applications for the technology may be found in various fields. Manufacturers and distributors might be disrupted by the capacity to produce things on demand using 3-D printers. Professionals employ the technology to do feats like generating bespoke dental work, customised prescriptions, organ transplants, artificial limbs, and personalised hearing aids.

Robotics

As early as the year 2000, academics and businesses began to apply the binomial Robot/AI to almost all potential fields, believing that developing technology could handle every work. This is accurate in part, as reflected in the research of Pagliarini and Lund (2017). On the other hand, it is becoming clearer that several bottlenecks are quite difficult to get through. Since robot technology is being used in so many different areas, it is practically impossible to keep track of the number of robotics fields that exist at this time. To keep up with such exponential growth, authors have attempted to discover and discuss the most obvious fields of application—as far as they comprehend—which include healthcare, medical and surgery, space, microbots, underwater, flight and self-driving, body-machine interfaces, networks, telepresence, collaborative, cyborgs, exoskeletons and wearable, industrial, military, housekeeping, entertainment, modular, art, environmental and alternately powered robotics.

Blockchain

Al-Saqaf and Seidler (2017) stated that blockchain technology is one of the techniques that can help to improve the internet's decentralisation, transparency, equality, and accountability. A distributed database of records may be either a public ledger of digital problems or transactions that have been accomplished and shared among participating parties over a vast network of non-trusted participants. Blocks of information, which can be verified are stored in this system, making it very difficult to hack. It eliminates the need for third-party verification, according to Chakrabarti and Chaudhuri (2017), and as a result, any industry that relies on it is rendered inoperative.

Using a blockchain instead of keeping all data in a single database provides more security. Data breaches in a database may now be averted because of the innovative usage these technologies have made possible in Bitcoin "mining". It is also possible to give transparency in data when the blockchain is used in an area that requires the disclosure of information. It is possible to utilise blockchain in a variety of ways. When smart contracts were introduced, numerous new financial applications were made possible by the blockchain's distributed ledger technology. Digital money or bitcoin, financial contracts, asset monitoring, payment system and digital identification have all been considered by Farah (2018).

Electric Cars

Globally, 26% of primary energy is used for transportation reasons, and 23% of greenhouse gas emissions are attributed to this, as per Helmers (2010), and street traffic accounts for 74% of the world's transportation industry. In order to make the

transition to a more sustainable society, there is a global demand for highly efficient transportation systems. The transportation industry has recognised electric cars as a critical technology for decreasing future emissions and energy usage. Furthermore, Helmers and Marx (2012) have further studied that a few nations, such as Germany, Denmark, and Sweden, have opted to move from fossil fuel to renewable energy sources, which further enhance the sustainability of electric automobiles when compared to conventionally powered vehicles. In comparison to ICEVs, electric vehicles are four times more effective in terms of energy use.

Artificial Intelligence

The advancement of artificial intelligence and its rising use across a wide range of industries has necessitated the necessity for ethically scrutinising and regulating its application. Graham et al. (2019) have stated that because intelligence is usually considered to be a human quality, the word "artificial" communicates the idea that this kind of intelligence is represented by a machine. AI is now ubiquitous in contemporary western life (e.g., for accessing information, facilitating social connections through social media, and operating security systems, among other things). In clinical settings, AI is being used in a variety of ways, for example, genetic testing and medical imaging, according to Tekkesin (2019). However, people are still a long way from routine implementation of Ai in healthcare, because the stakes and associated dangers are far greater than those associated with AI that enhances modern-day conveniences. Digital assistants, as an instance given by Gadea Llopis (2019), employ sophisticated artificial intelligence (AI), processing and comprehension of natural language, and machine learning to learn as they go and give a customised, conversational experience. Such voice-activated digital assistants can aid users in several ways. For example, one might look up a location on a map, search the internet, create a to-do list, or contact a friend. Fundamentally, they are attempting to save the user time by using simple voice commands to do everyday chores.

Online Streaming

People's consumption of broadcast media has been transformed by video streaming technology. According to the study of Camilleri and Falzon (2020), a growing number of consumers are abandoning linear formats such as cable or satellite TV and subscribing to internet streaming services instead. High-quality, original material is now available through digital and mobile streaming services offered by a variety of media businesses. This is especially noticeable among the younger groups, who are increasingly subscribing to online TV and video streaming services. Broadcast media is increasingly being consumed through digital and mobile technologies by individuals. Streaming services, such as Netflix, Hulu, and others, are often used to view television programmes, movies, series, and more. Online streaming firms like Amazon Prime, Apple TV and Disney+ are always investing in new programming since they operate in an increasingly competitive market.

2.5 Role of Technology in Sustainable Future

As per the view of Adamczyk et al. (2019), technology is often considered the key to the door of sustainability. In today's world, the necessity of sustainability has become crucial than ever as it has become an integral part of organisational operations. The rapid growth of the population has caused sustainability a challenge as a result, air pollution, water pollution and human health issues, climate change and reduction in biodiversity has increased. All the advancement which enabled different organisations to mitigate the fast-evolving need of consumer owes to the advancement of technology. The implication of technology has enabled the organisation to introduce new products and services which utilise less energy, water, chemicals and lessen the waste from the operation which has increased the efficiency at the same time.

In this context of the rising state of misbalance, the term sustainability has gained massive popularity. Hermundsdottir and Aspelund (2021) included the rapid transformation caused by technology in the environment, economy and social changes that have unimaginably changed the world. In this regard, practising sustainability among organisations has become a 'must have' practice as due to the rapid shift's climate-changing issue has become ominous for the world. In business, especially in the manufacturing segment, agriculture, transportation and construction, everyone is in the call of sustainability.

Though industries play a major role in our day-to-day basis life, the adverse impact of industries is directly hitting the environment negatively. Concerning minimising the negative impact, the causes should be identified. It is considered that the global problem is complex, and technology can play a pivotal role in this case. Technology has the power of increasing productivity, cost savings, productivity, lessening the waste and helping in tracking the progress which can benefit in minimalizing the adverse impact on the environment.

Agriculture is the largest industry in the globe. As per the World Wildlife Fund, the pasture and cropland comprise of 50% the earth's habitable land. Surprisingly, agriculture which works with nature is the leading source of pollution in multiple countries because 70% of the freshwater is consumed by the farmers and most of the farmer's practices lead to an increase in greenhouse gas emissions which include cleaning forest land, burning land to using a large amount of pesticide, toxic chemicals and pesticides which grow agricultural yield. As per the result published by EPA national inventory, in the US 10% of the greenhouse gas is accounted for by farmers. As per the Food and Agricultural Organisation of the United Nation, nearly 15% of global greenhouse emission is caused by livestock alone added by Schwartz (2021).

Here, technology can be a blessing, precession application of multiple pieces of equipment, for instance, can minimise the number of chemicals and water required in farming and advanced technologies like drones, robots and multiple types of sensors can be used to make the agricultural practices more environmentally friendly. As per the department of agriculture in the US, National Institute of Food and Agriculture, the increase of environmental benefits caused by technology will benefit in reducing the impact upon natural ecosystem and less runoff of chemicals into groundwater

and river. Furthermore, it will also contribute to growing conditions and safer foods for people.

One of the major cornerstones of businesses is transportation which benefits in developing connections and creating a supply chain that moves products around the globe implementing short and long-haul carriers, aeroplanes, trains and ships. Although, Schwartz (2021) noted, necessary transportation burns a large number of fossil fuels which are largely petroleum-based fuels including gasoline and diesel which causes 29% of total greenhouse gas emission in the US which makes this factor the largest contributor of greenhouse gas contributor. The environmental impact of transport will increase with time as the demand of people is increasing day by day as result travel will rise too. In addition, these factors like the rise of population, economic growth, urban sprawl and low fuel price will also contribute to the travellers. But there is an opportunity for transportation to improve as the impact of the transportation sector is substantial. The role of technological advancement can have a vast impact upon that. In this case, the implementation of electric vehicles, improved fleet maintenance and fuel efficiency, the autonomous vehicle can contribute to a far better positive impact on the environment from the side of transportation.

The implication of all these innovative technology implementations can benefit all the segments in bringing sustainability collaboratively in the world added by Hermundsdottir and Aspelund (2021). Apart from these technological solutions, some other technological solutions have been introduced by multiple organisations and these are committed to ensuring that the world can be saved for our future generations. Making the complete solution of industrial impact will not be an easy task but it will require some more time. It can inevitably be done via technological inventions and innovations and the world can be a better place to live in.

2.6 Scope of the Study

Literary history shows that science and technology have also led to new causes of war and weaponry. The fact that many well-known scientists, including Nobel Laureates and medical specialists, have devoted their careers to the development of various technologies in the process of reaching the optimum level of sustainability should not be overlooked. In order to have a thorough knowledge of the interplay between technology and sustainability concerns, research, like this paper, is required that incorporates brief conceptual knowledge on data across groups of practitioners working in several fields.

3 Conclusion

There must be a better understanding of the interconnectedness of the world's issues and the role they play in the larger context. ICT-based knowledge may make a significant contribution to sustainability. With today's global threats, we will require both scientific knowledge and creative thinking. In order to make people's lives easier, technology sustainability is always evolving. However, they have recently made it possible for their customers to access the majority of their financial services through internet banking. As technology has progressed, it has become remarkable and suggestive of what's to come. People's personal and professional lives have been made easier and simpler by walk-on technology.

The use of social media is essential for promoting the flow of ideas and information with the target audience. This potential should be used and integrated into nursing practice and education. Nanotechnology will have a major influence on the future development and usage of textiles. Expected results include more energy-efficient and greener textile manufacturing. Optical sensors may be used to measure temperature, stress, strain, gases, biological chemicals, and odours. Layering was initially used in nineteenth-century topographical maps to produce 3D models. The rise of 3D printing has been fuelled by decreased manufacturing costs and open-source software. Academics and corporations started using the term Robot/AI as early as the year 2000. Since robot technology is being utilised in so many diverse sectors, it is almost difficult to keep track of the number of robotics fields at this point.

It is possible to enhance the internet's centralisation, transparency, equality and accountability by using blockchain technology. Using the blockchain in an area that mandates the sharing of information may help provide data transparency. For the transportation sector, electric automobiles are a vital technology for reducing future emissions and energy use. Electric cars are four times more energy-efficient than internal combustion engine vehicles (ICEVs). It has become necessary to ethically scrutinise and regulate AI applications as it has progressed. There are significantly more at risk and hazards related to AI than those associated with current comforts that are facilitated by the technology we have now. Streaming services such as Netflix, Hulu, and others are often used to watch television shows, movies, and more. Digital and mobile streaming services from a range of media companies are increasingly offering high-quality, unique content to consumers.

As a consequence of population expansion, air pollution, water pollution, human health difficulties, climate change, and the loss of biodiversity have all risen. In this sense, sustainability has become a "must-have" practice in the workplace. The utilisation of modern technology like drones, robotics, and sensors may reduce the number of pesticides and water necessary in farming. The environmental effect of transportation will only become worse with time. When it comes to such issues, technological innovation may have a huge influence. In this situation, with the introduction of electric cars, enhanced fleet maintenance, and fuel economy, the autonomous vehicle may have a significantly greater beneficial environmental effect.

3.1 Implications in Theory and Practice

Despite the fact that this global crisis has numerous sides and will continue to change for many years into the future, technology is expected to play a significant role in its resolution. It is possible that technology will increase production, efficiency, and cost savings; reduce product waste, as well as chemical and resource waste; monitor and analyse progress to reduce the environmental impact. Since this research has focused on the wide area of technological sustainability and sustainable technologies in the twenty-first century, academics and scholars will be benefited from a vast range of theoretical ideas to carry out a further and narrower study. On the other hand, practitioners in every field will have a brief idea of the way different technologies are being used in their relevant fields.

3.2 Study Limitations

This research has been based on a broader sense of the area that revolves around the modern notion of technological sustainability. The method has only followed reviewing literary pieces as secondary data for qualitative research; hence, the research is mostly based on theoretical and opinionated data. Future research needs to consider the conceptualisation of the topic and conduct a field survey.

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The Implementation of Technology and the Future of Education and Knowledge

Interns' Self-efficacy, Internet Addiction, Wellbeing, and Online Learning Experiences: A Descriptive-Correlational Study



Ahmed H. Ebrahim, Mai Helmy, Ethan Engel, Khaled AlQoud, and Husain AlShakoori

Abstract The ramifications of Internet addiction on psychological and social wellbeing have been extensively demonstrated in previous studies involving college students, but examining the mediating role of Internet addiction between self-efficacy and overall wellbeing has not been well-investigated, particularly among interns. This study first assessed the online learning experiences of a sample of interns during the COVID-19 pandemic and then explored the association between three constructs: self-efficacy, Internet addiction, and overall wellbeing. Fresh graduates engaging in an online internship program were recruited to participate in a cross-sectional online survey during the outbreak of COVID-19 in Bahrain. Self-administered scales of General Self-Efficacy (GSE), Internet Addiction Test (IAT), and PERMA Profiler were used to collect data about self-efficacy, Internet addiction, and overall wellbeing. Pearson's correlation coefficient was used to measure the strength of the hypothesized relationships between these three constructs. A structural equation model was used to analyze the mediating role of Internet addiction. Overall, the higher the self-efficacy the participants perceived, the lesser Internet addiction they exhibited (r = -0.23, p =0.02), and the more wellbeing they felt (r = 0.45, p < 0.01). Internet addiction has been found as a mediating factor between self-efficacy and overall wellbeing (b = 0.12, p

A. H. Ebrahim (⊠) · H. AlShakoori Ministry of Health, Manama, Kingdom of Bahrain e-mail: ahh50@hotmail.com

A. H. Ebrahim Ahlia University, Manama, Kingdom of Bahrain

A. H. Ebrahim · K. AlQoud Bahrain Corporate Social Responsibility Society, Manama, Kingdom of Bahrain

M. Helmy

Psychology Department, College of Education, Sultan Qaboos University, Muscat, Oman

Psychology Department, Faculty of Arts, Menoufia University, Shebin El-Kom, Egypt

E. Engel

Ritchie School of Engineering and Computer Science, University of Denver, Denver, CO, USA

K. AlQoud AlQoud Enterprise, Manama, Kingdom of Bahrain

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< 0.001). 61.5% of the participants had mild to moderate levels of Internet addiction. Experiencing less communication with colleagues because of online learning was one of the top-rated online experiences and consistently, enjoying positive relationships was the lowest-rated pillar of PERMA. Therefore, problematic Internet use that negatively affects individuals' health should be managed through self-efficacy-boosting strategies. Further, fostering communications and social connectedness disrupted with excessive reliance on virtual environments demands special attention by counseling psychologists and e-education providers/developers.

Keywords Bahrain · Internship · Self-efficacy · Internet addiction · Wellbeing · Virtual learning

1 Introduction

In recent years, and particularly during the COVID-19 pandemic in 2020, there has been an unprecedented upsurge in the use of and reliance on information and communication technologies (ICTs), for an array of functions, including but not limited to distance work, education, shopping, leisure, and social connectedness (De' et al., 2020). Due to the pandemics' drastic and long-lasting disruptions on many industries and sectors, with a particular focus on education, most colleges and universities worldwide closed their campuses. They significantly changed their courses into fully online or at least a hybrid format (Lockee, 2021). In the twenty-first century, Internetbased activities growth and artificial intelligence (AI) usage in higher education of the modern world has been continuously growing even before the pandemic (Ikedinachi et al., 2019). However, the pandemics' strong catalyzing effect on inducing an abrupt transformation of the global higher education towards greater adoption of online education (e-learning) is evident (De' et al., 2020; Gallagher & Palmer, 2020). This has been associated with several adaptation-related, psychological, and behavioral challenges at the individual and organizational levels (Besser et al., 2020; Maatuk et al., 2021).

Studies investigating university students' psychological wellbeing have been abundant during the COVID-19 pandemic due to the crisis's devastating effects on different life aspects and the recognized vulnerability of students' population (Batra et al., 2021; Browning et al., 2021; Cao et al., 2020; Ebrahim et al., 2021). Many of these studies indicated the pandemic's negative psychological ramifications like increased students' symptomatic manifestations or suffering from anxiety, depression, stress, mood disturbances, emotional distortions, life dissatisfaction, and sleep disorders. Also, substance abuse, abnormal eating patterns, internet addiction, and unhealthy lifestyles were amongst the reported students' behaviors during the pandemic. In meta-analysis studies involving college students from different nations worldwide during 2020 found an overall pooled prevalence rates ranging between 29.1% and 39.4 for anxiety, between 23.2% and 31.2 for depression, 26.0% for stress, 29.8% for post-traumatic stress disorder, and 50.5% for impaired sleep quality (Batra

et al., 2021; Ebrahim et al., 2021). These figures highlight the importance of recognizing and addressing university students' risk factors for mental health and related consequences on their education and quality of life.

A serious issue that needs to be addressed is the heightened prevalence rates of Internet addiction and Internet-based addictive behaviors among adolescents and college students during the COVID-19 pandemic (Lin, 2020; Masaeli & Farhadi, 2021; Sujarwoto et al., 2021). In a study conducted in China on 8,098 college students, it was found that the prevalence of suicide attempts among excessive internet users reached 21.4% (Shen et al., 2020). Further, extant evidence indicates that internet addiction induces anxiety, depression, and disturbed mental health, which potentially could devastate learners' academic performance or induce academic procrastination (Aznar-Díaz et al., 2020; Lebni et al., 2020; Shen et al., 2020). Within this context, some studies pointed out that college students' perceived self-efficacy shows a negative relationship with Internet addictive patterns of use (Berte et al., 2021; Gazo et al., 2020). Self-efficacy is a crucial concept in social-cognitive theory, which refers to "people's beliefs about their capabilities to exercise control over their level of functioning and over events that affect their lives" (Bandura, 1993). Such control is toned by the influence of cognitive, motivational, affective, and selection processes associated with perceived self-efficacy. However, the strength of the self-efficacy-Internet addiction relationship or even its absence is an area of controversy amongst different research (Alrekebat, 2016; Craparo et al., 2014; Tavakoli et al., 2014).

Despite the proliferating research on high school and higher education populations to investigate their levels of self-efficacy, Internet addiction, and wellbeing, unfortunately, fresh graduates (interns), one of the vital community segments, have not been paid adequate attention in research activities. The transition stage from education to employability and its related uncertainties or expectations towards dream fulfillment is in itself a solid reason to steer research on interns. Considering the pandemic devastating and transformational effects, interns' online learning experiences, internet addiction, self-efficacy, and overall wellbeing have become of more importance to be objectively investigated. Hence, the current study was designed to investigate the relationship between specific online learning experiences, levels of perceived self-efficacy, Internet addiction, and overall wellbeing among a sample of interns during the Pandemic of COVID19. This has led to the formulation of the following research hypotheses and the development of a testable conceptual model (see Fig. 1).

Hypotheses

H1: Self-efficacy has a direct association with overall wellbeing.

H2: Self-efficacy has a direct association with Internet addiction.

H3: Internet addiction has a direct association with overall wellbeing.

H4: Internet addiction mediates the relationship between self-efficacy and overall wellbeing.

The chapter comprises this introduction, followed by the sections of materials and methods, results, discussion, limitations, study implications and recommendations, and the conclusion.

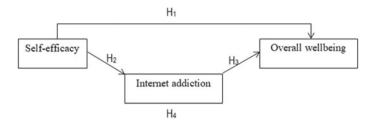


Fig. 1 The conceptual model

2 Materials and Methods

2.1 Ethics, Participants and Sampling

Respondents were eligible to participate in the study if they were above 18 years old, fresh graduates, and participants in the internship program provided by AlQoud Enterprise. AlQoud Enterprise is a professional consultancy firm that has a memorandum of agreement with Bahrain's Ministry of Labor to deliver internship training programs by which the interns are expected to acquire knowledge, skills, and field experience in the working world. This study's sample was selected from the Batch of 125 trainees enrolled in September 2021 and have received eight weeks of virtual training. Participation was entirely voluntary, and there was no monetary or nonmonetary compensation for the respondents' participation. Access to the online questionnaire requires reading a set of instructions that the questionnaire is voluntary with maintaining the anonymity and confidentiality of responses and that no personal data such as a name or an identification number will be requested. All participants provided informed consent prior to participating in the research by indicating that (1) accessing and responding to the questionnaire is based on the understanding of the research nature and (2) taking part in the research is on their own accord with complete freedom of withdrawal at any time. Ethical approval for the study was obtained from the Research Advisory Board of Bahrain's Corporate Social Responsibility Society (BCSRC)-Manama, Kingdom of Bahrain. Adherence to the set of ethical principles provided by the Declaration of Helsinki and also the American Psychological Association (APA) has been a priority by the researchers (American Psychological Association, 2016; World Medical Association, 2001).

In order to determine the recommended sample size, the following formula was used (www.raosoft.com/samplesize.html):

$$x = Z(c/100)^{2}r(100 - r)$$

$$n = N x/((N - 1)E^{2} + x)$$

$$E = \text{Sqrt}[(N - n)x/n_{(N-1)}]$$

5% margin of error (M.O.E) was accepted with setting the response distribution to 50% and the confidence level to 95%; hence, the recommended sample size (n) for the total population of 125 interns is 95. A mixed sampling design of total population sampling and self-selection sampling was adopted. The potential participants were approached through direct contacts, and also the e-questionnaire-based invitation was broadcasted in the private online communication platform, which embraces the entire targeted population.

Briefly, within a week, the survey was closed with a total of 96 completed responses (77% response rate), which the researchers accepted as the recommended sample size was attained. The demographic characteristics of the sample are displayed in Table 1.

2.2 Measures

The survey instrument was in English, and that there was confidence towards the respondents' level of English language proficiency as they have been graduated from academic programs taught in English. We administered the English version of the following scales:

The General Self-Efficacy Scale (GSES) (Weinman et al., 1995). This is a valid and reliable self-report scale composed of 10 items measured on a four-point rating scale from 1 (not at all true) to 4 (exactly true)—all items are worded in one direction. The range is from 10 to 40 points upon adding up all responses to a sum score. There is no cut-off score, and that establishing groups could take place based on a median split. The GSES evaluates the individuals' perceptions about their capacity to cope with life's demands, and it represents an optimistic sense of personal competence necessary for motivation and accomplishment (Bandura, 1993; Weinman et al., 1995). The GSES as a unidimensional construct has been applied in multicultural validation studies, which suggest the globality of the construct and endorse its excellent psychometric properties for adults (including adolescents). The scale showed a good internal consistency ($\alpha = 0.85$) for a sample of 19,120 individuals from 25 countries (Scholz et al., 2002).

Internet Addiction Test (IAT) (Young, 1998). This is a valid and reliable self-report scale consisting of 20 items scored on a five-point Likert scale with an additional response of 'Not applicable = 0'—all items are worded in one direction. The range is from 0 to 100 points upon adding up all responses to a sum score. The instrument evaluates the severity of Internet addictive behavior. The interpretation of total scores is as follows: 0–30 points indicate a normal level of Internet usage, 31–49 indicate a mild level of Internet addiction, 50–79 points to moderate Internet addictive Internet use as an impulse-control disorder that does not implicate an intoxicant but has the potential to erode one's performance at academic, social, and occupational levels (Ibid). However, the IAT was applied among different sub-populations in many countries, provided a comprehensive picture of Internet addiction prevalence, and

Domain		Frequency (%)
Gender	Male	28 (29.2)
	Female	68 (70.8)
Nationality	Bahraini	64 (66.7)
	Other	32 (33.3)
Age group	18-20	10 (10.4)
	21–23	36 (37.5)
	24–26	21 (21.9)
	27-30	20 (20.8)
	31–35	6 (6.3)
	36 and over	3 (3.1)
Academic degree	Diploma	10 (10.4)
	Bachelors	81 (84.4)
	Masters	5 (5.2)
University type	Public (local)	53 (55.2)
	Private (local)	31 (32.3)
	Private (international)	12 (12.5)
Academic discipline	Business administration	34 (35.4)
	Information technology	21 (21.9)
	Sciences	2 (2.1)
	Arts	8 (8.3)
	Engineering	14 (14.6)
	Law	2 (2.1)
	Medical sciences	1 (1.0)
	Other	14 (14.6)
Preferred learning	Face to face	42 (43.8)
mode	Online	22 (22.9)
	Blended	32 (33.3)
		1

Table 1 Demographic dataof participants

also exhibited good psychometric properties (Cheng & Li, 2014; Moon et al., 2018; Samaha et al., 2018; Sela et al., 2021). Further, in an Arab sample, the instrument has been validated and yielded a high internal reliability score of 0.914 (Samaha et al., 2018).

PERMA Profiler scale (Butler & Kern, 2016). This is a valid and reliable selfadministered scale composed of a 15-item scale to measure Seligman's five pillars of wellbeing, including Positive emotions, Engagement, Relationships, Meaning, and Accomplishment (three items per subscale). The PERMA Profiler encompasses eight supplementary items that assess negative emotions (three items), health (three items), loneliness (one item), and overall happiness (one item). All items have a rating scale of 11-point anchored by 'never' at the beginning and 'always' at the end. All items are worded in one direction. Scores are calculated by averaging the items comprising each pillar, and the overall wellbeing score is calculated by averaging the entire items representing the PERMA. There is evidence implying that the PERMA scale has acceptable reliability, cross-time stability, and convergent and divergent validity, (α range = 0.80–0.93) (Butler & Kern, 2016; Ryan et al., 2019; Umucu et al., 2020).

Online learning experiences. The researchers developed 13 items based on a review of relevant studies conducted recently during the COVID-19 pandemic and attempted to address college students' online experiences of college students (Adedoyin & Soykan, 2020; Lei & So, 2021; Mukhtar et al., 2020; Rahali et al., 2020; Selvanathan et al., 2020). Alongside, the researchers' area of expertise has been useful to formulate these items in a meaningful and valid manner. A matrix question was used, and that the extent of respondents' agreement or disagreement towards the developed 13 statements were objectively collected through anchoring a five-point Likert scale ranging from strongly agree (1) to strongly disagree (5). Briefly, these items focus on how online learning has been supportive for a participant to (1) attain academic success, (2) gain sufficient knowledge from courses material, (3) improve learning ability, (4) control on what to be extracted from textbooks, (5) work hard, (6) speed-up building-up knowledge, (7) communicate ideas and opinions, (8) understand the course material with less difficulty, (9) communicate more with colleagues, (10) motivate to study, (11) experience less boredom, (12) experience less anxiety about keeping up to date with course work, and (13) keep-up interest in most of the life activities. Items 8, 9, 11, 12, and 13 were formulated in a negative direction, while the remaining ones were positively stated.

2.3 Statistical Analysis

In this study, the analyses were performed using the Statistical Package for the Social Sciences version (SPSS) version 23. All collected responses were exported as CSV file format from the survey website. These responses represented completed surveys as all questions were inaugurated with the option of 'required answer' to proceed. The data were managed in SPSS to administer descriptive analysis to calculate mean, standard deviation, and frequencies. Pearson's correlation analysis was applied to assess the relationships between different variables. A t-test and analysis of variance (ANOVA) test were used to compare the means of two groups and three groups, respectively, and regression analysis to test the mediation effect using Andrew F. Hayes's PROCESS macro for SPSS (Hayes, 2017). A p-value of less than 0.05 (typically \leq 0.05) was considered statistically significant.

3 Results

The descriptive statistics related to the findings of self-efficacy, Internet addiction, and PERMA constructs are displayed in Table 2 and Fig. 2. Regarding self-efficacy (M: 31.72, SD: 4.69), 54% of the participants' scores were above the median value, which was 31. Results of Internet addiction (M: 37.82, SD: 15.21) showed that 61.5% of the participants had mild to moderate levels of internet addiction, while the presence of severe Internet addiction was rare. The analysis of PERMA (M: 6.98, SD: 1.34) had given a median value of 6.97, and that 54.2% of the participants' scores were above the median value. Within this construct, the 'accomplishment' pillar had the highest mean value (M: 7.06, SD: 1.63), followed by the 'meaning' pillar (M: 7.04, SD: 1.85); however, the pillar of relationships received the lowest rating (M: 6.83, SD: 1.99).

Through examining the descriptive findings of online learning experiences, the highest rating was associated with the experience of perceiving that online learning was helpful to improve the learning ability (M: 3.53, SD: 1.12). Also, the experience of "having less communication with colleagues because of online learning" (M: 3.53, SD: 1.31) shared the first rank of the highest rating. The lowest rated experience was "confronting difficulties to understand the material of courses with online learning" (M: 3.10, SD: 1.25).

The matrix correlation results in Table 2 indicated that self-efficacy has a significant and negative association with Internet addiction (r = -0.23, p = 0.02), but it has a significant and positive association with overall wellbeing (PERMA) (r = 0.45, p < 0.01). Hence, H₁ and H₂ are accepted. In addition, findings showed that Internet addiction has a negative and significant relationship with overall wellbeing (r = -0.23, p < 0.05). Therefore, H₃ is supported. Based on examining the regression models generated by using Andrew F. Hayes's process, it was found that while self-efficacy was a significant predictor for both wellbeing and Internet addiction variables, it is no longer significant in the presence of the Internet addiction variable, confirming the mediation effect. I.e., the mediation process showed that the mediator (Internet addiction), controlling for self-efficacy, was significant, b = 0.12, t(93) = 4.49, p < 0.01. And that, controlling for the mediator (Internet addiction), self-efficacy was not a significant predictor of wellbeing, b = -0.01, t(93) = -1.41, p = 0.16. Hence, the results support the acceptance of H₄.

Worth mentioning, mainly self-efficacy was significantly correlated with two online experiences "confronting a difficulty to understand the courses material" (r = 0.31, p < 0.01), and "suffering anxiety about keeping up to date with course work" (r = 0.266, p < 0.01). In contrast, there were no statistically significant correlations between Internet addiction and any of scored online experiences. As expected, ANOVA analysis showed that participants who preferred face-to-face learning mode—compared to those who preferred either hybrid or solely online learning modes—recognized online learning as (1) more difficult to understand the courses material (F [2, 93] = 7.63, p < 0.01), (2) less motivating to study (F [2, 93] = 3.26, p < 0.05), (3) more boredom inducing (F [2, 93] = 20.66, p < 0.01), (4)

Table 2 Correlations matrix

	VIIIMIII CIIOT												
Factor	$\text{Mean}\pm\text{SD}$	1	2	3	4	5	6	7	8	9	10	11	12
1. Internet addiction	37.82 ± 15.21	1	-0.231^{*}	-0.231^{*}	-0.109	-0.084	-0.287^{**}	-0.285^{**}	-0.158	-0.299^{**}	0.033	0.163	0.084
2. Self-efficacy	31.72 ± 4.69	-0.231^{*}	1	0.453^{**}	0.241^{*}	0.291^{**}	0.294^{**}	0.448^{**}	0.530^{**}	0.381^{**}	0.143	-0.108	-0.051
3. PERMA	6.98 ± 1.34	-0.231^{*}	0.453^{**}	1	0.806^{**}	0.582^{**}	0.791^{**}	0.890^{**}	0.747**	0.544^{**}	0.591^{**}	-0.106	-0.182
4. Positive emotion	6.99 ± 1.72	-0.109	0.241*	0.806**	1	0.320^{**}	0.545**	0.691**	0.428**	0.478**	0.671**	-0.399**	-0.376**
5. Engagement	6.95 ± 1.50	-0.084	0.291^{**}	0.582^{**}	0.320^{**}	1	0.258^{*}	0.365**	0.494**	0.276^{**}	0.148	0.178	0.197
6. Relationships	6.83 ± 1.99	-0.287^{**}	0.294^{**}	0.791^{**}	0.545^{**}	0.258^{*}	1	0.704^{**}	0.430^{**}	0.463**	0.448^{**}	-0.072	-0.273^{**}
7. Meaning	7.04 ± 1.85	-0.285^{**}	0.448^{**}	0.890^{**}	0.691^{**}	0.365**	0.704^{**}	1	0.641^{**}	0.534^{**}	0.435**	-0.136	-0.200
8.	7.06 ± 1.63	-0.158	0.530^{**}	0.747**	0.428^{**}	0.494^{**}	0.430^{**}	0.641^{**}	1	0.297**	0.248^{*}	0.112	0.059
Accomplishment													
9. Health	7.03 ± 2.26	-0.299^{**}	0.381^{**}	0.544^{**}	0.478^{**}	0.276^{**}	0.463^{**}	0.534^{**}	0.297^{**}	1	0.337^{**}	-0.219^{*}	-0.291^{**}
10. Happiness	7.10 ± 2.22	0.033	0.143	0.591^{**}	0.671^{**}	0.148	0.448^{**}	0.435^{**}	0.248^*	0.337^{**}	1	-0.170	-0.175
11. Negative emotion	5.63 ± 1.92	0.163	-0.108	-0.106	-0.399**	0.178	-0.072	-0.136	0.112	-0.219^{*}	-0.170	1	0.456^{**}
12. Loneliness	5.02 ± 3.20	0.084	-0.051	-0.182	-0.376^{**}	0.197	-0.273^{**}	-0.200	0.059	-0.291^{**}	-0.175	0.456^{**}	1
* Correlation is significant at		the 0.05 level (2-tailed)	tailed)										

** Correlation is significant at the 0.05 level (2-tailed) ** Correlation is significant at the 0.01 level (2-tailed)

Note PERMA (Positive emotions, Engagement, Relationships, Meaning, and Accomplishment)

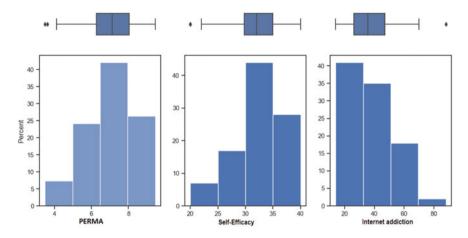


Fig. 2 Percentage of scores and medians for the main variables of the study

more anxiety-inducing to keep up to date with course work (F [2, 93] = 10.80, p < 0.01), and (5) more interest-destroying in most of the life activities (F [2, 93] = 5.29, p < 0.01). However, participants preferring online learning mode, compared to their counterparts, indicated that their online experiences as (1) more supportive to sped-up knowledge building (F [2, 93] = 3.18, p < 0.05), and (2) more convenient to communicate ideas and opinions with teachers (F [2, 93] = 3.69, p < 0.05).

Through comparing the means values, there was no significant difference between the male and female groups with regards to levels of self-efficacy, Internet addiction, and overall wellbeing (p > 0.05). Also, there was no significant difference between Bahraini and non-Bahraini groups with regards to levels of Internet addiction and overall wellbeing (p > 0.05); however, non-Bahraini interns indicated higher levels of perceived self-efficacy (33.56 \pm 3.80), compared to Bahraini interns (30.80 \pm 4.84), (t [94] = -2.83, p < 0.01). At the aspect of online learning experiences, there was no significant difference between the male and female groups with regards to rating levels towards all stated online learning experiences (p > 0.05), except for two experiences. Explicitly it was found that perceived difficulty in understanding the course material via online learning was greater in men (3.64 ± 1.31) than women (2.88 ± 1.17) , (t [94] = 2.80, p < 0.01); despite that finding, men considered online learning helpful to speed-up building-up knowledge (3.89 ± 1.07) in a greater extent than women (3.19 ± 1.16) , (t [94] = 2.75, p < 0.01). From a different angle, there was no significant difference between Bahraini and non-Bahraini groups with regards to rating levels towards all stated online learning experiences (p > 0.05), except for one experience. Non-Bahraini interns indicated that they felt more bored with online learning (3.84 ± 0.99) than Bahraini interns (2.98 ± 1.11) , (t [94] = -3.72, p < 0.001).

4 Discussions

During the abrupt switch to remote learning induced by the COVID-19 pandemic, this study attempted to evaluate interns' perceived e-learning experiences and hypothesized a conceptual model of relationships between perceived general self-efficacy, Internet addiction, and overall wellbeing PERMA (Positive emotion, Engagement, positive relationships, meaning, and accomplishment). This research is the first of its kind in the Arab region to target the interns' population to investigate the variables mentioned earlier, to provide education and market decision-makers with evidence helpful for informed decision-making. The main findings showed that surveyed interns' e-learning experiences of anxiety and difficulties in understanding materials were associated with their perceived self-efficacy. Also, the interrelationships between the three variables of perceived general self-efficacy, Internet addiction, and overall wellbeing were statistically significant.

With the deployment of Web 2.0, the models of e-learning in the 21st Century have become diverse and advanced. These include virtual meetings, discussion boards, and recorded videos, which aim to ensure content accessibility and encourage active engagement of learners (Cairns & Alshahrani, 2013). Within the increasing involvement with such models, our finding related to the participants' experience of learning ability improvement confirms the role of distance technologies in developing users' skills of self-regulated learning and enabling a personal learning environment (Yen et al., 2016). Despite this advantage, sustaining adequate levels of social connectedness emerges as the highest challenge that online learners could encounter. The results are consistent with prior evidence that off-campus students are more likely to have a sense of social isolation than their counterparts in face-to-face learning environments (Ali & Smith, 2015; Irani et al., 2014). Furthermore, the relationships dimension of the overall wellbeing factor received the lowest rating in this study's investigation, and hence, despite the unprecedented increased reliance on technology-based interactions during the COVID-19 pandemic, there has been an obvious issue concerning the fulfillment of social needs and aggravated vulnerability to experiencing loneliness or isolation (Dimmock et al., 2021; Shah et al., 2020).

Self-efficacy has been noted in several different disciplines, and it could be utilized differently in multiple domains, depending entirely on whether it is relevant to a particular context or covers a broad range. It was revealed, in particular, that self-efficacy was related to online learning self–efficacy, such as e-learning as well as using electronic technology. Prior research has shown that students with strong academic self-efficacy report less academic anxiety and stress and function effectively in academic activities (Elias & MacDonald, 2007; Gore, 2006; Hejazi et al., 2009; Nie et al., 2011). However, this study's findings highlighted that higher levels of perceived self-efficacy were associated with greater experiences of difficulty comprehending the course content and suffering anxiety with sustaining the coursework. Such results could be interpreted within the assertions provided by Strack et al. (2017), that working best and achieving goals by individuals can be attained when they are clear about their feelings and deploy anxiety as a motivating

element. However, few studies reported that students might experience stress and anxiety as a result of diminished self-efficacy with Learning Management Systems (LMS) and subsequent inability to fulfill their e-learning activities (Aldhahi et al., 2021; Alqurashi, 2016; Martin et al., 2010). Therefore differentiating between the perceived general self-efficacy and task-specific self-efficacy in predicting the ability to manage situations or perform a course of actions is necessary to avoid misinterpretation. Another possible factor to consider when analyzing such results is the participants' likelihood of overestimating their confidence (Moores & Chang, 2009).

This study found that difficulties in learning, demotivation, and anxiety were linked with face-to-face learning-preferring individuals than others who preferred online mode. This calls for viewing self-efficacy in the context of online learning as it could play a key factor for academic achievement and successful virtual learning experience (Alahmari, 2017; Alqurashi, 2016; Bolliger & Halupa, 2018; Bubou & Job, 2020; Gavrilisr et al., 2020; Hodges, 2008; Jan, 2015; Lee et al., 2020; Olivier et al., 2019; Puzziferro, 2008; Schunk, 1991; Shea & Bidjerano, 2010; Stephen & Rockinson-Szapkiw, 2021; Weidlich & Bastiaens, 2018; Yokoyama, 2019; Yýldýz Durak, 2018; Zilka et al., 2019; Zimmerman, 2000; Zimmerman & Kulikowich, 2016). Students' online learning self-efficacy (OLSE) is associated with improved learning, mental health, and motivation (Nie et al., 2011). It has been found as a potent predictor of academic satisfaction by Gunawardena et al. (2010) and many other scholars (Gunawardena et al., 2010; Lee & Hwang, 2007; Lee & Mendlinger, 2011; Lim, 2001; Yokoyama, 2019). Such evidence provides a rationale for our study's finding of why those who preferred online learning mode had experienced online learning as more supportive to (1) speed-up knowledge building and (2) vigorously communicate ideas and views with educators.

Considering the results of this study's hypothetical proposition that self-efficacy directly correlates with overall wellbeing, an explanation could be given based on adopted coping strategies (Freire et al., 2020). Individuals who consistently have high self-efficacy are more likely to utilize positive problem-solving coping mechanisms and are better at controlling their behavior and emotions. Accordingly, as a result, stressful situations seemed to have less of an impact on them. On the other hand, people with poor self-efficacy are more likely to use negative coping methods and engage in negative self-talk, resulting in an increased reactivity to stressful circumstances (Bandura, 2002; Schwarzer & Warner, 2013). Social anxiety, loneliness, and social dissatisfaction have been linked to low social self-efficacy (Betz & Smith, 2002). On the other side, high self-efficacy has been linked to positive life satisfaction, along with high self-esteem, interpersonal and professional achievement (Betz & Hermann, 2004; Betz & Schifano, 2000; Betz & Smith, 2002). It is acceptable to assume that students who believe in their abilities to complete their assignments effectively will appreciate the educational process greater; additionally, these individuals should experience more feelings of optimism and accomplishment than students with lower self-efficacy (Dai, 2016; Mega et al., 2014; Pekrun et al., 2011). This is consistent with prior research conclusions (Hayat et al., 2020; Putwain et al., 2013).

Another finding of this study was a significant relationship between internet addiction and self-efficacy, studied in some research. For example, Lee et al. (2001), Kim and Davis (2009), Esen and Gundogdu (2010), Yao and Zhong (2014), and Sari and Aydin (2015) have concluded that there is a strong connection between self-efficacy levels and problematic internet usage. Furthermore, the internet addicts have higher vulnerability to suffering anxiety and depressive symptoms than the nonaddicts, and subsequent potential of low academic performance (Akin & Iskender, 2010; Bozoglan et al., 2013; Chen et al., 2020; Cheung et al., 2018; Chiu et al., 2013; Craparo et al., 2014; Lee et al., 2001). Individuals' personal interactions deteriorate, and they become socially disconnected as they spend more time on the internet. Consequently, as the level of internet addiction increases, social self-efficacy decreases (Bakioğlu, 2020; Berte et al., 2019; Iskender, 2018).

5 Limitations

This study has some limitations. The nature of the small size sample drawn from a population of interns at a single private training foundation induces that findings may not be generalizable to interns at other institutions or with other demographics. Besides that, the interpretation of the results should be undertaken with precautions and consideration to the temporal dimension, as during the COVID-19 pandemic, problematic internet use and coping behaviors appear to be elevated during that pandemic (Jahan et al., 2021). Further, social desirability biases are of potential in this study due to the nature of subject self-reports. Another major limitation is the readability of the questionnaire, which was presented in English, and that variation in those respondents' level of English language proficiency is possible. However, we emphasized the importance of Arabic validation of the used tests within the socio-cultural context of this study through future research.

6 Study Implications and Recommendations

This study introduces challenges that interns have experienced with online learning, particularly during the era of the Covid-19 pandemic and the drastic learning evolvement. Developing innovative strategies to boost social connectedness in online learning environments is an important priority to support online programs' success and learners' sense of accomplishment. Alongside, higher education providers should seriously consider measuring learners' perception of social connectedness and their satisfaction with technology-mediated communication channels. This study found that individuals with low self-efficacy exhibited more Internet addiction and subsequently enjoyed lesser overall wellbeing. Hence, further research is needed to explore and analyze adults' Internet behavior by considering interactions with different social networks and information platforms that become a significant element of daily lifestyle for many young adults. Health promotion advocates need to ensure education, awareness, and encouraging healthy lifestyle and habits, including how effectively one can monitor Internet use duration and patterns.

The current study findings concluded that perceived self-efficacy directly correlates with overall wellbeing and is a key factor in academic achievement in virtual learning. Therefore, it is highly beneficial to work on modalities to improve perceived self-efficacy in general and perceived self-efficacy in performing virtual learning. Some recommendations are teaching students how to set specific learning objectives that are attainable, providing education for stress-reducing techniques to help lessen the anxiety associated with learning, and giving special attention to students who have learning difficulties or have high anxiety baseline levels. In general, the study findings enrich learning theories and provide valuable insight into the association of self-efficacy and Internet addiction on young adults' mental, emotional, and social wellness.

7 Conclusion

While many studies have addressed the online experiences, internet-related behaviors, and psychological aspects of college students, especially amid the COVID-19 pandemic, the community of interns has been neglected to a great extent with that regard. Our research, the first of its kind in the region, indicates that interns have an alarming prevalence of internet addiction which mediates the relationship between self-efficacy and overall wellbeing. Hence, institutions providing internship programs need to deploy practical assessment tools to evaluate interns' behavioral health and also to determine effective strategies promoting healthy technology use and resilience to cope with the tectonic shift towards virtual learning.

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The Challenges and Factors Influencing the E-Learning System Usage During COVID-19 Pandemic



Abdulsadek Hassan

Abstract This study aims to assess the experience of e-learning, especially in the post-Coronavirus period, and the challenges facing this experience. The study evaluated this experience depends on the review and analysis of all documents related to e-learning and the various experiments applied. The results revealed the challenges facing the electronic transformation process and how to overcome. And the evaluation of this experience in e-learning in the period of Corona and the future of this type of education in the post-Corona period.

Keywords E-learning · COVID-19 pandemic · Challenges

1 Introduction

E-learning is a modern type of education that arose as a result of the great development that this world witnessed. All modern means are used in e-learning, including computers, networks, the Internet, and other means (Almanar, 2020).

E-learning has many types and characteristics, which we will learn about in the coming lines. We will also learn about the most important and most prominent challenges facing e-learning (Coman et al., 2020).

The current situation in terms of adhering to social distancing played a role in the emergence of a set of unexpected and somewhat difficult challenges, which in turn affected a very important group in society, namely students and lecturers. This happened when education shifted to e-learning behind the screens, from pre-school age to university students (Muthuprasad et al., 2021).

Spending a long time in front of devices and their screens is the first major challenge in these circumstances, as it has become a habit acquired for everyone as we link in the relationship between education and devices (Mailizar et al., 2020). We can't stop it because it is the educational method in this time and circumstances we

A. Hassan (🖂)

Ahlia University, Manama, Kingdom of Bahrain e-mail: aelshaker@ahlia.edu.bh

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are going through, it is too powerful for us to control, but there are some solutions to deal with that challenge (Byun & Slavin, 2020).

Although recent studies have shown that the human brain can interact with devices and screens in a different way than it interacts with pen and paper, the material printed on the paper affects more than screens and has its way of gaining the student's confidence in himself, especially when he can touch that paper and follow the words printed on it (Al-Azawei et al., 2017). This makes it complete the task in a faster and more accurate manner in a tangible physical learning environment and not screens that cannot change when touched. Therefore, based on those studies, it is better to convert the electronic lesson into a paper for the student, either by copying and summarizing the most important points, or by printing the content on a paper so that the paper is the first source for it, thus facilitating the relationship between the student and obtaining information (Taat & Francis, 2020).

It is necessary to cooperate with students who learn through direct lessons, as it is necessary to be present in the place and time. What makes it easier for everyone and less stressful is for the family to write the daily schedule in a clear place so that everyone can cooperate with each other so that learning does not cause problems between family members (Mokhtar et al., 2020). It is also necessary to give the best space to those who need it most and most, for example, a university student needs a suitable, wider and quieter place during the exam period than a primary school student who can be in any other suitable place at home. In other words, it is necessary to priorities, which reduces the aggravation of the difficulty of the challenge and the inability to act properly (Almanar, 2020).

The flexibility of time and space allotted to e-learning is attracting more and more students to online education, however, many of them face serious challenges that prevent them from successfully completing their courses (Almanar, 2020).

In this article, we will discuss the challenges and factors influencing the E-learning system usage during and after COVID-19 pandemic in the world (Torres Martín et al., 2021).

2 The Importance of E-Learning

Proceeding from all of the above, researchers and specialists in the educational field unanimously agree on the importance of E-Learning, provided that it is appropriate for large segments of learners around the world, regardless of their countries, culture, interests and circumstances. Below are the main advantages that E-Learning provides (Varea & González-Calvo, 2020).

Learning Opportunities: Providing educational opportunity for all learners. It has become a challenge in light of the rapid progress and the successive explosion of knowledge and technology to enhance life skills and focus on the skills of the twenty-first century (Aboagye et al., 2020).

Flexibility: It allows learning according to the appropriate educational conditions appropriate to the needs, conditions and times of learners and achieves the continuity of the learning process (Chuang et al., 2018).

Effectiveness: Research conducted on this system has proven that it has an effect equal to or greater than the traditional education system, especially when using E-Learning and multimedia techniques efficiently, and the reflection of this positive on the educational content (Layali & Al-Shlowiy, 2020).

Innovation: Presenting curricula to lecturers in innovative and interactive ways.

Learner autonomy: organizing curriculum topics and assessment methods according to learners' abilities (Almanar, 2020)

Cost: This type of education is characterized by the fact that it does not cost large amounts of money (Gherhes et al., 2021).

3 Types of e-Learning

There are several types of e-learning, the most important and prominent of these types are:

Simultaneous E-Learning

This style of education is similar to the traditional one, where students must be online, and enter the site with the lecturer at a specific date (Cacheiro-Gonzalez et al., 2019).

The lecturer gives his lecture and receives questions and inquiries from the students directly, and therefore we see that this style of education is similar to regular university education where students attend the lecture directly, but the difference between them is that synchronous e-learning can attend the lecture from anywhere he wants, while in normal education the student must go to the university to receive knowledge (Mohmmed et al., 2020).

The feedback that the student gets is one of the most important features of simultaneous e-learning (Alqabbani et al., 2020).

Simultaneous e-learning requires only a personal computer and a high-speed Internet (Torres Martín et al., 2021).

Asynchronous e-learning

It is another type of education that is done via the Internet, and what distinguishes this type from the previous one is that there is no need for the student and the lecturer to be present at the same moment (Gherhes et al., 2021). It is sufficient for the lecturer to register the lecture and put it on the university's website, and the student enters at any time to the university's website and replaces the lecture or subscribe to the mailing list, and the university sends the lecture to the student's e-mail (Donitsa-Schmidt & Ramot, 2020).

Advantages of E-Learning

E-Learning has a number of advantages that can be referred to as follows:

1. Easy access to educational content: Online learning is a suitable method for the majority, where employees and students—and even housewives—can get courses and lectures in the areas they want, at a time that suits them. E-Learning is characterized by the flexibility of time, unlike traditional classes (Murphy, 2020). Through E-Learning, many individuals can obtain courses and degrees by attending online lectures on weekends or in the evening after work (AlAzwani, 2020).

E-Learning is also breaking the border barrier, as students no longer have to move from one country to another to obtain a degree or participate in a particular educational course, and all they need is high-speed internet (Coman et al., 2020).

2. **Supporting the assimilation process**: through the possibility of registering classes, and the student watching the lectures more than once in order to fully absorb the information, and this is not available in traditional classrooms, where the lecture begins and ends at a certain time, and if the student is unable to attend it (Pazilah et al., 2019). There is certainly no possibility to repeat it again, unlike E-Learning that enables learners to access educational content anywhere and at any time, which helps students more during the preparation and preparation periods for study exams (Chuang et al., 2018).

Several studies indicate that students prefer interactive educational content, as well as watching a video rather than reading the pages of a book (Franchi, 2020). Therefore, the tools used by E-Learning present educational content in a more attractive way than traditional education, making it easier for students to receive and better apply information (Hasan & Bao, 2020).

- 3. **Time saving and cost reduction**: E-Learning has contributed to a significant reduction in the time required to learn, which is due to the abolition of the time required for the process of moving to the educational headquarters and returning from it to the home (Fawaz et al., 2021). Expenses of residence and moving from one country to another, or to another city within the same country. In this context, IBM asserts that it saves 50 thousand dollars for every 1,000 days of training in the classroom, which has been replaced by e-learning programs to raise the efficiency of its employees (Cacheiro-Gonzalez et al., 2019).
- 4. **Positive environmental returns**: Since E-Learning is a paperless method of learning, it protects the environment by not using and consuming a large number of papers compared to traditional forms of education. In addition, according to the study conducted on e-learning courses, it was found that E-Learning programs consume less energy compared to traditional educational courses based on being present in universities or educational institutions (Cakrawati, 2017). Thus, E-Learning is an environmentally friendly method compared to traditional education methods (Hoq, 2020).

4 E-Learning Technologies

There are many and varied means and techniques used in the E-Learning process, and these technologies bear what distinguishes them from traditional education techniques because they keep pace with modern technology and innovative tools such as television at an earlier time, the Internet and satellites recently, which would transmit information and communicate it effectively (Radha et al., 2020), and we mention them:

Audio media: It includes audio materials that depend on the sense of hearing, such as recordings and audio communication media (Byun & Slavin, 2020).

Audio-visual media: It includes films, videos, TV channels for displaying educational media (Famularsih, 2020).

Television broadcasting: It contributes to the education of the largest number of individuals (Naveed et al., 2017).

Internet technologies: They are characterized by their diversity and low cost, such as sites that provide an integrated service that includes content for self-education, in addition to the possibility of communicating with classmates, through the website or e-mail (Tratnik et al., 2019).

5 Challenges Facing E-Learning

E-learning faces a wide range of challenges, and below we will get acquainted with the most important and most prominent of these challenges:

Content: Content is one of the most important and prominent challenges facing e-learning, where a distinctive and wonderful curriculum must be developed in order for e-learning to be successful, and one of the most important characteristics of a successful e-learning curriculum is clarity, brevity, usefulness, and consistent with the objectives that the learner seeks to achieve (Suryaman et al., 2020).

Creativity: E-learning faces a set of challenges related to creativity. The link between concepts and reality must be improved, in order for e-learning to be more effective (Obrad, 2020).

Template: The template is one of the most important challenges facing e-learning, as a set of easy and simple templates must be designed to help the student understand the course, and therefore these templates must be flexible and comprehensive (Alturise, 2020).

Media: The optimal use of media in e-learning is one of the most important and prominent difficulties facing the student, so these media must be used optimally, so that they are synchronized with the multimedia elements (Cakrawati, 2017).

Time: Time is one of the most important problems and challenges facing elearning, so the timing and timing of lectures must be managed well (Rooney, 2003). **Clarity**: Clarity is one of the most important challenges facing e-learning, as it must clarify the goals that the student will achieve through his studies in e-learning (Abdur Rehman et al., 2021).

Context: Context is one of the most important and prominent challenges facing e-learning, as a logical and user-friendly context must be maintained (Byun & Slavin, 2020).

Navigation chart: Navigation chart is one of the most important and prominent challenges facing e-learning, as it must be compatible with the scenario, and it must be a reference point for the storyboard (Pazilah et al., 2019).

Tools: The selection of tools is one of the most important and prominent challenges facing e-learning, as easy and effective tools must be chosen that facilitate student learning (Bergen & Labonté, 2020).

Getting started: The starting steps are one of the most important and prominent challenges facing e-learning, as the starting steps must be very clear (Alqabbani et al., 2020).

- Challenges Facing Education Instructional Script Writer
- There are a number of challenges facing the educational script writer, and the most important and prominent of these challenges are:
- Defining the problem and minimizing client requirements as well as setting educational goals (Cakrawati, 2017).
- Analyzing the category that will be targeted through e-learning, and the educational environment to which the class is to be applied (Taat & Francis, 2020).
- Choosing and designing an appropriate educational strategy (Yusuf & Ahmad, 2020).
- Determine the correct authoring tools for the required content and improve the way that content is presented (Ajmal & Ahmad, 2019).
- Gathering information and organizing content.
- Organizing the communication methods between the work team in order to reach an integrated codified product (Bergen & Labonté, 2020).
- Determining the powers of the software work in changing, modifying or developing the elements of the electronic scenario (Mokhtar et al., 2020).
- Manage project budget, resources and schedules (Almanar, 2020).
- Define classroom assessment strategies (Hasan & Bao, 2020).

6 The Challenges Faced by E-Learning from the Point of View of Academics

First: Legislation and laws are divided into:

• The platforms currently available are the most appropriate solution, due to the reputation and multiple advantages that these platforms have, including good protection, long experience, continuous updates, ease of use and many more,

and among those platforms (Google Meet, Zoom, Microsoft Teams) (Cacheiro-Gonzalez et al., 2019).

• Learning Management System

Every educational institution is supposed to have its own learning management system at the present time, and there are educational institutions in our Arab countries that have had such systems for a long time that exceeds ten years and more. The Moodle platform must be circulated to all institutions that do not have their own system, as it is an easy-to-use system, and somewhat free (Roblek et al., 2019).

• Evaluation Criteria

If we look at the reality of the evaluation standards currently used in most educational institutions, we find that these institutions have developed many aspects that go along with the progress we are witnessing in the education sector and have not developed evaluation standards, as they follow the same evaluation standards used for decades and did not take into account the obvious development on the level of content, new teaching tools, and the student (Carter et al., 2020). Therefore, the Ministry of Education and Higher Education to set new evaluation criteria after reviewing the best practices followed in various countries to keep pace with these developments, and to circulate them to all educational institutions and to work with them by those institutions in a unified manner, considering them to be a new constitution for education (Usher & Barak, 2020).

• Student commitment

Here turning on the camera, sticking to the uniform, and sticking to the lecture or class times is a foregone conclusion that does not require discussion (Alqabbani et al., 2020).

• Time management (the duration of lectures or classes)

Here we must reach the point that the duration of lectures and classes needs to be reconsidered, as blended education is a reality and will be implemented sooner or later, so a faculty member can submit content to the learning management system and the number of lectures or classes becomes more, but with a duration Less, and meetings are limited to answering students' inquiries and solving exercises only (Yan, 2020).

Second: Availability of devices and equipment for the lecturer and student

We have recently witnessed various solutions and commendable attempts by various public and private sectors, civil society institutions and non-profit organizations, including support and donations to provide devices and equipment, but unfortunately, they are not considered sufficient. The government play the role of a guarantor for families and parents for the money of the suppliers of these devices and present it to the parents with simple monthly payments starting from 10 or 15 dollars and without interest. Yes, the governments will pay large sums, but they will not lose those funds (Mailizar et al., 2020).

Third: The illiteracy of using the devices and technologies used

Here, as the use of devices and technologies has become an integral part of the lives of individuals, especially the new generation (the Internet generation) (Obrad, 2020).

Fourth: Internet availability

Here, to solve this problem is very difficult, as the financial capabilities of governments vary, but I will make a modest proposal to coordinate between the government and Internet service providers, by providing devices at preferential prices temporarily for students who are financially unable to pay the monthly subscription for Internet service (Ariyanti, 2020).

Fifth: Student interaction

• Before the lecture or class

There are wonderful applications and websites that can be used to interact with students, available in both Arabic and English before the lecture or class, which is a free site to some extent that has many advantages that a faculty member and students can interact through before the lecture or class session. Entertaining and easy to use and reduces external questions from students during the lecture or class (Gherhes et al., 2020).

• During a lecture or class

There are hundreds of sites that a faculty member can use to greatly increase interaction with students and these are Classtools.net, the great site that looks a lot like the popular YouTube but dedicated to education (edpuzzle.com), and site (Quizizz.com) It gives the opportunity for the faculty member to transform the scientific content of the lecture or class into a scientific game that the students enjoy and do not feel the time of the lecture or the class and does not require prior registration on the site from the students and is available free of charge to some extent (Mokhtar et al., 2020).

• After the lecture or class

Here we reach the stage of giving feedback to students after the lecture or class to assess their performance. A faculty member can use the indispensable website, which is free to some extent and does not require prior registration by students (Graham, 2019).

Sixth: A sense of introversion and isolation

There is a fact that cannot be ignored if we look at the factors that motivate students to go to school, college or university. Besides learning, there are important factors for them that must be taken into consideration, such as time (opportunity or rest period) and mixing with their colleagues and friends, so the suggested solution that does not solve the problem, but to limit it (Rasheed et al., 2020), is to work on encouraging faculty members to divide students and put them in work groups with a minimum of three students and a maximum of five students, and giving them an exercise or a case study on the one hand to communicate with each other about matters outside the

framework of the study and on the other hand working with each other to solve the exercise or the study case and determine it in a time frame between 15 and 30 min before or after the lecture or class (Tang et al., 2020).

Seventh: Scientific content

The experience in the field of education and higher education found that some faculty members offer the scientific material to the students extensively with the aim of completing the course before the specified date for the end of the semester, regardless of the level of students' understanding or perception of the content, so we must focus on the quality of the content. Content, not quantity (Yusuf & Ahmad, 2020). An example from the economics subjects instead of showing the whole book or course, focusing on the most important vocabulary such as (unemployment, foreign investment, import and export, GDP and gross national product, budget surplus and deficit, and inflation) (Aboagye et al., 2020).

7 Here Are the Top 5 Problems Students Face in E-Learning and Some Suggestions on How to Overcome Them

How to overcome 5 common problems that students face in e-learning?

E-learning is the latest wave of education, and it is already being relied upon a lot despite the challenges facing both lecturers and students, while lecturers need to put in extensive effort and time to design educational content, students need to equip themselves with technical proficiency to be able to handle courses E-Learning (Hoq, 2020).

There are 5 common problems that students face in e-learning classes, which must be solved through appropriate initiatives for a better future for students (Day et al., 2021).

1. Adaptability

The shift from traditional classroom and face-to-face education to computer-based training in virtual classrooms makes the learning experience very different for students, their resistance to change does not allow them to adapt to the online learning environment, while it takes some time for them to get used to the course management systems (CMS) and computer-based teaching methods (Andrade et al., 2020), while passive listening and note-taking in traditional classrooms are expected, in turn, require a chatroom for online discussion or the creation of a web page to start taking notes (Day et al., 2021).

Students with a "traditional" mindset find it difficult to adapt, however, and need to accept new learning conditions with an open mind and heart. Understanding and even discussing the benefits of e-learning with their peers may change this mindset and better prepare students for online classes (Hasan & Bao, 2020).

2. Technical issues

Many students are not provided with the strong internet connection that online courses require and thus fail to catch up with their virtual classmates and thus their learning experience becomes problematic, moreover, most of them live off campus and find it difficult to keep up with the technical requirements of the chosen course (Ying et al., 2021).

Some of them do not even have computers and seek outside help to provide them with capabilities, the only solution to this problem is to know exactly what kind of technology support they will need for a particular course before enrolling in it, as well as to properly prepare themselves to complete the course successfully (Jasrial, 2018).

3. Computer literacy

Although students are generally technologically savvy and thus can manage computers well, lack of computer literacy is a major problem among students today, many of them cannot run basic programs like Microsoft Word and PowerPoint and therefore cannot handle their files, Furthermore, many students find it annoying to fix basic computer problems, as they know nothing about it (Donitsa-Schmidt & Ramot, 2020).

However, technological proficiency is a must for pursuing online courses, as it enables students to manage their assignments and syllabuses in an organized manner without difficulty, and basic courses in computer literacy also enhance students' knowledge in this field, as having basic knowledge of computers will help them to participate in online classes without interruptions or hindrances (Carter et al., 2020).

4. Time management

Time management is a difficult task for e-learners, as online courses require a lot of time and intensive work, moreover, while most of them are adults who prefer online learning programs due to the flexibility of their place and time, they rarely have time to take courses due to their daily obligations different (Bataineh et al., 2020).

A regular schedule planner will be of great help to these learners, as they can set reminders for their courses and assignments (Ajmal & Ahmad, 2019).

5. Self-motivation

Self-motivation is a prerequisite for e-learning; however, many online learners lack it, which is strange (Alturise, 2020).

After enrolling in E-Learning courses, many learners fall behind and give up, as the difficulties in dealing with technology tools seem insurmountable (Yusuf & Ahmad, 2020).

Students need to find motivation to pursue new educational methods, as well as properly prepare themselves for future challenges in their education and careers. Only a positive attitude will help them overcome challenges in e-learning (Day et al., 2021). Although this is difficult to implement, students need to understand that it is necessary reap the benefits of e-learning in the future (Bergen & Labonté, 2020).

8 How to Overcome Obstacles Related to the Tasks and Activities Required of Students

E-learning depends on activating the student's role in self-learning, and therefore he is asked to carry out a set of activities and tasks, and this in itself constitutes a great burden on the teacher, starting with inquiries about tasks and activities and whether they are calculated or not, and when the deadline approaches, questions and inquiries are poured out through private messages and means of communication Social about mission (Taat & Francis, 2020).

1. Inquiries related to the tasks and activities required of students

To overcome this problem, clear and accurate information about the task, the method of answering, where it should be given, and whether it has degrees or not, and whether he writes it on a paper and photograph it or prints it, meaning not leaving room for inquiries about any point. and collect these inquiries received from students and include them in a special page and name it the frequently asked questions page in which answering all the frequently asked questions (Azam et al., 2019).

2. Development of e-learning systems

Most of the systems that educational institutions use are educational content management platforms, which are software that release advanced versions to develop and solve software problems that have emerged (Chuang et al., 2018). And when you have become accustomed to a certain system and form, you will find that it has changed and become in another way, but trust and make sure that all the buttons, tools and commands are still there, and all you have to do is make time to get to know the new environment (Bataineh et al., 2020).

3. The problem of communicating with students without any visual reactions

Recording the lecture and presenting it to students without any visual contact between you and the students, which may cause the students to not be interested in the lecture or lesson and lose the ability to perceive body language, so appear in front of them through recordings in a friendly and fun tone of voice and address as if they were in front of you in the classroom (Fawaz et al., 2021).

4. Problem deadlines and excuses

E-learning is related and depends on deadlines for everything, and you may find many students miss deadlines for many reasons that are creative and unimaginable, and they may be real in most cases, especially the issue of internet or electricity outages (Cakrawati, 2017). Here, the deadlines must be included in the form of a special agenda, which is provided by e-learning systems, or that you publish it in the advertisement forum and send a special message to all students reminding them of the deadline so that students' excuses do not distract you later from accomplishing the many tasks required little flexible when necessary (Hasan & Bao, 2020).

5. Students' impressions of performance

The lecturer may wonder whether the students attended the lecture. Did they understand it? Do they have questions about it? Is there any criticism about the performance? So, create a survey and set aside a forum at the end of each unit to receive students' opinions and impressions about the lectures, what they liked and what they didn't like (Rasheed et al., 2020). This will have a significant impact on the psychology of the lecturer and student and may be an alternative to body language from which the lecturer understands the students' impression (Almanar, 2020).

6. The problem of dealing with new students

The student moves from the school from the face-to-face learning system to E-Learning, and most of them are not ready to learn via the Internet and may encounter problems in using E-Learning technologies and systems, as well as the English language required to understand some terms (Jasrial, 2018). Therefore, starting meeting with the new students with a welcome message that appears clearly on their page or the communication page between you and them, and tell them about e-learning, its many advantages and the flexibility it enjoys, and explain to them how the lessons, assignments and exams will be, and make it as if it were a challenging game (Yan, 2020).

7. The problem of the old habits of students

The lecturer makes a great effort to prepare the lesson and deliver it in a way that the student can understand, but on the other hand, you find the student indifferent or interested because of the habits he has persisted throughout the face-to-face years of schooling (Ajmal & Ahmad, 2019). Here, the lecturer must commit the students to easy, interesting and fun activities around each lesson and allocate a grade of the year's work for it and follow up on the students by honoring the student who stays the most time on the system or give them medals when completing a specific task or activity (Almanar, 2020).

8. The problem of feeling lack of control over the study section

Gradually, the lecturer will feel hidden from the students, and students are not in control and that they are less connected to him compared to face-to-face learning. Therefore, there must be a plan to hold a virtual meeting through Zoom or Microsoft Teams or others, even once a week, and show them that he is always there to help them understand the material and succeed in it (Al-Azawei et al., 2017).

9. Justification of the grades obtained by the student

Students who are used to high scores will ask the lecturer to justify their scores less than excellent. Therefore, from the beginning, explain to them the foundations used for evaluation and the criteria used by the institution in the evaluation (Fawaz et al., 2021). There is commitment to the deadline, transparency in the answer, the number of attempts submitted, commitment to continuous follow-up and constructive communication during virtual classes. Because the student still thinks that he is studying in a face-to-face learning manner without realizing that e-learning systems monitor everything, with artificial intelligence (Torres Martín et al., 2021).

10. Feeling overwhelmed by multitasking

Online education requires the skill to do multiple tasks simultaneously. It is a necessary but cumbersome skill, the lecturer must do the work in parts and focusing on one part at a time rather than tackling a new problem every five minutes and tell the students how long the course will take. And be sure to remind students to upload assignments through announcements using your own announcement forum on the ECM (Suryaman et al., 2020).

11. Tiring workloads

Online education often requires more work than traditional education. The volume of papers to be marked and emails to be answered, as well as the preparation of lessons, lectures, activities and tasks, may be a huge task (Byun & Slavin, 2020). Therefore, it was suggested to make a schedule to organize these tasks according to their deadlines and to allocate a specific time to answer questions and inquiries and students and allocate a specific time to prepare the lecture and another to evaluate the activities and duties (Mohmmed et al., 2020).

12. Feeling distant and lonely

Working remotely may make the lecturer feel lonely and distant from your colleagues, and that you suffer from problems that no one is aware of. So he must communicate with his co-workers through social media and exchange with them the ideas and problems that he encountered, and he will find a lot of interaction and that he is not alone (Coman et al., 2020).

13. Feeling tired and tired

Exhausting to meet deadlines can cause the lecturer to work continuous hours in front of your computer. Suddenly he will find that his shoulders are tense and that he has forgotten to eat lunch or answer the phone. So he must take a break every now and then or between one task and another, it will make a big difference (Chuang et al., 2018).

9 Challenges Facing the Family in E-Learning

Some pandemics and circumstances push students and students in the world to resort to the E-Learning method, and here the difference in willingness to go through this experience appears between individuals and societies, but many face many obstacles that prevent E-Learning even in some developed countries that Its schools still adopt the foundations of traditional learning, and the following is a mention of some of the family challenges of the E-Learning style (Taat & Francis, 2020).

The lack of computers for students at home: This revealed social disparities among students, forcing them to share study hours with their parents who use their personal computers to work remotely. This disparity was evident for families with multiple children and with low incomes (Graham, 2019).

The absence of the educational ability of parents: Another challenge highlighted by E-Learning, due to the role that was added to parents in helping their children and filling the gap of the teacher's absence, which revealed a social disparity in the ability to teach children or not, as students' parents complain about their inability to explain lessons and solve exercises with their children (Almanar, 2020); Which highlights the importance of the lecturer and raises the value of the educational process, as it is an independent science in itself that requires special qualifications (Coman et al., 2020).

The inability to replace the screen with the teacher: Although learning via the screen may be the optimal solution under some circumstances, such as the emerging Corona pandemic crisis, for example, it is not expected to be popular and widely used even in the future; Because the live interaction between the students themselves is of great importance on the one hand, and the necessity of their interaction directly with the lecturer in an evolutionary process that gives students knowledge on the other hand (Hoq, 2020).

Not all students have single rooms to provide a suitable study atmosphere: E-Learning requires attendance at a regular pace every day of at least three hours, which is difficult to achieve for students who live in small or overcrowded housing, as there is no way to isolate themselves from the noise of the family (Taat & Francis, 2020).

The difficulty of keeping pace with the technological age: The severity of this problem may vary between countries due to the difference in technical and information capabilities. Countries such as the Republic of Egypt have established an educational communication platform called (Edmondo) to help lecturers communicate with their students safely (Byun & Slavin, 2020). In Algeria, the Ministry of Education announced the launch of a digital E-Learning plan, In Jordan, the educational platform (NoorSpace) was launched as an alternative to the interruption of education due to the outbreak of the new Corona virus, and in other countries TV channels were used to broadcast educational programs for students in cooperation with professors (Usher & Barak, 2020).

10 Challenges Facing the Community in E-Learning

Some crises may cast a shadow over the education sector, such as the Corona virus crisis; All schools, universities and educational institutions are forced to close their doors to reduce the chance of the spread of the disease, which raises the concern of the affiliates of this sector and students alike, which pushes educational institutions to switch to e-learning as a necessary alternative to ensure the continuity of the educational process, and despite the positives of e-learning, there are societal challenges towards it (Cacheiro-Gonzalez et al., 2019), we mention some of which:

The choice of teaching aids: the need to employ interactive learning and increase the attention of students by involving them directly as contributors to the learning process rather than as recipients; In order to increase their motivation and achieve better results, the lecturer must make a great effort to determine the interactive means that suit each goal separately; Engaging students in different places and keeping them attentive across devices is not an easy process (Hasan & Bao, 2020).

Evaluation process and calculating grades: Written exams are the most common method in mid-term and end-of-semester exams, and despite the availability of alternative evaluation methods such as electronic evaluation, the monitoring process is impossible to avoid in order to avoid cheating (Roblek et al., 2019).

Covering different learning styles and needs: Taking into account the diversity of learning styles is one of the parts of planning a successful and fair educational process, but it is also difficult to search for suitable applications to prepare educational materials in line with different learning styles (Cakrawati, 2017).

Lecturer readiness: It means his readiness to use modern technology in education, and this reality was imposed by the late discovery of technological devices and applications, as most lecturers thought that they needed to learn how to use them, but it was overshadowed and generations attached to it, and an environmental awareness arose of the need to reduce the use of papers, which led to a gradual and significant shift towards technology (Fawaz et al., 2021).

Availability of technology: It is an important factor for the success of the idea of E-Learning, but this challenge has different levels, starting with the availability of devices and the Internet at the appropriate speed. The lecturer or student may own the device, but it basically lacks Internet service, and the Internet may be available at a slow speed, or It comes in bundles that are not enough to cover videos of large material (Taat & Francis, 2020).

11 Successful Experiences in E-Learning

E-Learning is one of the most important concepts and modern technologies for education at all levels, and this type of education has become an important pillar of the knowledge economy (Ajmal & Ahmad, 2019). It is worth noting that E-Learning, or what is sometimes called computerized e-learning or online learning; It does not mean teaching curricula and storing them on CDs, but the essence of E-Learning is the interactive style, which means the presence of mutual discussions between students and each other, and interaction with the lecturer (Graham, 2019). There is always a lecturer who communicates with the students, sets their assignments and tests (Mokhtar et al., 2020).

There are several mechanisms for E-Learning, either through video conference technology, live lectures, or professors and specialists recording a number of lectures and placing them on a specific website (Hasan & Bao, 2020). In this context, some successful experiences in this field can be reviewed as follows:

 The United States: The United States is the undisputed leader in online education, with hundreds of online colleges and thousands of online courses available to students. A 2011 study conducted by the Sloan Consortium, one of the leading US institutions in the field of E-Learning, indicated that 6 million students in the United States are taking at least one online course (Obrad, 2020).

As a result of the increasing demand for courses offered through the E-Learning system, this has encouraged prestigious American universities—such as: Stanford, Berkeley, Princeton, University of California, and a number of other American educational institutions—to offer online courses for those who prefer this method and do not they can participate in the classroom in the traditional form (Abdur Rehman et al., 2021). It is worth noting that open educational programs in the United States are among the most important E-Learning programs in the world, especially the programs offered at the Massachusetts Institute of Technology, which represents an international model that many countries of the world are emulating (Mailizar et al., 2020).

- 2. India: Online learning in India has grown faster than traditional educational institutions, as the country is experiencing a major educational crisis as more than half of the population has received limited education, and in many cases Indian citizens do not have the means to complete their education, either because factors related to cost, or geographical factors represented in the long distances between schools, universities and remote villages in India, and thus e-learning allowed a large segment of Indian students to complete their education in its various stages (Layali & Al-Shlowiy, 2020).
- 3. China: China is one of the most important countries in which E-Learning sector is flourishing, as there are more than 70 online institutions and colleges in China. As a result of the intense competition for jobs there, students seek to obtain more degrees and training courses in several fields, so that they can get better jobs. Therefore, economic necessity has generated a great opportunity for the growth of the E-Learning sector in China (Rooney, 2003).
- 4. **South Korea**: The strong technological infrastructure in South Korea has allowed the spread of E-Learning, as it has a structure that is the strongest in the world. It offers one of the highest Internet speeds in the world, and Internet services are available even in rural areas, which made the situation conducive to the prosperity of This kind of education (Alturise, 2020). In this context, South Korea is witnessing an increase in the number of students enrolled in E-Learning courses every year, more than students enrolled in traditional educational institutions (Hasan & Bao, 2020).
- 5. Malaysia: Malaysia is progressing at full speed in terms of opening new opportunities for online learning, as the Asia e-University, based in Kuala Lumpur, is one of the most important technological universities in Malaysia, as this university has worked to support citizens in areas that suffer Universities are not available, but they have access to the Internet, which has facilitated the spread of the E-Learning system among Malaysian citizens and even Asians as well (Bergen & Labonté, 2020), as this university provides online educational courses for students of 31 different Asian countries, and the university has entered into partnerships with other universities to provide programs that allow Obtaining educational degrees through the Internet, for example, an MBA

program was developed in cooperation with the International Business School in Denmark (Hasan & Bao, 2020).

6. Australia: E-Learning is becoming an increasingly popular option for Australians who want to go back to school without quitting their jobs. Over the past five years, the online education market in Australia has grown by nearly 20%, and further growth is expected in E-Learning programs offered by Australian universities, especially with more Asian students, making Australia one of the leading providers of online education services. Distance (Cakrawati, 2017).

12 The Challenges of E-Learning After the Corona Crisis

The challenges of the experience of relying on E-Learning as an alternative or even complementary to traditional education after Corona will face many challenges, represented in the following (Almanar, 2020):

1. The obvious failure to meet the requirements of the transition from traditional education to E-Learning:

E-Learning does not only require the ability and understanding of the lecturer and student only, but also an information structure that includes powerful Internet servers that a large number of students can access at the same time, as well as the strength of the Internet in homes (Chuang et al., 2018). E-Learning or it will be difficult, that distance learning needs information and communication technology infrastructure and systems, including software and hardware, securing networks, sites, and others, which is what many educational institutions in the Arab world lack, especially non-oil ones, as educational institutions that do not have this infrastructure The strong ones cannot suddenly switch to the distance learning system (Bergen & Labonté, 2020).

Although the successful distance learning in the world came after the accumulation of experiences over the years, and the development of its idea, the Corona pandemic came to force some Arab countries to make a sudden transition towards E-Learning, and the concerned ministries tried to facilitate the process by creating e-learning platforms (Coman et al., 2020), but the Many countries have not previously tested the technologies offered by e-learning, and Arab experiences are still very modest, and the successful ones are only partially concentrated in some rich oil countries (Day et al., 2021), but many Arab countries were not even able to introduce E-Learning into the university system, in addition to the weak lack of Weakness in the preparation and training of members of the educational staff for E-Learning, even the training that was given to them was formal, as the bulk of the training is limited to dealing in the traditional classroom, and most of the digital initiatives that took place between lecturers and students were voluntary (Hasan & Bao, 2020), and there is another challenge related to digital culture for students, often The traditional curricula focus on simple programs such as office, compared to the curricula of developed countries

that provide students with very advanced lessons in the digital field (Ying et al., 2021).

In addition to the fact that many students are not enthusiastic about their online experience, one of the students said about her experience during the last period that "we did not learn much this year, we were closer to lab rats to test how to interact with online learning (Roblek et al., 2019).

- 2. The poor living conditions of a large part of the population and the lack of internet coverage reaching all regions of the country, which could lead to strengthening the class disparity among the population (Yusuf & Ahmad, 2020). Health care (despite the attempt of several countries to ban these lessons during this period), which is deprived of the poor class, who can only find public schools for learning (Almanar, 2020).
- 3. Interactivity in education can be an absent and challenging dimension in the event of the introduction of the E-Learning system, as some see that the lack of realistic aspects in the education process is the most important defect of this method in education, which sometimes needs human touches between the lecturer and the learner (Rooney, 2003), it is difficult conveying feelings through instant textual media such as anger, for example, but it is not impossible, in traditional education (face to face) students see each other, know each other well, and interact with the lecturer during the educational process, and in traditional education the presence of the student in the classroom is considered presence even if he was silent (Rasheed et al., 2020). As for e-learning, the student who attends and does not participate is as if he is not present. But the question is how we make all this acquaintance and interaction happen when the communication is limited to text or voice via the computer screen only. The interaction between students and their supervisors in a small real university space, can take place naturally by relying on many channels (Almanar, 2020).
- 4. The education systems in these countries are "largely rigid", and suffer from several problems, including the focus on certificates more than skills, and excessive concern for discipline, which leads to "memorization and negative learning on the part of the lecturer without effective participation on the part of the students (Fawaz et al., 2021), and the organizational structure of our educational institutions does not help to achieve this change in the ways of teaching and learning, as historically the hierarchical organizational structure is among the biggest obstacles to meaningful change (Taat & Francis, 2020). Semester courses due to academic and functional barriers between colleges and departments, and between faculty and administration, and imposed by force and without experience, as it was previously scheduled, and there are other barriers that can be a stumbling block to creating the synergy necessary for the success of an integrated and effective system of classroom education and e-learning (Muthuprasad et al., 2021).

In addition to the absence of legislation supporting e-learning, in most countries of the region, the education law does not allow E-Learning or the evaluation of such learning. In the midst of the current crisis, governments are overlooking these legal issues to allow universities to continue their online teaching programs, we hope that this crisis may expedite changes in national laws related to this (Cacheiro-Gonzalez et al., 2019).

5. The challenge of evaluation and exams, as exams are considered a thorny issue of the most challenges that will face education in the shadow of Corona and beyond, as many countries have already canceled final exams in universities and extended the suspension of educational activities at the local level, for example, the Supreme Council of Universities said in Egypt (Fawaz et al., 2021). The council directed universities to replace in-person exams with research papers or online exams, especially in non-final years (Usher & Barak, 2020).

Professors are turning to joint projects, oral exams and research papers to assess students due to the inability to take traditional exams due to the novel coronavirus pandemic (Cacheiro-Gonzalez et al., 2019).

In fact, if online education is different from traditional education, then its assessment and examination process must differ accordingly, in terms of focusing on the means of logical thinking and not memorizing, and trying to put in place strict controls to ensure that this is done in a correct manner, and to ensure that those who fulfilled the requirements of exams are the student himself and not anyone else (Byun & Slavin, 2020), and the Internet is full of research papers and papers ready to "copy and paste" and they are in unlimited numbers and make up a large percentage of the materials published on the entire network, and on this basis students can cheat and plagiarize their research from the Internet so that it appears sound Academically, just like any research that is prepared in all honesty (Chuang et al., 2018).

Assessing student learning has become one of the most prominent challenges to overcome, as lecturers across the Arab region face a new challenge of how to take exams to assess what students have learned after shifting towards e-learning in the wake of the closure of almost all universities with the aim of stopping the spread of the new Corona virus (Mailizar et al., 2020).

- 6. The difficulty of controlling the online education process on a large scale in light of the large numbers, given the number of students and the extent of their parents' commitment to follow them at this stage, especially since we are talking about homes, each of which has its own circumstances and capabilities, and this will actually create a kind of confusion and needs a focused study that considers In digital E-Learning, and revealing its effects, pros and cons before its launch (Ajmal & Ahmad, 2019), but as we said earlier, the spread of the Corona virus promptly prompted the search for a way out to avoid the white year and the loss of an entire academic year (Rasheed et al., 2020).
- 7. Lack of awareness and an integrated perception of E-Learning on all sides of the educational process: we must admit that we are not ready to deal effectively with this shift in the pattern of E-Learning, and therefore the first challenges we face lie in the absence of full or partial awareness of what is E-Learning, and therefore we must begin as parents and lecturers in educating ourselves by ourselves about what E-Learning is (Chuang et al., 2018).

- 8. The shift to online education exacerbates inequality and equal educational opportunities in the Arab region: The recent shift towards online education, due to the spread of the new Corona epidemic (Coman et al., 2020), will increase inequality in access to education among students in the region in light of the contrasting reality The spread and speed of the Internet for each country, in addition to the possibility of owning personal computers and smart phones, which will cause an increase in the digital divide and inequality in Internet access and its repercussions: 3.7 billion people lack access to the Internet, and most of them live in the poorest countries where it increases (Bergen & Labonté, 2020).
- 9. Weak commitment of students and their parents to follow E-Learning programs: This is considered one of the biggest challenges because it is illogical to expect that children will easily accept the idea of "staying at home" in their homes, as the school was in the end an outlet to get to know peers and spend quality time with them. Therefore, one must expect violent resistance (Mailizar et al., 2020).

13 Conclusion

The results indicated that E-learning is an excellent way to learn, but in its initial stage it poses certain threats to students, changing negative attitude and technological literacy will help them gain confidence in order to achieve success in their e-courses happily and positively.

The results showed that Despite the advantages of the E-Learning system; However, there are challenges facing this system, some of which are related to the preference of some people to have a face-to-face learning experience and not through videos or live broadcasts on the Internet, and these are personal preferences that differ from person to person and have nothing to do with the efficiency of this system.

E-learning is not a temporary solution to the Corona crisis as seen or promoted by some, e-learning is a natural development of the education sector, which has not witnessed any development in its vocabulary during the last hundred years if it is compared to the natural development witnessed by the various industrial, commercial, health, service and other sectors a lot.

On the other hand, there are still some challenges facing the spread of this system in some countries of the world, especially developing countries, such as: the lack of technological infrastructure necessary to support virtual learning systems. In addition to the increase in the number of electronic illiteracies, where E-Learning requires a basic knowledge of computers and the Internet, while there are countries that still have a large number of citizens who are unable to use computers or the Internet sufficiently.

In addition to the fact that the idea of distance learning and e-learning is not a new topic, it has been known for decades, and the trend towards digital education was not something strange, but rather it was expected, but Corona accelerated its appearance and pushed it to the fore.

In conclusion, it can be said that E-Learning is one of the solutions that countries have resorted to confront the spread of the "Corona" virus, and not to completely disrupt the educational process at the same time; However, there are challenges facing this process in some developing countries due to the lack of the necessary technological infrastructure and the spread of electronic illiteracy.

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Student Invigilation Detection Using Deep Learning and Machine After Covid-19: A Review on Taxonomy and Future Challenges



Manit Malhotra and Indu Chhabra

Abstract Exams play a significant role in an educational institution in learning, and it predicts strength and weaknesses of a student. There are two ways to conduct an exam, i.e. physical or online. In both ways of examination, cheating has become a major problem for academic institutions. Students use various cheating methods, such as using gestures, cheat sheets, written notes on hands, dodging cameras, smartphones, dim lights, etc. Due to physical limitations, typical invigilation systems are not successful in preventing students from cheating. An automated and yet authentic method must be made to prevent and detect different types of cheating during exams. In this article, several invigilation systems have been discussed, including manual and automated systems; they comprise various means adopted for cheating and methods for their interception. Deep learning-based surveillance systems have proved to be more efficient and accurate than manual methods. A taxonomy and detail analysis of cheating and deep learning algorithms like YOLO, LSTM, ResNet, Faster-RCNN, and others is discussed. This study investigates and summarizes different contributions of researchers in an organized manner and shows that using a deep learning approach/method is an efficient and precise way to detect and prevent cheating during exams.

Keywords Covid-19 \cdot Deep learning \cdot Smart invigilation system \cdot Student invigilation \cdot Object detection

1 Introduction

Moore's interaction hypothesis states that students connect, course content, and school personnel. Hence learning and teaching involve association and joint effort.

M. Malhotra (🖂) · I. Chhabra

Department of Computer Science and Applications, Panjab University, Chandigarh, India e-mail: manitmalhotra@rediffmail.com

I. Chhabra e-mail: indu_c@pu.ac.in

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Exams play a significant role in an educational institution in learning (Moore, 1989). Concerning a specific subject, what a student has learned is evaluated through the exam. Exam shows which part of the subject student has remembered or is interested in through its marks. Likewise, strengths and weaknesses can also be gauged through exams.

The emerging field of science and technology has taken its step in human life, especially in the education sector. A novel teaching method that provides everyone with basic and inexpensive learning is E-learning using information technology (Jalali & Noorbehbahani, 2017). Still, the thought of attempting an exam comes with a lot of pressure for both instructors and students. There are different ways to conduct an exam: the typical physical examination system and the online examination system. Physical exams are conducted in the examination hall under the supervision of human invigilators. Students are given question papers and sheets to write their answers. In computer-based examination systems, questions are uploaded online on the university's Learning Management System (LMS). Students download the question paper from LMS and upload the answer sheets back within a given time. In online examinations, institutions cannot monitor students at home, so they mostly use cameras for invigilation (Butt, 2016). Students try all the possible unfair means of cheating in both assessment methods, either physical or computer-based.

Research by Dr. Donald McCabe and the International Centre for Academic Integrity survey showed the tendency to use unfair means in exams for the past decade; around 68% of undergrads confessed to cheating in exams (Adil et al., 2019). Cheating during exams has become a significant challenge for academic institutions. On the one hand, where exams gauge a student's strengths and weaknesses, it plays an essential role in learning for educational institutions. Students cheat because they get under a lot of pressure to get good grades, fulfil their parents' expectations, get a bright future, etc. In physical exams, students use cheat sheets, hidden notes, exchange their answer sheets, etc. Students find their ways to cheat mainly due to the supervisor's negligence. But invigilation becomes more challenging with the fastgrowing trend of e-learning where there is no supervisor at all. Students copy their content from the internet, use cell phones, turn their cameras off, etc. (Asadullah & Nisar, 2016). Typical invigilation methods are human dependent, time-consuming, require energy, and are not very successful in preventing cheating. Educational institutions need an automated and yet authentic method to prevent and detect different types of cheating during physical and online exams.

Many research papers have been studied in this regard. Previously various manual methods were used to find the tendency of cheating during examination by taking feedback from both teachers and students. Cluskey et al. (2011) presented a manual method to reduce cheating during exams that consisted of few steps like time allowed to answer per question, exam duration, etc. The suggested model had few limitations of browsing and randomizing questions for both teachers and students.

In online education, recognizing and battling plagiarism from web sources is a concern for administrators and teachers, according to a case study, (Jocoy & DiBiase, 2006) plagiarism by adult learners. The study took place at Penn State's World Campus Geographic Information Systems (GIS) for a geography course offered

online. This proposed method scored 79.4% of accuracy. The effectiveness of the management was also evaluated to discourage the adult student from cheating. During the study, it was discovered that manual methods only found 3% plagiarism while it was recorded 13% on Turnitin (an online source to check plagiarism). The attempt to build awareness and oversee assumptions diminishes infractions quantifiably, yet not essential. Interestingly, Turnitin.com considerably worked on the capacity to distinguish infractions. It is concluded that bringing issues to light and overseeing assumptions regarding copyright infringement might be advantageous; however, it is not a viable replacement for deliberate location and careful requirement, even among grown-up students.

Butt (2016) presented an analysis utilizing data mining techniques and showed fewer female students are cheating than male students; most students prefer small cheat sheets over books. Students deliberately turn their cameras off during online exams to cheat and various other tactics as trends. In 2011 Ebrahim Khodaie et al. studied the factors influencing the probability of cheating in a school in Tehran. They analyzed that parental education background, education level, amount of study a student does, and age play a vital role in incentivizing cheating (Khodaiea et al., 2011). Manoharan (2019) developed a personalized examination system to perform his survey. They provided a personalized multiple-choice question-based test to both teachers and students. Then took feedback from them to compare the time teachers would manually spend making a personalized exam and student's performance in a regular exam with the personalized exam. They theoretically performed logistic regression analysis on their collected feedback samples and reported that around 95% of students confessed to cheating in the exam, among which only 70% were reported.

An article by Bawarith et al. (2017) showed a method to detect cheating during the online exam by fingerprint authentication and eye-tracking of the examinee. Unique finger impression confirmation alludes to the automated technique for checking a match between two human fingerprints. Finger impression distinguishing proof is perhaps the most well-known and advertised biometrics due to its uniqueness and consistency over the long haul. No two individuals have the very same fingerprints. Indeed, even indistinguishable twins with indistinguishable DNA have various fingerprints. This uniqueness permits fingerprints to use in a wide range of ways, including individual verifications (Bhargava et al., 2012). Finger impression offers numerous benefits like uniqueness, non-repudiation and non-transferable. The second technology used for this study is eye-tracking that calculates the gazes of the examinee when he or she tries to look around during the exam. The coordinates of the eye gazes were calculated according to the screen the student is seeing and is represented by x and y coordinates of the screen (Bagepally, 2015). The proposed system of the study was made on visual C# and SQL server database. As a result, the abnormal gazes were identified as cheating and non-cheating with promising accuracy.

The suggested method can be used in physical exams and encourage students to focus on concepts rather than cheating. Kasliwal (2015) presented a method to monitor student's activities during online exams. He enlisted websites that consisted of information helpful for exams as black websites and the rest as white websites.

The tool detected cheating if the student changes the browser or used any enlisted website.

Countless attempts have been made to detect cheating during physical and online exams using machine learning and deep learning. Sharma and Varshney (2020) showed how deep learning and machine learning could be used to identify and detect suspicious activities in parking lots, ATM centres, airports, railway stations, examination rooms, etc. Meena et al. (2016), designed a virtual invigilation model and smart exam scheduler by capturing the videos from the camera and extracting the features with HOG; after that, the SVM classifier compared the extracted frames with the frames present in the database. Navak et al. (2011), designed a model that would recognize cheating gestures during exams and write a description about it to keep count of cheating. Their model first used 3DCNN and XGBoost (Chen & Guestrin, 2016) to recognize gestures and then LSTM to write descriptions. Liu et al. (2020) proposed a method to recognize abnormal behaviour using Spatio-temporal features; they prepared a custom dataset consisted of 1742 poses for two candidates and 1347 pose for one candidate. The proposed model was able to identify abnormal behaviours like moving around, raising hands, or transferring cheat sheets with 93.3% accuracy for one person and 92.2% accuracy for recognizing multi-person activity. Fang et al. (2020) made an intelligent monitoring system using an adaptive threshold using supervised learning image recognition. The proposed method takes input from the real-time video of an examination room. The video is divided into images according to the predefined area range for the candidate's seat. The action recognition is performed on these images. A reminder is sent to the invigilator if an action beyond the predefined limit is recognized.

Li et al. (2019) used the RAE algorithm along with the LSTM network to perform cognitive diagnosis of students their answer's similarity index, answers speculating habits, etc., to determine whether a student cheat's or not. Lin and Zhou (2015) presented a method for detecting cheating in physical exams. The dataset was extracted from a video shot at a specific position; for pre-processing, the images' background was removed since detecting the object's movement was concerned. The processed data was tested on an artificial bee colony algorithm, and simulations were performed using MATLAB. The experiment indicates that the proposed method can achieve good results in real-life applications.

Tiong and Lee (2021) performed a case study for detecting cheating during online exams using deep learning techniques. Their proposed model had an internet protocol (IP) detector and an activity detector. The IP detector monitors the student's IP address to notify if students try to change their location or computer device. This work's dataset was taken through the online exam, mock interviews, mid and final assessments in an unregulated environment. The proposed method scored 68% on deep neural network (DNN), 95% on Dense LSTM, and 86% on recurrent neural network (RNN).

Ghizlane et al. (2019) proposed an online assessment monitoring management system that uses deep learning methods for face recognition and biometric module for identification. Once the student is identified, the monitoring modules monitor him throughout the exam. During the online exam, the proposed system was verified multiple times. Tavakolian et al. presented a face recognition method in (2018) for online assessments. They used an online dataset by Alex Martinez and Robert Benoventi. The proposed method was first applied to the SRC family, which scored 65.4% of accuracy, and then by using modified ResNet (He et al., 2015), this accuracy was increased up to 79.6%. To get the comprehensive results used the different queries such as "deep learning" AND "student invigilation", "machine learning" AND "smart invigilation", and "smart class" AND "invigilation" for searching on a different database. Such as google scholar, IEEE, and Springer. The IEEE database gets 904 results and chooses 10 search articles from it. While google scholar found 2,199 results, I took 18 results, from which 6 are replicated from the IEEE database. Springer gets only 4 articles and a Wiley 3 research paper out of 1,174 and 8,39 results, as shown in Fig. 1.

A different perspective of student invigilation detection using machine learning and deep learning is shown in taxonomy Fig. 2. There are different models of machine and deep learning that have been used for the student invigilation system. Various techniques of cheating like communication, using gestures or physical movements have been analyzed for student invigilation by applying multiple classification models such as VGG-16 (Simonyan & Zisserman, 1409), Inception v3 (Szegedy et al., 2015),

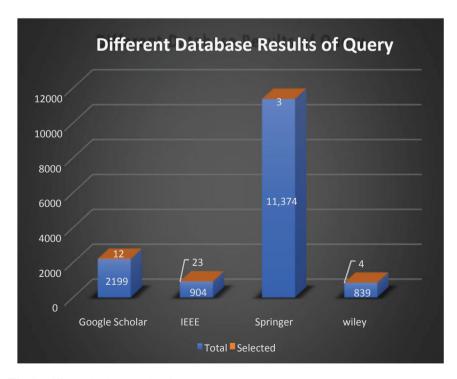


Fig. 1 Different database results of query

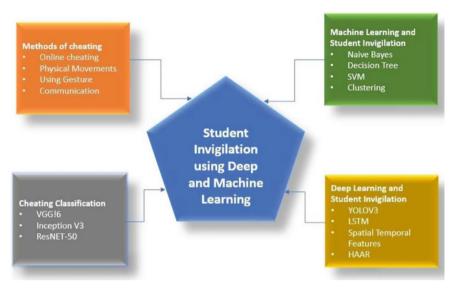


Fig. 2 Taxonomy student invigilation using deep and machine learning

ResNet-50 (He et al., 2015). Before deep learning, typical machine learning algorithms such as SVM (Wang, 2005), Naive bayes, etc., were also used to detect and classify. The taxonomy gave an overview of the articles.

2 Machine Learning and Student Invigilation

Machine learning is known for giving machines the capability to learn and make decisions accordingly. It is done by giving them a massive amount of data which could be in any form, be it words, numbers, images, videos, etc. With the help of an algorithm, it finds a statistical pattern in that massive amount of data, learns through these patterns, and acts accordingly. On the one hand, machine learning is just learning an algorithm to logically improvise the set of instructions given to it. On the other hand, it could be seen as the theoretical and numerical perspective demonstrating how this cycle functions. The outline's numerous approaches can be sum up with the three types of machine learning; supervised, unsupervised, and reinforcement. Among which two of them are discussed below.

2.1 Supervised Machine Learning

Many researchers have tried to make a human behaviour system that deciphers and understands it. Early analysts focused on supervised machine learning to classify different human behaviours, subjected to those suspicions that there exists a clear boundary between both the classes of normal and abnormal human activities. One may develop a managed approach containing peculiar arrangements; moreover, run typical practices before constructing a final model; afterwards, using the prepared model to manage progressions as normal or abnormal behaviour is not a good approach. Many research on recognizing abnormal behaviour through surveillance videos depend on supervised learning for its promising precision. Support Vector Machine (SVM), K-Nearest Neighbors, Naïve Bayes, Decision Trees, and Neural Networks are some well-known supervised machine learning algorithms (Sharma & Varshney, 2020).

2.2 Unsupervised Machine Learning

The unsupervised machine learning method depends on abnormal frequencies that are comparatively less than normal behaviour. A generative model is constructed by unsupervised machine learning for both normal and abnormal activities, by then use the model on mastermind foolish contemplations and direct progressions as abnormal at they need help, in reality, new plans from the normal foolish contemplations and direct (Ouivirach & Dailey, 2010; Ryoo, 2011; Swears et al., 2008). Unsupervised learning is related to general grouping practices such as regular and unpredictable or an outlier for a prepared dataset; as a result, no extraordinary prerequisite These systems by the worth of exertion by differentiating another model against an amassing about groups addressing truly normal lead method Furthermore arranging the new plan concerning representation a deviation Assuming that its division from that nearest centroid might be over the edge.

A lot of work has been done using machine learning for the detection of cheating during exams.

In research, Meena et al. (2016) developed and implemented a virtual examination model and a smart exam scheduler. Developing this model was to make monitoring and seating arrangements during exams easy which was a tedious task before reducing the error rate of large human resources and its expenses. The invigilation system and the schedular took input from a captured video using histograms of oriented gradients (HOG) feature extraction and compared the converted frames with the previously stored frames by the SVM classifier. The proposed method achieved promising results during implementation.

Amigud et al. (2016) presented a biometric-based machine learning system to increase academic integrity. The dataset of this work included articles of 11 students, forum messages, etc. These articles and messages were further divided into five

assignments with different word lengths. Initially, using natural language processing (NLP) methods, the dataset was pre-processed to plain text and analyzed using Naïve Bayes classifier and Counter Vectorizer. Five separate experiments were conducted to predict the authorship. The flow of these experiments was (i) to train the model with assignment one and predict the writer of assignment three, (ii) to train the model with assignment one and predict the writer of messages, (iv) to train the model with assignment three and predict the writer of messages, (v) to train the model with assignment four and predict the writer of messages, (v) to train the model with assignment four and predict the writer of messages. Among which only the second experiment scored 100% accuracy.

Cavalcanti et al. (2012) present a case study to inspect how text mining and supervised classification methods can be used to identify cheating in scholarly exams. This case study was performed in Brazil in the Business Management and Computer science department of the Federal University of Campina Grande. A custom dataset in Portuguese and Brazilian language was generated for the case study. Pre-processing techniques like tokenization, punctuation, and stop words removal was performed on the dataset. They compared two decision tree models on the pre-processed dataset, one with cosine similarity and the second contingent on the overlap coefficient against the domain expert. The supervised model outperforms the domain expert with an accuracy of 99.43%.

Jalali and Noorbehbahani (2017) proposed two different methods using MATLAB and Clustering, both utilizing distance function to recognized cheating during exams. The custom dataset prepared for this work was composed of students sitting at different positions; few were shown cheating through cell phones or cheat-sheet, and the rest were not. In MATLAB, the difference of pixels between two images was calculated, which gave a numerical output that could be used to analyze the cheating. Distance between an image with the reference image was calculated; if the distance exceeds the predefined value, the image will be considered the cheating state. Similarly, in the case of the clustering method, the previous distance function was utilized. A cluster of 50 images was made as a reference before an exam. The distance of the images during the exam was calculated with the centre of the reference cluster. The image will be considered as a normal state if it does not exceed the threshold value. Both proposed methods achieved 100% accuracy and can detect cheating.

3 Deep Learning and Student Invigilation

Deep Learning is a subclass of machine learning influenced by the functioning of the human brain. Deep learning can often surpass human performance as it can learn and classify images, text, or voice directly. It is the key technology behind innovations like driverless cars, Alexa, SIRI, etc. deep learning is gaining a lot of attention recently and has been used to detect cheating in both online and physical exams. In an article published by Lv et al. (2014), a system was proposed that detected cheating behaviour using the Pictorial Structure Model. The paper uses video

surveillance for detecting abnormal behaviour during the examination depending on the implementation environment. Moreover, building a model depending on the human body and related to human appearance requires colour and pose information. Finally, for interfacing the posterior pose belief, a propagation algorithm was used. The testing of the model showed the effectiveness of the method with promising results. Kulkarni (2019) designed a competent classroom invigilating model using computer vision techniques to recognize body movements, poses, and expressions. Image segmentation, classification, and detection are some primary tasks that must be performed for computer vision. Performing all these tasks using the different algorithms is more prone to error and may not be feasible. Inception V3 algorithm is used to overcome this problem. The convolutional layers recognize lower features such as shape and edge. AvgPool and MaxPool layers carry out image transformation. Classification is performed by Dropout, Fully Connected, and Softmax layers. The suggested model produced less than a 10% error rate which inferred that Inception V3 performs better than other algorithms.

Kuin (2018) detected cheating through a video recording using CNN. She first annotated the extracted frames from videos and passed this pre-processed data to VGG-16, Inception v4 (Mindoro et al., 2020), and MobileNets. VGG16 has 16 layers between each layer activation function ReLU is used, and Softmax is finally applied before making predictions. The subsequent model, Inception V4 has 467 layers, but it has less than half parameters to train compared to VGG16. The third network, MobileNets, utilizes depthwise convolution, which is substantially more efficient than standard convolution; it also has the least number of parameters compared to the other two. The performances of these three models were compared. Results show that VGG16 and Inception v4 outperform MobileNets with 96.8 and 96% accuracy, respectively, as it only scored 48.8% accuracy compared to the other two models. Mindoro et al. (2020) used YOLOv3 (Nishchal et al., 2020) to detect whether the student is attentive or not. An experimental setup was prepared for the acquisition of the dataset. The attentive and nonattentive behaviour of students were recorded in two videos. Almost 14,000 were extracted and labelled as focused and nonattentive. These annotated images were split into training and testing of the model for face detection and prediction. Accuracy and artifacts under observation were measured using the mAP function; the high value of mAP shows the student is attentive, and the low value represents his inattentiveness. YOLOv3 achieved 88.6% of accuracy on the testing state.

4 Classification and Invigilation

Classification in machine learning is defined as grouping the observations into categories. For instance, plants and animals are classified into respective categories by biologists. In artificial intelligence, classification algorithms are used to classify faces, detecting spam emails, frauds, etc. Classification technique has been proved helpful in detecting cheating during online and physical exams as well. Adil et al. (2019) designed a surveillance system to identify suspicious activities during physical exams. They made a custom dataset to classify the face, head, and hand movements, pre-processed by foreground subtraction, background subtraction outlier's removal. The haar-like feature was used for detection purposes. The model accurately classified face with 84% accuracy, hand and head communication with 72 and 70% accuracy.

Nishchal et al. (2020) proposed a method to make invigilation completely automated. The proposed model has five different parts. In the first part, OpenPose (Krizhevsky et al., 2012) classifies various 18 positions of a body as posture recognition; in the second part, Alexnet (Mondal et al., 1300) was trained to detect cheating and achieved 96% accuracy on classifying activities like bending down, turning back, and moving arms back successfully. The third part was the emotion analysis model that scored 65% accuracy on testing and analyzed the student's emotions while performing the abnormal activity. Arinaldi and Fanany (2017) present a gesture recognition model and a language generation model using 3DCNN, XGBoost, and LSTM network. The proposed model takes input from a real-time video during physical exams, classifies gestures, and provides a textual output. With Kappa statistics of 0.76, the gesture detection model achieved 81.11% accuracy and 96.6% on word accuracy. In Table 1 Different datasets are shown that are used in the various article. Mostly preferred to work on the dataset that they developed. A few also used the public dataset for their experiments.

5 Methods of Cheating

The exam is a way to evaluate student's knowledge and understanding of their studies. Exams come with a lot of pressure for both teachers and students. Students cheat for various reasons, for instance, to get good grades, fulfil the expectations of parents and teachers, they're not prepared for the exam, etc. There are various cheating methods during online and physical exams, such as using gestures, crib notes, copying from other fellows etc. (Mirza & Staples, 2010). The researcher had worked on the different types of cheating methods. Some detected the plagiarism; few implemented the system to detect the poser of the students in a classroom environment to perceive anomalies. Table 2 shown some methods of cheating on which scholar worked on.

6 Conclusion

The use of deep learning algorithms and techniques in student supervision creates several specific challenges. Deep learning approaches face a difficult challenge in the form of a shortage of training datasets. In the last decade, several smart systems have been proposed using diverse types of algorithms and techniques. Most of the work has been done using deep learning object detection models like YOLO, Faster RCNN.

Table 1	Data acquisition methods and their source		
Sr. No.	Paper acquisition	Method	Dataset sources
1	"Automated invigilation system for detection of suspicious activities during the examination." Adil et al. (2019)	Custom developed	N/A
2	"Design and Implementation of Virtual invigilation System and Smart Examscheduler" Meena et al. (2016)	Custom developed	N/A
3	"Realization of Intelligent Invigilation System Based on Adaptive Threshold." Fang et al. (2020)	(Video comes from monitoring module)	N/A
4	"A Multi-index Examination Cheating Detection Method Based on Neural Network." Li et al. (2019)	Custom developed	N/A
5	"Detection method for cheating behaviour in examination room based on artificial bee colony algorithm." Lin and Zhou (2015)	Online	N/A
6	"E-cheating Prevention Measures: Detection of Cheating at Online Examinations Using Deep Learning Approach–A Case Study." Tiong et al. (2021)	Custom developed	Chen and Guestrin (2016)
7	"Face recognition under occlusion for user authentication and invigilation in remotely distributed online assessments." Tavakolian et al. (2018)	Online	N/A
8	"A behavioural biometrics-based and machine learning aided framework for academic integrity in e-assessment." Amigud et al. (2016)	Online	N/A

 Table 1 Data acquisition methods and their source

(continued)

Sr. No.	Paper acquisition	Method	Dataset sources
9	"Detection and evaluation of cheating on college exams using supervised classification." Cavalcanti et al. (2012)	Online	N/A
10	"An automatic method for cheating detection in online exams by processing the student's webcam images" Jalali and Noorbehbahani (2017)	Online	N/A
11	"Real-Time Automated Invigilator in Classroom Monitoring Using Computer Vision." Kulkarni (2019)	Custom developed	N/A
12	"Capturing Students' Attention Through Visible Behavior: A Prediction Utilizing YOLOv3 Approach." Mindoro et al. (2020)	Custom developed	N/A
13	"Fraud detection in video recordings of exams using Convolutional Neural Networks" Kuin (2018)	Custom developed	N/A
14	"Automated cheating detection in exams using posture and emotion analysis." Nishchal et al. (2020)	(Diff. datasets)	Zhe Cao, Tomas Simon, Shih-En Wei and Yaser Sheikh, Realtime Multi-Person 2D Pose Estimation using part Affinity Fields, The Robotics Institute, Carnegio Mellon University, 2017
15	"Cheating video description based on sequences of gestures." Arinaldi and Fanany (2017)	Online	N/A
16	"Video summarization for remote invigilation of online exams." Cote et al. (2016)	Custom developed	N/A
17	"An automated technique for cheating detection." Asadullah and Nisar (2016)	No particular dataset (input from microphone)	N/A

 Table 1 (continued)

(continued)

Sr. No.	Paper acquisition	Method	Dataset sources
18	"Cheating behaviour detection based on pictorial structure model." Lv et al. (2014)	Custom developed	D. Ramanan, D. A. Forsyth and A. Zisserman, Strike a pose: Tracking people by finding stylized poses, Proceedings of 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR 2005), 1: 271–278, 2005
19	"E-exam cheating detection system." Bawarith et al. (2017)	Both custom developed and online	M. Lourde and D. Khosla, "Fingerprint Identification in Biometric Security Systems," International Journal of Computer and Electrical Engineering, vol 0.2(5), p. 852, 2010
20	"Webcam as a new invigilation method: students' comfort and potential for cheating." Mirza and Staples (2010)	Online	N/A

Table 1 (continued)

To work on a deep learning problem dataset is the heart and soul of the system. The number of publicly accessible datasets has steadily increased, and many also generated local datasets as well. Some researchers also used the novel approach of data augmentation for the generation of the dataset as well. But still, it's an open challenge for researchers to find out the efficient way to data generation without needing much computation resources. After reviewing numerous articles, one should distil the best deep learning framework, methodology, and process for specific tasks and application areas. The architectures and approaches based on CNN will be the best performers for the detection of student invigilation. Convolutional Neural Networks (CNNs) have been introduced into the current problem and replaced conventional handcrafted machine learning approaches. Furthermore, handcrafted features are used in current approaches and systems. Researchers have favoured an end-to-end professional CNN's method for invigilation analysis in the last 5 years. Several studies have shown that designing architectures for unique task properties yields better results than simple, basic and pre-trained CNNs. Task-specific architectures such as multi-view and multi-scale networks were encountered by the researchers many times. The network's efficiency is also affected by model hyper-parameter optimization (e.g., dropout rate, learning rate). There were no simple strategies or methods for determining the best set of hyper-parameters for empirical exercise,

Sr. No.	Study	Method of cheating	Accuracy (%)
1	Md Adil, et al., "Automated Invigilation System for Detection of Suspicious Activities during Examination". (Adil et al., 2019)	Body movements	Face = 84 $Hand = 72$ $Head = 70$
2	Bawarith et al., "E-exam Cheating Detection System" (Bawarith et al., 2017)	Online exams	97.78
3	Kasliwal, "Cheating Detection in Online Examinations," 2015. (Kasliwal, 2015)	Browsing Monitoring	100
3	Chang Liu et al., 2020, "Abnormal Behavior Recognition in an Examination Based on Pose Spatio-Temporal Features" (Liu et al., 2020)	Gestures	92.2
4	Zhizhuang Li et al., 2019, "A Multi-Index Examination Cheating Detection Method Based on Neural Network" (Li et al., 2019)	Plagiarism	79.4
5	Khatereh Jalali et al., 2017, "An Automatic Method for Cheating Detection in Online Exams by Processing the Student's Webcam Images". Conference Paper Research Gate (Jalali & Noorbehbahani, 2017)	Cell phone, cheat sheets detection	100

 Table 2
 Methods of cheating

which was disappointing. In short, it leaves the gap that the researcher will fulfil may be in future.

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The Websites Technology for Arabic Language Learning Through COVID-19 Pandemic



Samer Shorman^(D), Muath Jarrah, and Ahmed R. Alsayed

Abstract The pandemic of COVID 19 is transformed the people life style over the world. The teaching and learning filed is one of the most sectors were influenced by the procedures, new situations and social distancing through this pandemic. The self-learning via websites and internet used in various methods to teach the people the languages and skills. As well it used to learn the Arabic language which is one of the most widely used languages in the world. It is expected to play a critical role in educational operations and assignments. The aim of this study is to asset people to find and assess the websites for Arabic language learning based on multi criteria to support the learners. As well as to become a reference for teachers and learners to select a good quality website for non-Arabic speakers. These criteria are to evaluate Arabic learning websites to be guidelines based on functionality, usability, and learning content to serve the language skills writing, reading, listening and speaking based on correct grammars. This study focuses on Arabic language learning websites to classify them based on quantitative and qualitative methods to distinguish among them. However, this study will not assess the computer systems for learning which is out of websites scope.

Keywords Websites · Learning · Usability · Non-Arabic speakers · Arabic languages · COVID-19

1 Introduction

During the COVID 19 the online learning, E-learning systems or web-based applications, which is used extensively in education due social distancing, is considered

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S. Shorman (🖂) · A. R. Alsayed

Department of Computer Science, Applied Science University, Al Eker, Kingdom of Bahrain e-mail: samer.shorman@asu.edu.bh

M. Jarrah · A. R. Alsayed School of Information Technology, Skyline University College, Sharjah, UAE

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as a part of education system processes in different learning levels (schools, universities, and self-learning) (Al-Shoqran et al., 2021; Harrati et al., 2016). According to Benaida et al. (2018) Arabic language is the fourth language in term of used on world wide web. The websites technology used in learning Arabic language for tourism purposes in Ghani et al. (2016), this research finds the effectiveness of this matter for tourism, it is enough fine to learn and give good information for tourists. In (Jaafar, 2013) the research shows there are three kinds of Arabic language are Professional Purposes, Academic Purposes and specific topics. In (Gahwaji, 2020) the researches study the websites for children in terms of interactivity and accessibility and other multimedia such as written text, animations, videos and sounds.

Learning web-based means a website contains online pages related to content; Arabic learning websites contain parts for reading, writing, listening and speaking and grammars. This website should contain a good multimedia which enhance the content presentation, and to make the learning process easy and useful. The researchers in National Standards in Foreign Language Education Project (NSFLEP).: Standards for foreign language learning: Preparing for the 21st century (1996) used multi criteria to evaluate the English learning websites in the university. The test of usability means assessing the interaction between users and computer interface (Shehab et al., 2020). It is a human computer interaction process, based on the quality of design interface and functions (Ghasemifard et al., 2015), which aims to develop the data and its applications. Moreover, the technology has become an integral part of our life in different aspects such as education, daily lives, shopping, entertain activities, and social communication (Jarrah et al., 2019, 2020). According to Achour and Abdesslam (2012), general method was proposed to assess the website and Arabic language learning websites (Fauzi et al., 2017; Mohamad Jaya et al., 2015), this method used nine criteria to assess the web sites, the study did not mention how many websites were studied, and did not include references or links related to Arabic language learning websites. In (Failed, 2018), the authors discussed seven diminutions to measuring the websites usability; those diminutions include usefulness (resource allocation, reference, and accuracy), efficiency (structure and completeness), navigation (link to home page and page linking), satisfaction (fascinate and fantastic), content (subject coverage and choice of media), accessibility (loading time and readability), and learnability (ease to learn, terminology, and memorize) (Failed, 2018). The evaluation website has quantitative and qualitative methods, quantitative method should generate a statistical date to analyses them such as number of users, pages and others, but in qualitative method well understand, describe and explain the concepts and terms that are related to subject such as seven diminutions.

The research structure will be Significant of study, The ACTFL standards for foreign language learning, learning using Internet website, websites components, research methodology, The websites evaluation, analysis and discussion, websites for Arabic and multi languages, websites with some Arabic martials, findings and results and conclusion.

2 The ACTFL Standards for Foreign Language Learning

According to According to American Council on the Teaching of Foreign Languages (ACTFL) (National Standards in Foreign Language Education Project (NSFLEP).: Standards for foreign language learning: Preparing for the 21st century 1996) (see Table 1), there are five criteria including communications, culture, connections, comparisons, and communities. Communications: means how the learners can communicative with each other using the language word properly. The main question in this point is how the learners can use the language to express and exchange their thoughts and feelings. Cultures: means no languages without cultures, most of languages are based on the events to generate the word and sentences, which become a background history of that language. When learners can explain the relationship among of language and other aspects related with target language. Connections: This means the learners need to know about the important disciplines within the language. It is useful for learners to collect information from these fields that are existed only in this language.

In addition, Comparisons: to understand this point we have a simple question. How the learners will learn the language? The answer is that learners should have an original language to make comparisons between it and the concepts of new language. Finally, the Communities: it is an important point, which means that the learners should use the new terms in their communities to be familiars with new words and expressions. These behaviors will increase possibility to learn more, it is life-long learning.

3 Significant of Study

Websites for Arabic language learning for non-speakers suffer lack of multi factors such as the content for reading, writing, listening and speaking.

Using the websites internet useful for the people that are cannot attend live courses, because the time or place and cost not appropriate for them. This study introduces several of aims as the following:

- To enhance the Arabic language teaching via e-learning systems as internet learning websites.
- To introduce a good criterion for non-Arabic speakers, to explain the strength and weakness for websites.
- To guidance the Arabic teachers to enhance their skills in some aspects according to result of study.
- This study will assess the websites design, to make the designers how to good methods to present the Arabic content though websites.

Goal areas	Standards		
Communication Communicate effectively in more than one language in order to function in a variety of situations and for multiple purposes	Interpersonal Communication: Learners interact and negotiate meaning in spoken, signed, or written conversations to share information, reactions, feelings, and opinions	Interpretive Communication: Learners understand, interpret, and analyze what is heard, read, or viewed on a variety of topics	Presentational Communication: Learners present information, concepts, and ideas to inform, explain, persuade, and narrate on a variety of topics using appropriate media and adapting to various audiences of listeners, readers, or viewers
Cultures Interact with cultural competence and understanding	Relating Cultural Practices to Perspectives: Learners use the language to investigate, explain, and reflect on the relationship between the practices and perspectives of the cultures studied	Relating Cultural Products to Perspective Learners use the langua explain, and reflect on t the products and perspe- studied	age to investigate, the relationship between
Connections Connect with other disciplines and acquire information and diverse perspectives in order to use the language to function in academic and career- related situations	Making Connections: Learners build, reinforce, and expand their knowledge of other disciplines while using the language to develop critical thinking and to solve problems creatively	Acquiring Information and Diverse Perspective Learners access and eva diverse perspectives that the language and its cu	aluate information and at are available through
Comparisons Develop insight into the nature of language and culture in order to interact with cultural competence	Language Comparisons: Learners use the language to investigate, explain, and reflect on the nature of language through comparisons of the language studied and their own	Cultural Comparisons: Learners use the langua explain, and reflect on t through comparisons of and their own	the concept of culture

 Table 1
 World-readiness standards for learning languages (NSFLEP 1996)

(continued)

Goal areas	Standards	
Communities Communicate and interact with cultural competence in order to participate in multilingual communities at home and round the world	School and Global Communities: Learners use the language both within and beyond the classroom to interact and collaborate in their community and the globalized world	Lifelong Learning: Learners set goals and reflect on their progress in using languages for enjoyment, enrichment, and advancement

Table 1 (continued)

Arabic language has roughly 300 million speakers in twenty two Arab countries. As well in 1974, Arabic becomes one of the sixth United Nation's official languages in addition to Chinese, Russian, English, French and Spanish. It contains main items that are important for learners' namely reading, grammar writing, listening and speaking. Arabic language shares those elements with global languages (Al-Huri, 2015; Shorman & Al-Shoqran, 2019).

4 Learning Using Internet Website

Most of the people believe that the learning is the most important factor in human development. The information revolution continues increasing; therefore, the learners need a fast method to learn a new concepts in different fields such as internet. Using websites to learn Arabic language is becoming active method to reach the far people and other sciences. Website is a good and effective method to learn the people, because it is available any time, which means that the website can be used in proper time according to learner, every day means no day off. Moreover, a low cost to keep people saving. The information and materials updated on websites are faster than books, journals or even magazines. Another advantage of using websites is including multiple media such as images, videos, sounds and text effects to display information, it makes the learning process fun and exciting. Using the internet for learning is divided into two categories as follows:

Enrichment system: means using the internet to find the general or specific information; it is for reading the articles, journals, books or other learning about cultures and people. In this level, the teachers and professors used the websites to distribute the materials for students and assignments like e learning systems.

Primary system: it uses the internet as main method to learn and gain the information; such as formal classroom for learners, it is used as a resource store for materials content and learning tools.

5 Websites Components

The websites on the internet are built by using Hypertext Markup Language HTML, Cascaded Style Sheet CSS to design pages, and language programming such as PHP, ASP.net (VB, C#) to create the functions and classes which implement the tasks, these pages are divided into categories according to main websites usage. Learning websites include the text (normal text and hypertext), images (fixed image and animated images) to support the texts to explain the terms. Graphics mean using shapes, lines and texts to arrange something. Sound, which recorded for people to send a message as lessons or instructions to assist explanation of some concepts. Videos to support the lessons and give examples for some concepts. Communication and interactive tools, which used to communicate with users such as emails and chat system.

The main website components for learning language are presented in Fig. 1. The website should have four sections which are reading, writing, listening and speaking, with various supporting materials. In addition, the website should contain multimedia types such as text, images, graphics, videos and sounds to attract the users and learners. The website interface and all pages should also have good structure. Usability is an important issue that includes the five components (See Fig. 2), which integrate with each other. Those components include ease of learning, high speed

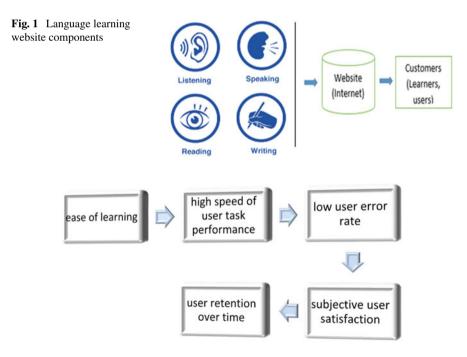


Fig. 2 Elements of usability websites internet

of user task performance, low user error rate, subjective user satisfaction, and user retention over time (Shneiderman, 1987).

Bad website design makes the user not satisfied of the services that offered in this website. In study from the internet performance research firm found 95% of IT, managers felt the loss of revenue (Dyn. World's it executives Agree: Vital online Sales Hurt by poor website performance up to 50 percent of the time (web log post) 2015) because of bad website due to bad design, content and not ease of use. The websites that have poorly or good design often signal to quality of website such as content, brands and services (Bhatt et al., 2019).

Language skills refer to the skills that are required for learners to communicate with others using the target language. Language skills divided into four core skills namely writing, reading, listening and speaking. There are two skills to support the cores such as grammar and skill of literary taste.

6 Research Methodology

The research methodology in this study involves qualitative and quantitative analysis to study the Arabic learning language websites. Qualitative method analyzes the websites based on a set of factors including the main criteria for assessment learning Arabic language websites, for example websites design, websites content and language skills (reading, writing, listening and speaking). The analysis is based on referring to websites and observing the websites criteria. In the quantitative method, some of statistics from Google website is used to compare between them. The accepted websites is the website that uses Arabic formal language to help non Arabic speakers, and includes the main language skills and good interaction with users. In the following part will present a website that are offer a learning Arabic language, for non-Arabic speakers.

Table 2 shows thirteen websites for Arabic language learning. Those websites divided into two parts namely free and not free websites, seven websites are not free and six free websites. On the other side, there are many websites not included in the table for two reasons, the first is those websites offer learning Arabic language as a simple part of multi services of that website. The second is some websites learn Arabic languages using local accent as Egyptian accent and others, which affect correct pronunciation of formal Arabic language.

7 Analysis and Discussion

Table 1 shows that the first three websites (mylanguages.org http://mylanguages.org/ learn_arabic.php, madinaharabic.com https://www.madinaharabic.com/articles/ara bic-snack.html and hobob.org (http://www.hobob.orgl/earn_arabic/index.php/com ponent/content/article/68-click-a-listen-verbs/181-read-erase-concentrate) offer a

NO	Website link	Reading	Writing	Listening	Speaking	Pros	Cons
1	http:// www. madina harabic. com/	Available A lot of sections and very good categories	Available	Available	Not available	A lot of quizzes	The interface need to enhancement
2	http:// www. hobob. org/ arabi/	Available	Available	Available	Not available	A lot of word and sentences, Contain Quizzes	The interface is very old design
3	http:// mylang uages. org/ind ex.php	Available A lot of sections and very good categories	Available	Available	Not available	A lot of sections and very good categorical, Multi language, Contain Quiz	Not available for how to pronounce the letters
4	http:// www.dal ilusa. com/ara bic_cou rse/lex ical_a rabic_les sons_0 1.asp	Available sample	Available	Not available	Not available		Not free
5	http:// www.nat uralar abic. com/	Available The Arabic Alphabet, Arabic: Pronouns, Arabic, story	Available	Available sample	Not available	Contain quizzes	Not free
6	http:// www.ara bicpod. net/abo utus	Available sample	Available sample	Available sample	Not available	-	Not free

 Table 2
 Arabic language learning websites

(continued)

NO	Website link	Reading	Writing	Listening	Speaking	Pros	Cons
7	http:// www.loo tah.com/ arabic tutor/eng frmset. htm	Available words Sentences	Available	Not available	Not available	-	Very simple and little content
3	http:// www.ara biconl ine.eu/	-	-	-	-	-	Not free, it is a system learning not web site
9	http:// www.l- lingo. com/en/ learna rabic/ index. html	-	-	-	-	-	Not free, it is a system learning not web site
10	https:// www.ros ettastone. com/lp/ sbsr/liv emocha/? prid=liv emocha _com	_	_	_	-	_	Not free, it is a system learning not web site
11	http:// www. myarab icwebs ite.com/	Available	Available	Available, videos	Not available	Some Arabic Culture, Contain Tests	It is used HTML pages only, it is weakly in usability and interface
12	http://loo klex. com/ babel/ara bic/12. htm	Available	Available	Not available	Not available	It has Arab world map with details for most cities in all countries	It is very simple, It is used HTML pages only
13	http:// www.lea rnarabico nline. com/	Available Only sentences and words	Available	Not available	Not available	A lot of word and sentences, Contain Tests	Not free

 Table 2 (continued)

(continued)

NO	Website link	Reading	Writing	Listening	Speaking	Pros	Cons
14	https:// www.ara bac ademy. com/	_	_	_	-	_	Not free

Table 2 (continued)

good service and high-quality learning facilities over other websites. These three websites are the most comprehensive websites in three criteria of reading, writing and listening. However, speaking criteria is not available in the all studied websites. On the other hand, websites 4, 5, 6, and 13 have some advantages as free services, but most of the advanced contents are not free.

The websites 8, 9, and 10 offer some contents to promote their Arabic language learning software but it is not free. The websites 11 and 12 have reading and writing sections, and contain some of Arabic Culture and information about Arabic countries. To conduct more analysis, an online checkpagerank.net (https://checkpagerank.net/check-page-rank.php) is used in this study to get the data statistics related to mylanguages.org, madinaharabic.com and hobob.org.

Table 3 shows eight important factors to evaluate the most comprehensive and best three websites in this study including mylanguages.org, madinaharabic.com and hobob.org. The most important two factors are Google PageRank and Consumer Perception Rating (CPR). Google PageRank is a measurement used to measure the level of a whole website or each page in the website in google (Gleich, 2015). CPR is the second factor which is used to score a consumer perception rating which indicates a reputation of website between consumers. The result in Table 2 and Fig. 3 are show that the Google PageRank for the websites of mylanguages.org, madinaharabic.com and hobob.org are 5, 5, and 3, respectively. Besides, CPR Scores for the three websites are 5.2, 4.9, and 2.8, respectively. Moreover, the usability components are applicable to be used in these websites of Arabic learning language.

This section highlighting on websites that introduce multi languages learning. The following Table 3 shows twelve websites to learn multi languages.

Among multi languages websites to learn some languages, not all websites have same number of languages. They have fluctuation in multi levels such as content,

Website	Google PageRank	CPR score	Domain authority	Global Rank	Trust flow	Spam score /18	Referring domains	EDU backlinks
mylanguages.org	5	5.2	51	44,423	43	5	2000	273
madinaharabic.com	5	4.9	49	226,203	44	1	1,496	934
hobob.org	3	2.8	25	495,348	3	7	78	0

 Table 3
 Online websites ranking

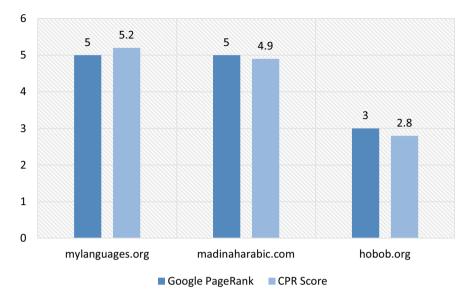


Fig. 3 Google pageRank and CPR score for (mylanguages, madinaharabic, hobob) websites

interface design and others. Table 4 presents a simple description for the selected twelve websites to support the learners during learning process.

8 Websites with Some Arabic Materials

This section discus the websites that are contain some Arabic language material. Those websites not used as reference for learners.

Table 5 shows the websites that are interested in Arabic language; they contain some information related to Arabic such as letters, dictionary, and examples from Arabic in videos and images, and culture history.

In general, the websites (madinaharabic.com, hobob.org/arabi, and mylanguages.org) include good skills of reading, writing and listening. Thus, they are recommended to assist the learners to learn Arabic language.

9 Finding and Results

The website technology plays an important role to support the teaching and learning sectors. As well as in some cases it be the first resource for learners and teachers. This research finds the attractive website depend on different aspects starting from the professional design (menus, text color and images), a comprehensive content

No	URL	Description
1	http://ar.forvo.com/languages/ar/	Has an Arabic interface for reading Arabic words not for non-Arabic speaker
2	http://www.dicts.info/	It is a dictionary for multi languages not to learn Arabic language
3	http://linguanaut.com/index.htm	It is to learn Arabic letters and some sentences only
4	http://gloss.dliflc.edu/Default.aspx	It can support learners. It contains examples for reading, listening and videos
5	http://www.l-lingo.com/en/learnarabic/ index.html	Not free, it is supporting the examples by images to explain the Arabic terms
6	http://www.transparearabic/-nt.com/learn	This website has reading, listening, grammar, letters, not free
7	http://livemocha.com/	This learnt Arabic in multi languages; it contains some lessons and examples with images and sounds
8	http://mylanguages.org/index.php	Presented some of lessons related to subjects with related words and sentences with recorded sound for them
9	http://www.rocketlanguages.com/	Not free, used Egyptian dialect, this website is marketing for software
10	http://a4esl.org/	Has a vocabulary quizzes to support learners
11	https://www.internetpolyglot.com/arabic/lan guages	Learn Arabic word in multi languages with using images and sounds
12	https://www.esl-languages.com/en/study-abr oad/online-tests/arabic-test/index.htm	Has simple quizzes for multi languages

 Table 4
 Multi languages websites

(reading, writing, speaking and listening), using multimedia effects to display the content (images, videos and sounds). In general, the administration for website should be conducted an update for the content of website and to repair the bugs and any technical issues.

10 Conclusion

Arabic language learning using websites is an effective method to help the learners over the world during the COVID 19 pandemic. This research conducted the observation method and used data statistics to evaluate Arabic language learning websites. It was found that mylanguages.org, madinaharabic.com and hobob.org websites are more comprehensive in reading, writing and listening, and have good ranking, likewise the learners can depend on them since they more inclusive from other websites. As well as, numerous websites for learning multi languages were involved because

No	URL	Description
1	http://www.laits.utexas.edu/aswaat/ind ex.php	This website presented some of Arabic sounds and videos as example for Arabic language not for learning
2	http://www.abcleb.com/	Used youtube.com videos to learn Arabic in Lebanese Accent
3	http://lang.arabe.free.fr/	It like dictionary
4	http://www.languageguide.org/user/wiki. jsp?lang=ar	It like dictionary
5	http://transcon.info/co-1-english-ntent/ arab1	It contains a sentences and words in military field
6	http://looklex.com/babel/arabic/index.htm	The website has a good content for letters and writing, it contains some sentences and word for reading and sounds
7	http://arabic.colegioo.com/	It used Egyptian accent to learn Arabic language. Not free
8	http://web.uvic.ca/hrd/hist455/index.htm	The site is very simple and has an unattractive view and does not have multimedia media such as pictures or videos, and the sound of some words
9	https://al-bab.com/arabic-language/arabic- language	This website contains different of things related to Arabic culture as Articles, Society & politics, Arts & culture, Arabic language, Special topics and other Documents

 Table 5
 Websites with some Arabic learning content

it has some contents related to Arabic language, but they are not comprehensive to be a reference or main resource for learners. In addition, for the most websites with some Arabic learning content to learn multi languages, the content and the website structure will support the learners in some skills but not all. Eventually, the whole websites need developments in various aspects such as interface designing, reading, writing, listening and speaking.

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The Impact of Digitizing Business Education on the Quality of Education During COVID-19 Pandemic: The Role of International Accreditation Bodies



Ali Ateya Alromaihi and Allam Hamdan

Abstract The role of business schools in delivering social and economic value for a nation is now more important than ever. After completion of the degree requirements, business schools graduate their students to join the labor market accordingly to fuel the economy. Further, this underlines the importance of business education. At the end of 2019, COVID-19 erupted the educational sector as well as it erupted other major sectors in the world. This forced higher educational institutions (HEIs) to switch to digital learning which was accompanied with many challenges. Learning Management Systems (LMS), evaluation and interaction have an impact of the quality of education in a digital setting classroom. Therefore, international accreditation bodies are responsible during the time of the pandemic to ensure that HEIs provide education of quality as it was pre-pandemic and to provide full support to HEIs to overcome challenges accompanied with ensuring quality in digital learning. Future research needs to conducted to assess to what extent business tertiary education programs graduates reflected the learning outcomes and skills acquired at their workplaces.

Keywords Digital education \cdot Quality \cdot COVID-19 \cdot International accreditation bodies

1 Introduction

In today's economic arena, it is crucial to human capital that is educated, creative, innovative and valuable that is able to drive an economy of a country. Knowledge is perceived to have the transforming potential to move a country forward. As a result, it is critical to invest in the country's educational system (Sun & Lee, 2020). In general, the term Business Education (BE) is as task assigned to the instructors of specific

A. Hamdan Ahlia University, Manama, Bahrain

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A. A. Alromaihi (🖂)

MBA, College of Business and Finance, Manama, Bahrain e-mail: allamh3@hotmail.com

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courses to produce graduates who can thrive in a drastically changing world and prepare through education a new generation of renaissance leaders (Johan, 2014).

BE is a part of the general education which is part of the technical education spectrum (Onyesom & Umoeshiet, 2018). According to Kadiri and Bupo (2011), the term is described as the process of transferring of competencies related to business and pedagogy compulsory for teaching of knowledge, concepts, skills and attitudes related to the field of business. Consequently, BE is that aspect of educational training that an individual receives with the primary goal of empowering himself to develop appropriate business attitudes, knowledge, concepts, understanding and skills in business activities for skill - based usage wherever this individual may find himself in the business world as an administrator, manager, or teacher (Onyesom & Umoeshiet, 2018).

Onyesom and Umoeshiet (2018) indicated that in order to get most of the BE process, there is an urge need to ensure quality in the educational system. As a result, it is critical to develop and improve quality assurance systems in BE. Idialu (2007) defined quality as benchmarking a particular factor with another factor. Oladipo et al. (2009) define the phrase "quality of education" as the extent to which an educational system adheres to set standards that are acceptable. As a result, quality in education refers to the program's relevance and appropriateness to the requirements of the community for whom it is delivered. Within the context of an educational system, an educational institute is expected to be able to meet the users' expectations for the quality of skills acquired through its outputs. (Ajayi & Akindutire, 2007). Wang (2020) has stated that for the purpose of quality assurance of digital learning, instructors are required to reformulate the classroom experience, pay attention to the mental and emotional state of students that are located remotely, and provide guidance to their parents.

According to Sun and Lee (2020) higher education institutions (HEI) face difficulties in implementing a quality assurance procedure that effectively measures students' performance. Tertiary education programs are governed by Higher Education Qualification Agencies (HEQA). These agencies are tasked with monitoring the quality assurance practices of the programs and courses offered by universities. Once the courses and programs provided by HEIs meet the framework and accreditation criteria set by HEQA, those programs are accredited accordingly. The role of HEQA is to assure stakeholders that the programs provided are quality assured.

Due to the new technologies that emerged, adoption of the internet globally, and the demand of a skilled labor force for ready for the digital economy, digital education has become a global phenomenon. Digital education has become a mainstream instead of being a trend (Kumar et al., 2019). According to the 2030 United Nations (UN) Agenda pertaining to education and the Sustainable Development Goal 4, there was a recognition for the need for more flexibility in the tertiary education system to provide a learning pathway to facilitate equity and life-long learning.

There was a long history of the revolution that occurred in the learning process due to the emergence of digital learning. This process saw the adoption of technology in the learning process for it to be reachable for everyone who desires transcending geographic barriers. Prior to the development of computer technology in the 1960s, remote education methods such as correspondence courses and individual study presented difficulties to the learning process. Computers and telecommunications improved distance teaching and learning throughout the next several decades, but they were primarily utilized to automate old educational delivery models rather than to build new forms of pedagogy. The widespread use of the Internet, however, changed the nature of remote education in the 1990s. Nowadays, digital learning has established itself as credible and perceived as a practical method of instruction. Real and digital educational experiences are deeply integrated into learning which is distributed across all aspects of work and life as interactive technology evolves (Dede et al., 2004).

Via a digital learning setting, certain channels are provided to the users to facilitate independent and collaborative interaction between students and their instructors. In a collaborative learning setting, technological tools are integrated to facilitate the process. Learning Management System (LMS), Google Classroom, and Google Hangouts are examples of those tools (Norah & Shabir, 2020). HEIs shifted towards other teaching methods such as video conferencing courses. In this type of teaching, instructors are able to upload their learning sessions, quizzes and activities (Klašnja et al., 2011). The usage of video conferencing allows for useful guidelines on varying levels of knowledge and cognitive skills among learners, as well as connections with various learning styles (Hsu, 2017). The course instructors evaluate their student's work either by individual work assigned to them or through group tasks in the form of a project or a case study (Norah & Shabir, 2020).

Therefore, BE plays a significant role in supplying the demand of the local labor market with skilled employees who will become future leaders (Sun & Lee, 2020). In return, this will bolster the national economy due to the reliance on national labor instead of expat workers.

Over the last two years, many lives have been disrupted due to the outbreak of COVID-19 in its origin in Wuhan, China in 2019. At the initial phase of the virus, the World Health Organization (WHO) office in China declared that the newly spread COVID-19 virus as an epidemic on 3st of December 2019. However, the situation continued to evolve until WHO declared on 11th of March 2020 the novel COVID-19 Virus as a global pandemic due to spread of the virus on a global scale.

This has caused people to change their habits to try to immune themselves against the virus. This includes using hand sanitizers, keeping social distance, frequently washing their hands, wearing masks and gloves. Apart from people's habits that have changed, fundamental changes have occurred to the way people execute their jobs (Nasu, 2021).

The global pandemic has hit many vital sectors in the economy. This situation has forced governments to take measures to limit the virus from spreading. Therefore, government agencies have shut their doors as per the instruction set by their governments. The education sector was not excluded from this impact; it was also part of it. The situation has forced schools and universities to shut their doors for an unknown period of time.

On the 8th of April 2020, the World Bank (WB) reported that HEIs in 175 countries comprising over 220 million post-secondary students were affected by the pandemic.

As a result of the global pandemic, HEIs have been forced to deliver their classes digitally since the first quarter of 2020 as per their government instructions (Sahu, 2020). Due to proper IT structure deployed pre-pandemic and their previous experience, certain HEIs did not face any difficulties or delays in the transition process from traditional to digital learning.

The main tool that facilitated the transition was having in place LMS; examples of these systems are Blackboard and Microsoft Teams (Lim, 2020). The main feature of LMS is that it facilitates the interaction between the students and their instructors via live streamed lectures, recorded sessions, chat conversations, quizzes, online assessments and tests and coursework. Although many instructors did not encounter any difficulties to cope with the new technology deployed to facilitate the new way of delivery of teaching. It was witnessed that some faculty members and students faced difficulties due to the lack of preparedness and capabilities with regards to the new teaching method. HEI located in developing countries faced difficulties in promptly transiting the means of the education delivery. The underlying reason behind this is that there was no proper IT infrastructure in place (Sarea et al., 2021).

In the first quarter of 2020, the Government of the Kingdom of Bahrain has prosecuted a number of initiatives to contain the situation of the outbreak since the first positive case was detected within the borders on 24 February 2020. These initiates include social distancing, closure of particular services such as a number of commercial activities, including cinemas and gyms as well as the closure of schools and HEIs till September 2020 (Derasat, 2020).

All above measures were taken by the top management in HEIs to cope up with the changes occurring due to the pandemic as the educational sector was hit hard in this period. Subsequently, tertiary education faculty experienced challenges due to the short time of the transition period. They had to amend their syllabus and teaching methods to match the new needs that technology required. The aforementioned methods include teaching style, student evaluation techniques, research performed and finally in-class participation. Apart from the educational aspects, faculty's emotions have changed negatively due to the pandemic developments (Sarea et al., 2021).

According to Bowe (2015), technology is considered as a main factor that facilitates the improvement of the education and its quality comprising many factors. Information accessibility is one of the dimensions that will be improved by the integration of technology in education (Amin, 2013). Therefore, it is necessary to assess and evaluate technology. (Azma, 2011; Law et al., 2016).

The urgent "move online" caused by the novel pandemic has resulted in more workload and therefore stress on the tertiary education faculty whom already found it difficult to reach a work-life balance whilst also balancing their teaching, research, and service responsibilities (Houston et al., 2006; Houlden & Veletsianos, 2020). As a result, this may result in a negative impact on the quality of education provided. In these instances, the role of international accreditation comes into action as a monitoring body to ensure quality of education. According to the WB, the unemployment rates of graduates will likely increase due to economic contraction and due to the distrust of the quality of digital learning by the labor market.

Due to the degree of change in digital learning that occurred in the Kingdom of Bahrain and all over the globe, and in addition to the speed of the change. Therefore, there is an urge need to analyze this change in the context of digital BE and its quality as it may have an impact on it. This analysis will help identify the pros and cons of the transition. Also, this will help to identify what should be amended in terms of quality of education in the following period once COVID-19 ceases to exist. Currently, a number of growing literature is dealing with the subject in other countries, however, solid studies should be conducted within the Kingdom of Bahrain due to the fact that each society has its own circumstances and unique characteristics. Therefore, it is not necessary that principles applicable in certain countries would also be applicable in Bahrain.

2 Literature Review

2.1 Digitizing BE

Via a digital learning setting, certain channels are provided to the users to facilitate independent and collaborative interaction between students and their instructors. In a collaborative learning setting, technological tools are integrated to facilitate the process. LMS, Google Classroom, and Google Hangouts are examples of those tools (Norah & Shabir, 2020). HEIs shifted towards other teaching methods such as video conferencing courses. In this type of learning, instructors are able to upload their learning sessions, quizzes and activities (Klašnja et al., 2011). The usage of video conferencing allows for useful guidelines for learners with varying levels of knowledge and cognitive skills, as well as connections with various learning styles (Hsu, 2017). Course instructors evaluate their student's work either by individual work assigned to them or through a group tasks in form of a project or a case study (Norah & Shabir, 2020).

According to Alsanoosi (2021), although digital learning has many benefits, it has many shortcomings. The main shortcomings are that firstly it is highly dependent on technology which will result in the absence of direct interaction between instructors and the student, with a focus on the cognitive aspect. The second shortcoming is that digital learning is not suitable for teaching all science teaching objectives; development of scientific research skills, scientific trends, and the ability to learn from the efforts of scientists. The absence of these factors may have an influence on the quality of education.

The novel pandemic had an impact on the entire educational system, and especially HEIs. This impact forced higher educational institutions to establish a new phase in the educational process called "digital learning" (Elumalai et al., 2020). This approach of modern education is supported by the integration of technology to allow access to online classes and portals (Ngampornchai & Adams, 2016). Kuhad (2020) has indicated that although the adoption of digital learning is challenging for students

and their instructors, the incorporation of gadgets and proper internet connection will allow for a smooth flow of digital learning during this phase of learning.

To cope up with the current trends occurring in the educational system worldwide, a responsibility lies upon HEI to continuously upgrade their technological facilities (Elumalai et al., 2020). In addition, financial aid is required to facilitate the shift from traditional learning to digital learning. It was also noticed that due the incorporation of technology in the educational process, a rise in complexity of information mapping on students was experienced (Darling-Hammond et al., 2020). Madani (2019) has stressed on the importance of aligning the curriculum with digital learning. The author suggests that it is mandatory to link digital learning with essential qualities such as reading, writing, logic, and numerical skills. For students to maintain a competitive edge in the labor market, the outcomes of the aforementioned qualities are considered critical.

2.2 COVID-19 and Its Impact on the Educational Sector in the GCC Region

The GCC region was not immunized from the pandemic as the virus was spread in the member states. This has caused the educational institutes to shut down their doors to contain the situation. Bahrain has initiated the closure of educational institutes on the 25th of February 2020, followed by the United Arab Emirates (UAE) on the 8th of March 2020, then on the 9th of March 2020 followed by Kingdom of Saudi Arabia (KSA) and the State of Qatar. The last two GCC member states to close their educational institutes were the State of Kuwait and the Sultanate of Oman on the 12th and 15th of March 2020 subsequently. Based on the UNESCO statistics, the total number of affected students in the Arabian Gulf region was about 12,085,898 (UNESCO, 2020a, b). KSA consists of the highest number of affected students as the total reached 8,410,264 students constituting around 69.5% of the total number of students in the Arabian Gulf region. With a percentage constituting of 1.44% of the total number of affected students in the region, Qatar had the lowest percentage of affected students.

Higher educational institutions have shifted from traditional to digital learning through a number of LMSs. These include Microsoft Teams, Blackboard, Big Blue Button as well as other learning platforms (Bensaid & Brahimi, 2020). Almost all HEIs located in the Arabian Gulf region were equipped with LMS prior to the pandemic which resulted in a smooth transition to digital learning. Microsoft teams, Zoom, Blackboard, Google classroom and many other platforms were part of the LMS (Bensaid & Brahimi, 2020). Those platforms facilitate the learning process as users can attend video lectures, seminars, class debates, as well as upload any necessary material. Registration and library services were also made available online. Some HEIs evaluate their students through online exams through LMS, open book exams or have replaced all exams with assignments. In order to ensure a mechanisms

that is fair and effective in nature in term of evaluation of the student's performance, the ministries of education in the GCC member states were in continuous contact with HEIs (Sarea et al., 2020). Bahrain and UAE, on the other hand, gave their students the option of including or excluding their final grades from their CGPA (Bensaid & Brahimi, 2020).

Stdents in KSA were offered the option of deferring their studies until the second semester or withdraw from the courses. The Saudi Ministry of Education instructed HEIs to calculate a student's grade based on their current semester average mark or previous year grade, but without affecting their CGPA. If the new mechanism results in a lower CGPA for the student, the previous CGPA remains (Sfeir et al., 2020).

Today accounting constitutes a fundamental part of any curriculum in Business Administration; therefore, the effect of the pandemic on accounting must be looked at carefully. Sarea et al. (2021) stated that the pandemic will have a positive effect on the accounting profession due to the lower-cost of education. The lower cost of education was driven by the transition to digital learning which will enable students to save time and cost (Zarret, 2020). Aside from the benefits of digital learning, digitizing accounting education may confront a number of challenges that may have an impact on the quality of the outcomes of accounting courses. These challenges include student's evaluation procedure, instructor self-efficacy, digitization accounting education, teaching techniques and lecture timing (Sarea et al., 2021; Sandri, 2021). With respect to the challenges faced with respect to pedagogical and competence, a number of HEIs indicated that digital learning requires a unique pedagogical approach to maintain the quality of traditional learning; however, the sudden shift to digital learning did not allow instructors to prepare for the new approach of teaching although LMS was already deployed before pandemic. Horvitz et al. (2014) states that the fast transition to digital learning might threaten the quality of education due to the shortfall in the instructor teaching self-efficacy.

2.3 Student's Perception of Digital Learning

Jeong (2019) conducted a study that revealed that students perceive learning English in a form of online collaborative setting as a positive and encouraging experience. The author expresses that this is due to the productive feedback provided by their peers in digital learning. Similarly, Chen and Wu (2015) study have indicated that video conferences will contribute in enhancing the learning performance. In the same manner, it was proved that digital learning has a positive influence on English as a foreign language student writing skills as improved results were witnessed. In addition to better writing skills, students presented more self-assurance skills and better composition skills (Cahyono and Astuti, 2019). Furthermore, Naderi and Akrami (2018) study confirms that digital learning has a significant influence on the student's intellectual capacity. Many researchers have also assured that using online platforms have a positive impact on the student's assertiveness and presentation skills (Almusharraf and Khahro, 2020).

Digital learning has many benefits including development of independent learners in which they seek information, explore it individually, assess, transform, and acquire new skills (Almusharraf, 2018). Furthermore, one of the many other benefits of digital learning platforms is that it allows its users to access material at their own pace (Almusharraf and Khahro, 2020). The digital learning platforms are an essential tool for self-efficacy for education and enhanced learning performance (Al Fadda, 2019). This study is backed up by A. Alenezi (2020) research paper where it was found that students that are using digital learning platforms are usually drawn into much deeper discussions than traditional classes. These platforms have also provided the students with time-management and self-efficacy skills. However, Chen and Wu (2015) argue that the digital learning may delay the students' learning progress if there was no quality in the mentoring process. Therefore, the authors emphasize that instructors must pay attention in choosing relevant online activities, material distributed so that it will meet the expectations and abilities of the students.

2.4 Quality of BE

Dumond and Johnson (2013) explains that due to the significant challenges related to increased competition, reduced budgets, higher expectations, and the changing mix of backgrounds and capabilities of students forced higher educational institutions to face difficult times. For BEal institutions to survive in these difficult times, institutions have responded by mandating their educational units focused on providing better governance and products (Lomas, 2004). Traditionally, these efforts were initiated by the accreditation bodies that provided guidance to higher educational institutions. These bodies include Association of Advance Collegiate Schools of Business (AACSB) or the Accreditation Board for Engineering Technology (ABET) (Dumond & Johnson, 2013). Dumond and Johnson (2013) continue that the AACSB certification procedure is conducted within the borders of a business school, which is frequently associated with an HEI.

Quality refers to a series of procedures and instructions established by an academic institution to guide it in managing its work and its services provided in the context of digital learning. It necessitates the development of a diverse set of educational materials, the use of a variety of media and activities tailored to students' needs, and the assessment of labor market needs in a manner that complies with the educational process' outcomes. (Qader, 2013).

The concept of quality in higher educational institutions seems to be vague as researchers have defined it based on different points of view. Based on Mishra (2018), Iyede, Fallon and Donnellan (2018) and Vencheh and Yousefi (2018), the term quality is defined as "a focus on meeting a predefined set of standards, specification, and requirements, or focusing or focusing on exceeding the highest standards in pursuit of excellence and exclusivity". Other researchers defined it as "either emphasizing

public accountability or providing a transformative learning experience to benefit students and employers" (Pathiratne et al., 2018; Blitz 2020; Thomas et al. 2017).

Quality is viewed as a tool for achieving success in all sectors, specifically in the educational sector. In higher education, academic excellence has long been a core value. Accreditation is used to improve and develop educational quality in the academic environment. Nowadays, there are numerous accreditation bodies all over the world. The AACSB, the European Foundation for Management development EFMD, and the Association of Masters in Business Administration (AMBA) are business school accreditation bodies that are closely working together. The purpose of assessing any business school or management program is to promote ongoing quality improvement in education by assuming general presumptions about the standards and quality of those institutions (Cura & Ahmed Alani, 2018; Ahmed & Elali, 2021).

The result of a study conducted by Elumalai et al. (2021) reveals that there is a positive relationship between quality of digital learning and administrative support, course content and course design. Also, the instructors and students characteristics plays a significant role in ensuring the quality of digital learning (Hoey, 2017; Kintu et al., 2017). Moreover, social support also has a positive impact on the quality of digital learning as support encourages student's in-class participation and promotes the completion of courses (Munich, 2014). Further, sustainable technical support plays a significant role in enhancing the quality of digital learning as there is a need to have in place proper infrastructure of gadgets, networks and technical teams consisting of experts to provide technical support at any time required (Nawaz & Kundi, 2010). In addition to the aforementioned variables that have an impact on the quality of digital learning, the gender of the students play an important rule in the quality, satisfaction and motivation with respect to digital learning (Cuadrado-García et al., 2010). Finally, the study revealed that the level of quality of digital learning will vary between the levels of courses. This is supported by Peixoto et al. (2012) study that indicated that there is a difference between study habits, satisfaction, and learning strategies depending on the course level.

According to Bumjaid & Malik (2020), Because of its positive impact on the educational process as a whole, educational quality is critical to institutions all over the world. By ensuring quality, instructors are able to transfer knowledge to their students in an effective manner. Additionally, quality provides strategies for development for the instructors and their students in terms of knowledge satisfaction (Alshurafat et al., 2021).

2.5 The Link Between User Satisfaction of Digital Learning and Quality of Education

The term satisfaction in the context of digital learning is a complex term and consists of many dimensions as it incorporates various factors. The various factors include communication, student engagement in online discussions, flexibility, course load, technical support, instructor pedagogical skills, and feedback. (Wei and Chou, 2020; Öztürk & Çetin, 2020).

Digital teaching strategies adopted during COVID-19 for digital course development have a direct influence on the student satisfaction and course-related perspectives (Norah & Shabir 2020).

According to a number of research papers it has been proved that the student engagement and academic performance have a positive influence by satisfaction (Meyer, 2014; Croxton, 2014). According to Gómez et al. (2016) and Kurucay and Inan (2017), faculty and student satisfaction, learning effectiveness, access, and institutional cost-efficiency, all influence to learning quality. In a previous study conducted by Rienties & Toetenel in 2016, it was concluded that there is no substantial difference between traditional and digital learning if the digital class was well designed. However, other studies found that students and instructors were more satisfied with traditional learning (Fishman et al., 2013). Measurement of student satisfaction in digital learning, according to other studies, is an important part of effectively fostering educational processes for HEIs, instructors, and students (Latip et al., 2020; Cheon et al., 2020).

The faculty, interactions and the technology are the three main factors that influence student and instructor's satisfaction with digital learning (Kurucay & Inan, 2017; Bolliger, 2004) as well as the students, their instructors and the institution (Bolliger, 2009). There is a relation between the satisfaction of the students and the faculty satisfaction with respect to technology. Since the student satisfaction is influenced by the interaction and technology, this requires extra efforts from instructors in order to engage the attendees of the digital class. In addition, the course instructors must possess proper techno-pedagogical abilities (Yildiz, 2018).

The International Association of Universities conducted a survey in 2020 to determine the impact of COVID-19 on HEIs on a global scale. Findings of the study revealed that COIVD-19 had an impact on all of the participating institutes' activities. The findings also revealed that there is a negative impact on quality of activities and inequity in educational chances (Mahyoob, 2020).

2.6 Quality Through Accreditation

Accreditation is the best and most appropriate evaluation method for HEIs. Although it is the oldest of all the methods, it has offered the most relevant information for quality throughout history (Cura & Ahmed Alani, 2018). Although the processes for obtaining degree-granting authority and accreditation processes differ from country to another, accreditation serves a dual purpose. The first purpose is that it should serve the public purpose as there is a requirement to protect public interests. The reason for this is due to the fact that the business sector is a very complex sector and uses the public funds to pay institutions and students. Also, the society has the full right to make sure that the public spending is effectively employed in terms of assuring that qualifications that graduates possess reflect appropriate quality. Further, the

society has the right to know the level of qualification comparability across higher educational institutions. With respect to the second purpose, accreditation serves the interest of the higher educational institution itself. This occurs by providing support in pursuing continuous improvement and by reduction of costs related to inter-institutional collaboration (Page et al., 2017).

In the Arab region, Business schools are requiring AACSB accreditation as achieving the accreditation status from this body has many benefits. The AACSB accreditation's most tangible benefit is driven by changes in the internal operations that provide guidance to the higher educational institutions to comply with the standards in place. Although accreditation by AACSB is of high importance, there has been little written in this regard and the challenges facing the business schools in meeting the standards in relation to outcomes of the assessment in the Arab region (Al-Khalifa, 2016).

2.7 Quality of Education and Accreditation in the Kingdom of Bahrain

2.7.1 The Case of University of Bahrain

Meeting the assurance of learning (AoL) standard is the most challenging task for higher educational institutions that seek initial accreditation by international bodies due to the absence of the assessment culture. The College of Business in the University of Bahrain mainly relies on formative assessment comprising of establishment program goals and objectives, choosing instruments (e.g., oral presentation, essays, and test), assembly and examination of data, and using the results to enhance student learning outcomes in the University academic programs (Al-Khalifa, 2016). In addition to aforementioned assessments, the researcher recommends the college of business to rely on major field tests. These field tests will enhance the Aol process as it assesses the student mastery of the course and performance skills. Also, the tests will provide data for comparison uses for undergraduate level. Another recommendation by Al-Khalifa (2016) is that MBA dissertations must be taken into consideration as it will provide summative data to the College of Business that will result in improvement in student's learning in the Business programmes. Improvement in the quality of results would be achieved through continuous review of the AoL process and by supporting pedagogic research on outcomes assessment. This can be achieved by dedication of HEIs through commitment of their leaders. Leaders have a big influence to increase interest in the assessment and organizational change that is required to enhance quality and continuous improvement. However, the level of commitment of the leaders depends on the type of leadership exercised is crucial. This is due to the leader's perception of quality and the ultimate goal behind their pursuit for achieving the AACSB accreditation status. These are considered.

2.7.2 Implementation of Six Sigma Approach in Improving the Quality of HEIs in Bahrain

Currently, one of the main challenges in education curriculum is quality in higher education. There is an increased demand by the stakeholders and the growing competitive environment for enhanced quality. In the field of business, Six Sigma has been successfully applied to improve products and services. However, this concept has not yet been applied to improve quality of higher education. Bumjaid and Malik (2020) defined the Six Sigma as a process that enhances quality by gathering data; examine possible variations in order to improve the certainty in business HEIs. This process incorporates measure, analysis, improvements and controls (DMAIC) as they are considered the key factors in the Six Sigma process. For that reason, the Six Sigma process highly emphasizes the aforementioned values as they play an important role for a project to achieve high returns and benefits. To elaborate, the Six Sigma establishes a supportive internal change that is initiated by the support from administrations within the organization.

Bumjaid and Malik (2020) explained in their research paper conducted in the Kingdom of Bahrain that by the application of the Six Sigma principle will ensure continuous improvement, reduction of wastes, and improvement of the missions of international accreditation agencies and HEIs. Based on their questionnaire prepared by Bumjaid and Malik (2020), respondents composed of higher education faculty members responded that the majority of institutions in Bahrain use the Six Sigma model to improve quality of the education as it will facilitate the communication process of the quality objectives to the staff. The authors emphasize on the importance of communicating the quality objectives and the methods of achieving it are crucial to institutions. The authors recommend that maintaining a proper communication policy within the organization is essential to be digested by all stakeholders.

2.8 Accreditation in HEIs

Accreditation of HEIs has existed in one form or another for over a century (Page et al., 2017). In the United States, the term accreditation refers to the process of improving and affirming the quality of education and support provided for programs offered by HEI (Cura & Ahmed Alani, 2018). There are now a number of accreditation bodies operating globally that have been successful in improving the quality of education in HEIs and programs. According to Sun & Lee (2020) that being accredited from professional bodies offers major recognition to the HEIs and/or programmes for effectively assuring the learning process. This comprises identifying learning outcomes, appropriate teaching and learning methods, evaluation settings, and finally performance analysis of the courses and programs' continual improvement and quality enhancement.

The process of accreditation is defined as the process of evaluation of HEI and their programs in terms of educational quality. Also, this includes a measurement of how the services provided by HEI serve the students and the society. Once a higher educational institute meets the standards set, the institute will be granted "Accredit status" (Cura & Ahmed Alani, 2018).

As explained by Cura and Alani (2018) that of business schools view the accreditation process as follows:

- (1) A tool that brings in institutional change by providing an unbiased evaluation of the strengths, weaknesses and opportunities.
- (2) According to Cornuel (2007), business school accreditation is viewed as a determinant of future success. This is due to the fact that accreditation would provide international recognition and will boost students' trust in the HEI's activities and services.

The main accreditation bodies for business schools are the AACSB and the EFMD. Both bodies evaluate the HEI as a whole, taking into account the resources, faculty, and programs provided (Cura & Ahmed Alani, 2018).

With respect to the types of accreditations a higher educational institute can achieve, there are two types. The first type is known as "Institutional accreditation", this type is granted by the AACSB and EFMD Quality Improvement System (EQUIS). The other type is an evaluation of the HEI as a whole. This accreditation is performed by regional or international bodies such as EFMD Program Accreditation system (EPAS) and the Association of MBAs (AMBA).

The AACSB approach is designed to measure and improve learning outcomes, and it is updated on a regular basis to reflect the current business environment. External peer review is adopted in the accreditation process to ensure that basic requirements are met.; yet, because the reviewers are academics, it's possible that they have their own opinions and beliefs about the process. Furthermore, if a certain set of views is widely held within the AACSB, changing the method or interpreting of the process outcomes may be challenging (Dumond & Johnson, 2013).

In a research paper conducted by Cura and Alani (2018), the results show that international accreditation bodies encourage business schools to hold themselves accountable to enhance the quality of education by scholarly education and intellectual contributions. For a business school to be accredited, international accreditation bodies have put in place specific standards, self-evaluation process and consultation services. The authors also found out that there are positive effects of accreditation on the students, their instructors as well as the public.

2.9 Challenges Faced During Digital Learning in Terms of Quality Assurance

There are many challenges accompanied with shifting from traditional education to digital. These include access issues, internet connectivity issues, applications not supported by digital technology such as lab-based courses (Martin, & Furiv, 2020). In addition to the aforementioned challenges, quality challenges also arise in this regard.

Students and instructors of Arabian universities have defined challenges in achieving quality in digital learning as factors that prevent attaining quality in the educational learning process with respect to digital learning during COVID-19 (Mahyoob, 2020). Although digital learning is common in many countries, findings from an international survey conducted by the International Institute for Educational Planning at the UNESCO indicates that 78% of UNESCO member states have already in place flexible modes of courses even before COVID-19 even if the quality of delivery was not a major issue to many countries (Martin, & Furiv, 2020). However, the evaluation of students' learning outcomes acquired through digital learning has been challenging for quality assurance and accreditation bodies. Thus, it is expected that these will now vanish under the current circumstances.

In order to overcome those challenges related to the quality of digital learning, relying on other countries' best practices is crucial. The Accreditation Organization of the Netherlands and Flanders (NVAO) has released guidance in the form of a memorandum on digital and blended learning. This guidance includes the formal recognition of Massive Open Online Course (MOOCs) by HEIs. Another example comes from the U.S. Department of Education (USDE), where guidance has been issued to provide both HEIs and accreditation bodies with flexibility regarding accreditation visits and for digital learning.

Since COVID-19 affected the educational process, therefore, the process of academic accreditation has been affected. As a result, the management of the accreditation process has changed. Abdelhadi (2020) came up with a proposal to amend the accreditation process in order for it to be more effective during COVID-19 pandemic. These amendments include measures preceding the proposal set that include technological and human resources as well as reformulating elements of the curriculums and the evaluation processes.

3 Conclusion

In accordance with the methodology adopted for the purposes of this research paper to find the impact of digitizing business education during the pandemic and the moderating role of international accreditation bodies, it was found out that digitizing business education during the pandemic had an impact on the quality of education, as LMS, evaluation and interaction influence the quality. Another finding is that international accreditation bodies have an impact on maintaining the quality of education to its levels pre-pandemic. However, future research need to be conducted as this study is limited to the Kingdom of Bahrain. Additionally, the future research should cover designing the pedagogy post-pandemic is essential.

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The Role of Artificial Intelligence in Knowledge Management



Jaafar Alghanemi and Muneer Al Mubarak

Abstract Until the introduction of artificial intelligence, knowledge in organizations was a unique ability of humans. Since the revolutionary development of AI, the impact of data system and businesses developed significantly, such as collecting, storing, processing, maintaining, transmitting, and making content accessible. Humans are no longer the sole sources of knowledge. Artificial intelligence is becoming a key element in knowledge generation processes in enterprises. The purpose of this research paper is to investigate how knowledge practices can benefit from AI technology and understand the role of applying artificial intelligence in terms of knowledge processes in businesses, based on a review of scientific literature. The outcomes can operate as a platform for future studies on the fundamental effect of applying artificial intelligence in knowledge innovation process on employees and businesses.

Keywords Artificial intelligence \cdot Knowledge management \cdot Processes \cdot Information system

1 Introduction

1.1 Overview

O'Brein (2003) discussed that artificial intelligence is an innovative technology that has powered the world's technological revolution. The artificial intelligence sector has grown at an unusual rate as a result of greater adoption of new technology breakthroughs and is currently being employed in a range of industries. Today,

J. Alghanemi

M. Al Mubarak (⊠) Ahlia University, Manama, Bahrain e-mail: malmubarak@ahlia.edu.bh

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George Washington University, 800 21st St NW, Washington, DC 20052, USA

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innovations and inventions appear to be the key drivers of a higher standard of living in the modern world, and businesses appear to be significantly involved in this approach, they are neither isolated nor exempt. Artificial intelligence (AI) is an area of science and technology whose goal is to build machines that can understand, perceive, listen, move, communicate, and, surprisingly, feel as human. Currently, organizations recognize the role of Artificial Intelligence in ensuring the plans for the coming years, this can help the economy to achieve a competitive advantage. According to Microsoft's research (2019), above 50% of the organizations in the United Kingdom have adopted some form of such technology, with an increase of eleven percent to computer science, nine percent to automating data, seven percent in speech identification, and six percent in digital assistants when compared to data from previous year (Microsoft, 2019).

This research is discussing the effect of Artificial Intelligence on Knowledge Management. The knowledge management is no exception of global advancement in the digital era. Knowledge management boosts the efficiency of an organization's decision-making ability, that is why it's important. KM is the procedure of developing, distribution, utilizing, in addition to controlling the organizational knowledge and data. Most multinational businesses, government agencies, and non-profit organizations devote resources to internalize knowledge management, which are also part of their corporate planning, IT, or HR management departments. These organizations receive KM advice from a variety of consulting firms.

Accumulating knowledge, storing knowledge, and sharing knowledge are the organizational enablers for creating learning loop between employees. One of the most known applications for knowledge management is artificial intelligence. Artificial intelligence has become somewhat necessary for organizations today. Because it helps organizations to quickly respond and move forward toward achieving efficiency and gaining competitive advantage. Quite a few advocates state that artificial intelligence is not an essential part of knowledge management, it can stand on its own without the help of technology. Technology has changed today's culture and society because in today's time, information is accessible for everybody, everywhere through the internet. This has changed the mindsets of today's society in the aspect of how to look for information, how to read it, how to share it, and how to store it. This change has forced organizations into adapting new technologies to store, share, learn, and create new knowledge in a very short period. This research clarifies the relationship between the two concepts in order to have a closer look on the applications of KM and AI.

1.2 The Research Problem

Several businesses have incorporated technology into their daily operation. The use of technologies seems to have influenced the way business is conducted over time, to the point where enterprises are attributing the value and significance of artificial intelligence in the achievement of their operations and job delivery. Several scholars

have empirically studied the impact of artificial intelligence on company success (Wisskirchen et al., 2017). Previous research has concentrated on varying results, with economic success factors serving as the outcome variables. Furthermore, because artificial intelligence is a relatively new area, the literature on the subject is likely to be scarce. As a result, a gap must be addressed that thoroughly investigates the importance of adopting artificial intelligence technologies in the business.

1.3 The Purpose of the Study

The main purpose of this research paper is to analyze the adaptation of Artificial Intelligence technology in knowledge management. This research provides an indepth overview of the use of AI approaches in artificial intelligence.

1.4 Definition of Terms

AI: Artificial Intelligence may be expressed as a field of processing practical information that replicates individual problem analytics procedures besides transferring those procedures using a computerized system to provide not only effective but also innovative solution besides new courses of action. As a result, it can be concluded that AI is a computer software that can operate on any device or data center and interact with its environment (Paschek et al., 2017). According to Broussard (2018), artificial intelligence can be defined in several ways, however the main 2 primary forms of AI that can be recognized are:

General AI: a computerized technique which could think and act by itself without being supervised. The general artificial intelligence type is still not being invented.

Narrow AI: a sort of AI in which the computer package is quite complicated, algorithm approaches are used to discover configurations in the data point, it is also identified by "machine learning."

KM: for more than 30 years, knowledge management has been a crucial field that describes how information can be created, progressed, reserved, also, utilized in the boarders of an organization or a state, and it permits development, and allow innovation (Soto-Acosta et al., 2015). According to Wren (2000) knowledge management is about coordinating and utilizing the knowledge within an organization's resources to provide advantage plus competitiveness.

Tacit Knowledge: the knowledge that exists in a person's head and is commonly difficult to put into words and adequately explain (Mohapatra et al., 2016).

Explicit Knowledge: is documented and represented as tangible artifacts, which are available in digital and paper media (Mohapatra et al., 2016).

1.5 Contributions

This study explains the relationship between AI and KM to understand how those two concepts when adopted and integrated in the daily tasks can benefit organizations.

2 Literature Review

2.1 Overview

The primary purpose of this chapter is to understand and explore the previous studies. This has been performed out in the area of knowledge management and artificial intelligence. There are many published studies that look at the connection between AI and KM. This section reviews the meaning of both terms and understand the integration between them. Although there are significant body of literature on how artificial intelligence is applied in knowledge management in organizations, it was found that there were no studies focusing at the two terms independently, ignoring the high connection between them.

2.2 Artificial Intelligence

The above listed connections concerning humans and high-tech techniques were changed by the remarkable development of AI. Alan Turing, a researcher, changed history in 1950 by introducing uncomplicated though demanding query: "Can machines think?" research under the title: "Computing Machinery and Intelligence", Turing experiment that followed identified artificial intelligence's primary mission and vision (Moor, 2003). According to Jovanovic (2020), Artificial Intelligence concept usually applicable to task related, constructing procedures equipped with brain intelligent methods, for example discern sense, to make it general, or acquire lessons in regard to the past. In its simplest form, the inclusion of knowledge into computers to provide the power of executing tasks that would normally need individual thinking is known to as artificial intelligence.

Furthermore, Artificial Intelligence is a technology for effectively utilizing data in order to provide knowledge to the humans who is providing the data. Ghosh et al. (2018). Considering is the primary characteristic of intelligence, therefore the usage of this verb to describe the processes of a computer came as quite a surprise. Many people objected to the concept of intelligent computer machines being introduced. Lady Lovelace, a very popular philosopher and author, made a famous objection asserting that computers cannot invent, achieve something from the base line, and in that regards humans will never be surprised (Bringsjord et al., 2001). Jovanovic (2020) indicated that AI research has already concentrated on individual's intellect such as to learn, to give reason and to solve problems, conflict resolution, observation, and languages used (Jovanovic, 2020). Akerkar et al. (2018) makes a similar point, claiming that AI provides all tools for computers to gather information and understand from large number of data, as well as the ability to simulate environment behavior in addition to standard intelligent models and algorithms.

According to Mata et al. (2018) the potential applications of artificial intelligence in various areas such as enormous, and recent advancements cover hardware as well as software technologies which contributed in improving the capabilities of artificial intelligence algorithms. The innovative capability, of developing and generating knowledge, is not explicitly acknowledged through the AI meanings. Beginning with a technological standpoint, Artificial Intelligence could be defined as a system that executes method of tracking based on procedures (Kusunose et al., 2019). Artificial intelligence is used in a variety of fields, including optical communication, network, coding, transport systems, and health sciences, to mention a few. Artificial intelligence systems employ a variety of complicated algorithms that communicate at fast speeds and are supposed to make superior decisions.

Aleksander (2004) contend that when addressing cognitive computational modeling, the language of cognitive sciences is frequently misapplied. Specifically, the term "information" has been incorrectly applied to operations that are performed by both humans and machine, meaning that they do identical tasks in the same ways. The discussed capability is viewed as artificial intelligence ability that collect knowledge and information based on many foundations, procedures related to data that is adopted by preset guidelines and obtained knowledge which is then applied in various ways and different settings. Artificial intelligence is not primarily intended to recognize patterns, but also to gain new knowledge in order to identify proper solution based on the situation (Shekhar, 2019).

According to Haenlein and Kaplan (2019), Artificial Intelligence defined as a system and its capability to effectively adapt from certain inputs and affect this knowledge to achieve certain goals and activities. In addition, at same journal, the researcher proposed two strategies to classify AI, the first is based on AI's developmental periods, while the other is based on the intelligence style demonstrated by an Artificial intelligence system. AI can be classified into three sorts based on evolutionary stages: artificial narrow intelligence, general intelligence, and superintelligence. The intelligence of an AI system can also be logical, affective, or relational intelligence. Thus, based on the nature of their intelligence, AI systems are classified as analytic, sentient, or human looking AI, while Kumar et al. (2019), described artificial intelligence as a platform for unlimited potential and information that could be limited to customized approach. Furthermore, Jarrahi (2018) defined the term as a collection of tools, techniques, and methods used inside an organizational setting to benefit the company and its stakeholders.

2.3 AI in Our Daily Life

Many if not all of us use AI regularly in our daily life without paying attention to its related concept. Some examples are:

- Face/fingerprint recognition
- Chatbots
- Social Media.
- Cloud computing.
- E-payments, (In Bahrain we have the famous BenefitPay application).
- Digital assistance (like Siri in apple devices).

Bhbosale et al. (2020) indicated that AI is integrated in the daily tasks of individuals, and more effectively on organizational level, following are the advantages of AI, including but not limited to:

- Human Error reduction: AI processes are derived from predetermined input of information; therefore, errors are reduced to the minimum level.
- Making repetitive work done faster: repetitive work is time consuming in the daily working life such as sending confirmation, sending reminders, and many other, automation options available in the AI systems contributed to enhancing the processing time.
- **Creative inventions**: with the AI capabilities, human can solve many extremely complicated problems in a creative and innovative way. For example, robots will have the ability to perform Microsurgery procedures.
- **Tireless, selfless and with no breaks**: unlike human, machines don't need rest or breaks. They are intended to work 24/7. No conflicts are raised between machines which may cause distraction.

On the other hand, we can list few limitations of the AI as follows:

- Unexpected outcomes: AI technologies require a manual outcome of steps and solutions. The solutions should be predetermined. AI works at the know-what level and cannot work on the know-why level. This is the reason behind AI technologies cannot innovate the way a task is performed.
- Human replacement/unemployment: As AI technologies are advancing more every day, they could eventually lead to replace employees in the industry. Human involvement is becoming less especially in performing repetitive tasks.
- AI do not have the power on the existing knowledge: AI needs the data in order to perform the tasks, it is intended to complete; it does not have the ability to leverage knowledge gathered from different sources to create new know how in regard to the tasks being performed.
- Absence of out of the box thinking: machines will execute predesigned and programmed to do. Anything out of the prespecified systems, an error message will appear to the users of things will stop.

• **High cost**: AI applications and systems can be costly when adapting for the first time in the organizations, although it can lead to bigger benefits when integrated in the system.

2.4 Knowledge Management

Knowledge Management (KM) refers to the procedure that entitles the capture, distribution, in addition to, using knowledge efficiently. This definition can be described as classic one-line description of knowledge management created by Davenport et al. (1996). The practice of developing value from an organization's intangible assets is known as knowledge management (Liebowitz & Beckman, 1998). It is focused with how to effectively exploit information both internally within the firm as well as outside customers and stakeholders. As a result, knowledge management incorporates principles from a variety of areas, such as organizational behavior, human resource management, artificial intelligence, information technology, and so on. The emphasis is on how to best share knowledge in order to create value-added benefits for the organization.

The Gartner Group established another definition of KM, which became the most widely referenced (Duhon, 1998) where knowledge management is seen as a practice to encourage an integrated approach to finding, acquiring, reviewing, retrieving, and sharing all of firm's information. Databases, records, regulations, procedures, and previously untapped expertise and experience in individual workers are examples of these assets. An enterprise will become more profitable and cost-effective when it can easily access, exchange, and update business information. The capability for a reliable knowledge management system and having the access to the right knowledge at the right time informs accurate decision-making and encourages collaboration and creativity.

According to Ngai and Chan (2005), knowledge management is a set of operations that allows businesses to produce, gather, store, retain, and share knowledge within the organization. There might be a misconception of knowledge and information meaning. Information is organized data while knowledge is the ability to act. So basically, the cycle starts with data which is scattered figures, and it will turn into information once it's organized, then it will be knowledge once we get to do actions with the amount of information we have, which eventually will turn into experience. Individuals within organizations who have developed a solid understanding of the company's knowledge, similar to the acquisition of knowledge from corporations, can increase their abilities, resulting to the provision of more value to the organization (Tsang & Zahra, 2008).

2.5 Knowledge Management Types

Three main types of knowledge management can be outlined which are explicit, implicit, and tacit (Dalkir, 2005)

- **Explicit**: systematic and structured information in a written format. FAQs, directions, actual data and relevant material, diagrams, and strategy presentation decks are some examples.
- **Implicit**: is learned skill from the explicit knowledge. For example, using label by Ikea to assemble a cupboard is an "explicit knowledge" while assembling it is considered as implicit knowledge.
- **Tacit**: is informal and gained by time and experience. It is also intangible information that can be difficult to describe in a clear way.

2.6 Knowledge Management Cycle/Model

Knowledge management cycle is the process of transforming information into knowledge by capturing, processing and distribution through the organization. Knowledge management Model is different from one organization to another, each is tailored to the organization's need. However, it all consists of four parts: Information capture, Storage, Customization, and use. Some of the KMM (Fig. 1):

- Choo
- Nonaka and Takeuchi
- Boisot
- Beer and Bennet & Bennet
- EFQM—European Foundation for Quality Model
- Inukshuk Model

Fig. 1 An example for Nonaka et al. (1996)		Tacit knowledge	Tacit knowledge	
	Tacit knowledge	Socialization	Externalization	Explicit knowledge
	Tacit knowledge	Internalization	Combination	Explicit knowledge
		Explicit knowledge	Explicit knowledge	, _

2.7 AI and KM Relationship

Knowledge is the key to both knowledge management and artificial intelligence, AI is a powerful tool that supports knowledge in all aspects, this collaboration supports the KM process with all the advancement and innovation in the technology being integrated by AI. Thus, the effectiveness of AI can provide to the organizations will serve as an accessibility tool for their needs. The benefits and downsides of knowledge management and artificial intelligence could be understood solely through scientific theory, knowledge principles, and procedures. Power relations are essential for understanding the AI and KM interaction since individuals constantly debate identities, rules, and destiny while utilizing AI and KM to support domination or oppositional projects (Courpasson et al., 2012).

There are several research studies investigated have been conducted in artificial intelligence and knowledge management, but there seems to be little studies about how KM and AI may be incorporated to assist a business. According to Birzniece (2011), "no survey describing the usage of artificial intelligence capabilities in knowledge management tasks has been done since the early 2000s." However, Yigitcanlar et al. (2020) found that AI could enhance productivity to automate the information management process and eliminating the need for intermediaries, hence enhancing profitability. Furthermore, AI has the potential to enhance network connectivity by increasing the reliability and efficacy of the Internet of Things. As a result, knowledge management and development are increased.

Knowledge management has an objective with the AI interface in that it utilized cognitive innovation that increase efficiency related to communities in addition to individuals, moreover, the AI innovation is essential for the effective KM (Smith & Farquhar, 2000). AI has become an essential part, although unsuccessful and unplanned application of AI can lead to lower the competitiveness of any organization by slowing down the learning cycle, and that's why organizations will always be in need to adopt an approach of managing AI putting into consideration the strengths and weaknesses of the concept. Mainly there are two concepts regarding AI in the management field which are augmentation and automation. Enhancement exists when people work closely with machines to complete a task (Davenport, 1998), whereas automation comes when machines take across a human task. Artificial intelligence can help making advanced as well as quicker decision through leveraging the significance of the organizational information by shifting to enhanced algorithms (Akerkar et al., 2018). From managerial perspective the two concepts cannot be separated from each other in regard to the benefits they both deliver to the management in any organization. Automation allows organizations to save money, create simpler processes, and provide improved data rationale and accuracy. while augmentation advantages from the manual enhancement of human-artificial skills.

Information management is critical because it improves the productivity of an organization's decision-making capacity. It ensures that all workers have access to the overall knowledge held within the organization, a smarter workforce is built who has the ability to make fast, educated decisions that benefit the company. Today,

knowledge is seen as a strategic requirement, and the prevalent paradigm sees knowledge as a source of power. In today's economy, information has become a more valuable resource than property, labor, and capital (Kumar and Anwarul, 2014) Any system that achieves storage of the information is a knowledge management system. Some are commercially available such as Customer Relationship Manager System which helps any employee in the company to communicate with the customer and Application Tracking System which is a system for HR recruitment. Technology is considered one of the most KM enablers. It contributes to the success of the KM process in the organization, and Artificial intelligence has been introduced in the field.

Artificial intelligence has been a very interesting topic in recent years, because of all the capabilities that can be brought by AI technologies on organizational level. The main objective of AI is to allow machines to accomplish tasks that would typically need human intelligence, and AI will eventually turn to take over many occupations that were previously undertaken by people. Machines executing cognitive functions normally involved in human minds, such as learning, communicating, and solving problems, are referred to as AI. According to (Jahoda, 1989), There is a lack of technological understanding which should be addressed in order to comprehend the interaction among its function and realities. While Soni et al. (2019) mentioned that over the last few years, artificial intelligence has attracted attention from a variety of sectors, including scientists, vehicle manufacturers, and household appliances.

In our reading to identify the relationship between the two concepts, we noticed that some journals mentioned that there are not enough researcher's talks about this relationship or proof that there is a connection of Km and AI. AI has the capability to enhance a specific company's automation data handling and eliminating the use of any intermediates (Diao et al., 2009) have shown how AI must be integrated with km in order for knowledge to be accurate, promptly developed, and appropriate. Because while KM gives the power and meaning to knowledge to occur, AI provides the ability to create and organize the knowledge in a more efficient and effective ways to the organizations. The connection between the two concepts has provide a guide for cognitive computing. Cognitive computing simulates human thought processes using computational models. Identity learning convolutional neural network software that uses message mining, analytical thinking, and natural language processing to replicate the way the human brain functions is used in cognitive computing. Machine learning is creating the path for future AI and KM technologies.

Data bases will be an important foundation backed by KM for organizations to produce a better solution for km system for automation with AI in the digital era so that firstly, knowledge management focuses on information as such an actual resource, as well as the importance of maintaining critical skills and understanding from being lost or copied, secondly, it helps businesses to learn from prior failures and triumphs, which increases the business's innovation capabilities; and lastly, it improves the utilization of existing collective knowledge by re-doing (Chadha, 2021). By producing and applying new knowledge of consumer behaviours and expectations, AI may significantly improve customer relationships. AI is used to map potential solutions related to earlier dialogues which will enhance natural searching

performance, in such for marketers to customize information distribution for every individual, in overall to adjust the customers' requirements according to previous performances. AI identifies different insights about archetypes in data, enabling successful consumer segmentation and servicing (Akerkar et al., 2018).

Enhancing operational business management when used to facilitate or improve management function, AI identity models enable firms to quickly adapt to the technological advancement that could change information internally and externally, as well as commercial situations. By utilizing effective and efficient organizational information model, AIs can help businesses and organizations make better, quicker decisions. AI innovative contribution of launching various markets and the development of basic data through the emergence of new existing information and the full usage of knowledge assets Accelerating learning in two ways is one means of speeding up creation. For starters, faster processing of vast volumes of newly available data yields results that are presented to employees as the platform for fresh insights into how activities might be done. Second, AI may be used to speed up product development by utilizing machine learning in modelling and court hearing virtual experiments (Akerkar et al., 2018).

All the above examples of AI's recognized the impact on knowledge management which are evidence that artificial intelligence has already made a significant contribution to the excellence and effectiveness of KM in terms of thinking and problem-solving methods, but also through knowledge acquisition, modelling and processing, decision support systems, intelligent tutors, planning, scheduling, and optimization systems (Mercier-Laurent, 2017).

2.8 Scope of the Research

This research paper focuses on defining the meaning of the main terms related to research which are Artificial Intelligence and Knowledge Management, finding the link between the two terms, and list some of uses in addition to advantages and disadvantages of applying artificial intelligence in knowledge capturing in the business. This research adopted a qualitative research method by revising the related literature that has been done in this field to gain better understanding and help future researchers to get an overview of the studied concepts.

3 Conclusion

As we have explained though this research paper, well planned KM approach can create a competitive advantage for the organization, in which Artificial Intelligence serves as a support tool for this approach. Through the literature both Concepts were defined, Artificial Intelligence and Knowledge Management. Several definitions were illustrated, in which AI concept usually applicable to task related to constructing

procedures equipped with brain intelligent methods, while Knowledge Management in simplest form refers to the procedure that entitles the capture, distribution, in addition to, using knowledge efficiently. The literature well identifies the relationship between AI and KM, in which it is associated with how humans use and design technology. The extent to which different types of tacit and explicit knowledge could be developed and acquired disseminated, and applied should be recognized as a limitation of both AI and KM. Until recently, there is no AI application that can "learn" tacit knowledge embedded in the social environment, AI tools serve and support KM if it is dealing with Explicit knowledge.

Furthermore, Artificial Intelligence in our daily life was discussed, which outlines how this technology is shaping the future of life. AI is playing major role in managing our habits and experiences, in which businesses can benefit from these great opportunities, not only in learning the customers' preferences, but also managing the knowledge within the organization. As studied in regards of Nonaka and Takeuchi model that knowledge is created through dynamic process, in which making personal knowledge available to others in the organization is the core and it is a continuous interaction between the tacit and explicit knowledge to generate new knowledge. while AI applications and machines process the explicit knowledge regardless of how it is codified, because those machines and applications do not have the ability to learn tacit knowledge. The use of AI to create knowledge in the organization does not intend to the replacement of individual, however, in order to assist them and the organizations in creating opportunities to reach maximum efficiency. AI enhance knowledge to find the best solution at the right moment for the right person. AI technology is predicted to provide an entirely innovative baseline for organizational performance, strategic edge, which eventually will lead to business success. Adding AI to the KM process of the organization can add a huge value to its core functions. Following are the key benefits of adding AI to the KM in the organization:

The main four practices of KM are capturing, maintaining knowledge, discovering, and sharing. Many tools were developed recently to simplify capturing and sharing knowledge which eventually created another issue by making enormous amount of data and information available and shareable which has led to difficulty of discovering knowledge. AI provides solutions to this challenge by simplifying knowledge discovery using modern technology by utilizing new technology such as information searching system which cover Semantic search and intelligent systems. Conceptual search and intelligence are used to reduce the requirement for Basic searches, complicated hierarchy, and comprehensive categorization. Alternatively, AI enables employees to communicate using natural language. to search the knowledge store. Then, upon that search results, alternatives, and implicit contexts, it makes inferences and returns results. while Machine learning tracks both keyword and forecasting what people are searching for based on user activity at the time. The system learning procedure analyzes what staff data was searched for and predicts what material they're looking for based upon which content satisfied previous colleagues who had comparable searches. In other words, AI adds automatic search capacity to the knowledge and expertise, enabling for staff to get the knowledge they require right away.

The literature also outlined the advantages of AI technologies which states that AI connects data from different sources employees, because working in different departments use different KM tools to share the knowledge across the same organization. For example: HR uses secured intranet portal, and sales team uses customer relation manager tool to manage their knowledge. In that context AI tools help organizations to combine and connect the available knowledge across multiple systems. AI ability to quickly search through huge amount of data within a storage system and capability of anticipating what the researchers are looking for, gives it the power to solve such complicated Knowledge issues. Furthermore, AI keeps the organization's knowledge content updated through machine learning technology which contribute to helping the employees to find more relevant data based on the most updated stored knowledge on the system. For example, employees may be asked if the data provided is correct by asking questions like: "does that help" or "did you find what you are looking for?" such questions help to notify the knowledge team about irrelevant or outdated data that needs to be updated. Furthermore, managers and employees will have the ability to set a reminder to update the knowledge base of the organization.

Finally, in order to understand and the successful relationship between KM and AI, organizations should define their unique and specific needs of knowledge, because while KM supports the occurrence of the knowledge, AI have the capability to use and create this knowledge in a very advanced and efficient way.

3.1 Implications

Knowledge management process is very critical for the success of the business which eventually lead as discussed in the literature to gain competitive advantage. Knowledge management would be very useful when integrated with Natural language algorithm and machine learning related to Artificial Intelligence technology. This can support the business operations and minimize costs. Public sector is advised to adopt this technology, to reduce the time needed in allocating and capturing data of the services that are provided to customers.

3.2 Limitations and Suggestions for Future Research

Although this research paper achieved the intended goal of understanding the relation between Artificial Intelligence and Knowledge Management, some limitations can be recorded here such as time constraints, study model and filed research. These can be considered in the future research.

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Knowledge and Perceptions of the COVID-19 Pandemic in the Kingdom of Bahrain: A Descriptive Study



Mukhtar Al-Hashimi, Noor Alsayed, Maryam Husain Almahdi, and Faisal Al-Showaikh

Abstract This study aims to explore the public's knowledge and perceptions towards COVID-19 and its preventive measures in the Kingdom of Bahrain. This is in order to aid the authorities in improving information dissemination and help control the spread of the virus and in time eliminate it. Data was collected from 613 Bahrain residents who were asked to complete online survey questions about their perceptions, knowledge, and thoughts toward the virus. The dataset was then analyzed using SPSS 23. Based on the analysis, several interesting findings were uncovered. For example, while about 70% of the respondents said they trusted the governments' reaction to contain the coronavirus and showed knowledge about COVID-19 measures undertaken in the government, nearly 32% of the respondents thought that the virus is a part of an international conspiracy. Our results show the persistent fragmented opinions of the public toward the pandemic, which calls for additional education and health communication efforts directed toward them in order to combat misinformation and succeed in the battle to fight the pandemic.

Keywords COVID-19 · Perceptions · Knowledge · Conspiracy theory · Bahrain

1 Introduction

On 30 January 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a public health emergency of international concern (WHO, 2021). The virus was first identified in Wuhan City, Hubei Province and initially reported to WHO on December 31, 2020. WHO declared the COVID-19 outbreak as a global health emergency on January 30, 2020 and as a global pandemic come March 11, 2020 (Gallegos, 2020; Wee et al., 2020). It is well known that this disease is caused by SARS-CoV-2 virus which is a member of Coronavirus family. COVID-19 causes respiratory infections that may escalate to severe effects. The main transmission routes of the SARS-CoV-2 virus are through coughing, sneezing, contacting infected people, or

M. Al-Hashimi · N. Alsayed · M. H. Almahdi (⊠) · F. Al-Showaikh Ahlia University, Manama, Kingdom of Bahrain e-mail: malmahdi@ahlia.edu.bh

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touching items or surfaces that are contaminated with fecal traces (Gallegos, 2020). The severity of the virus lies in its spreading speed throughout the world to becomes an epidemic. The WHO encourages everybody to take responsibility and adopt protective behaviors (Wee et al., 2020). These measures include preventive measures (such as social distancing, hand hygiene, and wearing face masks), avoidance measures (such as home isolation and quarantine and travel restriction), and illness management measures (such as medical consultation, testing, and infection control) (WHO, 2022).

As of February 2022, the Coronavirus or COVID-19 pandemic has infected more than 386 Million people around the globe with an estimated death toll of 5.76 Million (WHO, 2022). The pandemic is continuously showing its negative impact on the world economy, businesses as well as in social interaction. It has brought unparalleled stress on the world's health care system and other public services (Kauzya, 2020). In the past year, various measures had been carried out by different countries to manage the spread as well as combat the virus. Forceful measures such as lockdowns, social distancing, contact tracing, work from home orders, closure of non-essential services and businesses, health and safety protocols were carried out.

Many researchers have conducted studies to identify the actual knowledge, awareness, and perception of people to control the spread of COVID-19. The behavior of the people towards the virus is important, and human behavior is affected by knowledge, perception, and awareness (Mirza et al., 2020). Several studies showed a direct correlation between knowledge of COVID-19 disease with the compliance of the public to the governmental measures mandated to contain its spread (Kauzya, 2020; Mirza et al., 2020; Xiu, 2021). A study in the United States of America showed that individual risk perception of being contaminated by the virus affect people's protective behavior (Xiu, 2021). Similarly, another study that was conducted in ten countries across Europe, America, and Asia found that if an individual perceives that they have a higher probability of getting the virus, the higher the compliance in observing social distancing measures, wearing of mask, and staying at home (Dryhurst et al., 2020). Studies conducted in South Asia (India, Nepal and Pakistan) and the Middle East (Jordan) show that respondents generally have a good perception about the nature, cause, symptoms of COVID-19 disease (Mirza et al., 2020). However, individuals with lower level of education might require additional educational campaigns to get them oriented with the disease (Dryhurst et al., 2020). They also perceived that the elderly part of the population is more prone to experience progression of the disease (Mirza et al., 2020). Interestingly some of the research also indicated that respondents believed that the virus is a bioweapon developed by a government or anti-terrorist group and they have false perception on the treatment of the virus which is not backed up by scientific evidence (Bhatt, 2020; Mirza et al., 2020) or was engineered in the laboratory (Khabour et al., 2020).

The behavior and perception of the individuals are influenced by their environment and the trust they have in the information being given by the authorities (Lim et al., 2021). The research found out that the knowledge and awareness of the people increases while the pandemic progresses. Having information on the count of infected individuals as well as the death tolls encourages the people to observe and follow health and safety protocols such as wearing of facial masks and social distancing as set by the government. It also showed the importance of using available social platforms to disseminate information and keep the people updated. Some showed that a trust is a vital commodity when managing an evolving outbreak (Bhatt, 2020). Since public trust in health authorities matter in terms of their action and response, this trust should be always maintained so that the people adopt the required safety behaviors during crisis like this (Lim et al., 2021).

People generally showed positive perception on the efforts of the authorities on informing the public of the disease, its symptoms, transmission as well as in the prevention of contacting it (Ning et al., 2020) and the efforts of the government in mitigating the effects of the pandemic (Prakash et al., 2021). People also observed individual protective measures and regarded their government's response to the virus as reasonable and appropriate (Führer et al., 2020). Though appreciated the efforts of the authorities in using different media such as television, newspapers, radio, and social media platforms, they however showed some reservation on the information from social media since some are coming from unreliable sources (Ning et al., 2020). They also expressed the need for balance information campaign, with media having room for positive information drive and not entirely focusing of the danger and deaths being brought about by the crisis (Bhatt, 2020).

The government of The Kingdom of Bahrain has taken several measures to prevent the spread of the virus. The government has imposed the law of wearing masks anywhere in public and staying at least six feet away from others to limit the virus. In addition to that, free COVID-19 vaccines have been offered to the citizens and residents of the Kingdom of Bahrain. The government also created an app called 'Be Aware Bahrain' to inform people about the latest health developments, and to raise awareness to the virus.

Though a lot of studies showed people awareness on the current pandemic particularly of the virus, there is still quite a percentage of the population that needs to be reached out. A need to increase the knowledge, awareness, and perception of COVID-19 from responsible authorities is still important to stop its spread (Rabby et al., 2020). There is also a need in enhancing awareness of the population through information education and communication/behavior changing communication materials (Mamo et al., 2020). Additional studies could be conducted to different countries to be able to measure perception of different population, to help in understanding current level of awareness and trust on their respective policy makers to ensure stoppage of this virus and build readiness for similar occurrence in the future. Therefore, this study aims to investigate the perceptions of people on COVID-19 and its preventive measures in the Kingdom of Bahrain in order to aid the authorities in improving information dissemination to help control the spread of the virus and in time eliminate it.

2 Methods

An online survey created using Survey Monkey was distributed to a wide array of respondents who are residents of the Kingdom of Bahrain. Both convenience and snowball sampling methods were employed, as they were deemed the most appropriate for the aims of this study. 613 responses were collected during the Summer of 2021. Only those respondents who provided their consent and were 18 years old or older were allowed to participate. The questionnaire included demographic questions including age, gender, qualification, and employment status. It additionally included questions about respondents' perceptions of the COVID-19 virus, gauging levels of anxiety toward the virus, levels of knowledge about the virus, and levels of trust in virus precautions. The measurements used in this paper were developed by the researchers and validated using the input of academic experts. The data collected in this study is analyzed using SPSS 23.

3 Results

In this section the demographics statistics are outlined, followed by descriptive statistics reflecting customers' perceptions and reactions towards the pandemic as asked in the online survey. To view the full results of the statistics, refer to the appendices.

3.1 Sample Demographics

Out of the sample, 334 (54.5%) are male and 279 (45.5%) female. The majority of the respondents (91.8%) hold a Bahraini nationality and the remaining 8.2% non-Bahrainis but live in Bahrain. Most of the participants stated that they are under the age of 40 years old (60.9%), hold a bachelor's degree with (46.5%) and are employed (63%). The majority of the participants also stated that they do not have any chronic or hereditary diseases (63%). When it comes to the number of people that live in the household, the majority stated that they have at least 4 people (39.4%) living in their household.

3.2 Government's Reaction

When participants were asked whether the reaction taken by the government to the current coronavirus outbreak was appropriate, 426 (69.5%) participants said it was appropriate where 100 (16.3%) participants said it was too extreme.

3.3 Anxiety About Getting COVID-19

When participants were asked (How worried are you that someone from your family will be getting coronavirus?), 130 (21.2%) responded that they were extremely worried and 230 (37.5%) were worried. Whereas 153 (25%) were neither worried nor not worried.

3.4 Knowledge About Quarantine Period

When participants were asked (How long is the quarantine or self-imposed isolation period?), participants demonstrated a high level of knowledge of the quarantine period at the time: 428 (69.8%) participants said that it will take 14 days and 134 (21.9%) said it will take longer than 14 days. Only 51 (8.3%) participants said that it will take less than 14 days.

3.5 Behaviors During COVID-19

When participants were asked (To what extent do the following statements describe your behavior for the past week?) most of them (459) (74.9%) preferred to stay at home when they were asked 432 (70.4%) said they washed their hands more frequently than before. Others, 388 (63.3%) said that they did not attend social gatherings; 293 (47.6%) said that if they had exhibited symptoms of sickness, they would have immediately informed the people around them. Finally, 272 (44.4%) said that they kept a distance of at least two meters to other people.

3.6 Reasons to Leave Home

When participants were asked (What are the reasons for you to leave your home?), 452(73.7%) participants said that they left home for purchasing food for their family; 299 (48.8%) went to work; 128 (20.9%) left home to do exercise; 71 (11.6%) got tired of being inside of the house; 63 (10.3%) met friends and 46 (7.5%) did other activities.

3.7 Social Distancing Measures

When participants were asked (How effective are social distancing measures (e.g., through a general curfew) to slow down the spread of the coronavirus?), most respondents (246 (41.8%) to 272 (44.4%)) agreed on that the social distancing measures were effective or very effective, respectively. Others, 85 (13.9%), said that it was not effective.

3.8 Effect of Coronavirus on Household's Economic Situation

As the results show, when participants were asked (How worried are you about the effects of coronavirus on your household's economic situation?), 143 (23.3%) were very worried, 232 (38.0%) were worried, 139 (22.7%) were neither worried nor unworried. The rest of the participants 97 (15.9%) were unworried or very unworried.

3.9 Coronavirus and the Future

Regarding participants' views on how likely they think that coronavirus will come back again, 106 (17.3%) to 321 (52.4%) agreed on very likely to likely, respectively, that it will come back. Participants who were neither likely nor unlikely were 120 (19.6%). Very small participants, 66 (10.8%), were in the favor of unlikely and very unlikely.

3.10 Government's Economic and Financial Support Program

When participants were asked (How satisfied are you with the government's economic and financial support program? Such as government supporting salaries, electricity, and stopping bank loans on the citizen of your country?), majority of participants 314 (51.2%) and 220 (35.9%) agreed on very satisfied and satisfied, respectively. The rest of the participants, 79 (12.9%), were not satisfied.

3.11 Current Situation

When the participants were asked (To which extent do the following statements apply to you right now?), 306 (49.9%) of the responses were worried about the health of their family members; 243 (39.6%) were calm and relaxed; 216 (35.2%) were nervous when they think about the current circumstances; 151 (24.6%) felt stressed about leaving their houses; 96 (15.7%) worried about their health, and only 37 (6%) had other issues such as: they were worried about their financial situation, they felt stressed when going to work because they might get the virus, and some of them had dealt with cases that were worse.

3.12 Lessons from COVID-19

When the participants were asked to share their lessons (Share with us what you have learned from this coronavirus crises), 67 (38.5%) of the responses were related to responsibility; they said that it is the responsibility of the individual towards himself affects the entire society. Other responses were as follows: 58 (33.3%) related to precautious, 26 (14.9%) of the responses related to patience, 11 (6.3%) related to cooperation, 5 (2.9%) related to careless or other issues, and 2 (1.1%) related to learning.

3.13 Conspiracy Theories

The results of the question (Do you think coronavirus is part of an international conspiracy?) showed that only 162 (26.4%) responded no. However, 194 (31.6%) thought that coronavirus is part of an international conspiracy and 257 (41.9%) said they did not know.

3.14 Opinions About COVID-19

When the participants asked the question (Please add any comments reflecting your opinion toward the coronavirus), the responses were scattered into 17 topics, as shown in the above table. Majority of the comments, 51 (17.3%), said that it is crises. Other comments, 36 (12.2%), said that "May God keep this disease away from us". 34 (11.5%) said that it is a lesson for humanity. Some responses, 31 (10.5%), said this coronavirus is a man-made disease.

4 Discussion and Conclusion

The current study aimed to investigate the public's knowledge and perceptions of the COVID-19 pandemic and its preventive measures in the Kingdom of Bahrain. There are 613 participants in the study who represented both males and females and the majority of which (91.8%) are Bahrainis. All of the respondents were educated, ranging from high school to PhD degrees. This leads us to conclude that that the sample's educational status affects their perception of the virus (Mamo et al., 2020). The majority of our sample (63%) are employed and did not have any chronic or hereditary disease. Most of them have knowledge of the virus, health and safety protocols that need to be followed, and the government efforts to contain the effects of the pandemic.

The answers of the participants in the survey supported that people's behavior is affected by their knowledge they have on the virus (Mirza et al., 2020). People stayed home, did not attend gatherings, washed their hands more frequently, only went outside their homes to buy food are behaviors that more than 50% of the participants have positively responded to.

These behaviors showed that people are aware of the virus and their attitudes towards the virus are shaped by their knowledge confirming the results of previous studies on the public perception of COVID-19 in India and in Jordan (Khabour et al., 2020; Prakash et al., 2021), that people are aware of the disease as well as its accompanying symptoms. Lack of awareness of the situation which may lead to unconcerned attitudes (Qiu et al., 2017) is not an issue with the Bahraini respondents.

These results also supported the findings in the studies conducted in the US, Germany and across 10 countries in US, UK and Asia saying that there exist a correlation between perceived risk from the virus and people's adoption of health and safety protocols like staying at home, social distancing, etc. (Dryhurst et al., 2020; Führer et al., 2020; Xiu, 2021). The survey showed that majority of the Bahrainis are worried about the virus not only for themselves but for their household members which showed the same results in the number of Bahrainis who followed the safety protocols initiated by their government.

The government's preventive measures during the pandemic have been fully communicated to the people. This is seen in the responses of the participants, that they observed social distancing measure, avoided meeting friends, preferred to stay at home are examples of being aware of the virus which is very important to stop its spread (Rabby et al., 2020).

Participants perceived the efforts of the government as appropriate, and 87.1% said that they are satisfied with the economic and financial support programs. Still, almost 50% of the respondents are worried about the health of the family members and while 61.3% are concerned on the effects of the coronavirus in their household's economic situation which reflected the result of the research conducted in UK citing that working age households more likely to face financial and housing precarities as an effect of this health crisis (Mikolai et al., 2020). Still the Government of Bahrain like other governments in the world responded in order control the spread of the

virus and mitigate its economic effect. It is also important to note that 31.6%% of the respondents said that the virus is a part of an international conspiracy and in another part 10% said that it is man-made, this reflected closely similar results in previous study in Nepal citing that the virus is a bioweapon (Bhatt, 2020) or was engineered in a laboratory (Khabour et al., 2020).

In summary, the study was able to achieve its objective. It showed that people of Bahrain have knowledge of the virus and this knowledge and perception dictated their response to the call of the government to be united in taking precautionary measures to help contain the effects of the pandemic. The government on the other hand was able to do its part in informing the public, provided economic and financial support among others which help mitigate the effects of the pandemic. On a final note, the research also found out that for Bahrainis, the fight against the virus is not solely the responsibility of the government but the responsibility of everyone. They answered that lessons learned from the situation was that the responsibility of the individual towards himself affects the entire society, that being precautious, having patience is very important in crisis like the COVD 19, which they believe may happen again (Gebbia, 2020).

Appendices

No.	Question	Answer	Frequency	Percent (%)
1	In which country do you work?	Bahamas	1	0.2
		Bahrain	563	91.8
		Bangladesh	1	0.2
		China	1	0.2
		Egypt	2	0.3
		France	2	0.3
		India	1	0.2
		Iran (Islamic Republic of)	1	0.2
		Jordan	2	0.3
		Kuwait	3	0.5
		Lebanon	1	0.2
		Morocco	1	0.2
		Saudi Arabia	25	4.1
		United Arab Emirates	4	0.7
		United Kingdom of Great Britain and Northern Ireland	2	0.3

Appendix 1: Demographic Data

(continued)

No.	Question	Answer	Frequency	Percent (%
		United States of America	3	0.5
		Total	613	100
2	What is your gender?	Female	279	45.5
		Male	334	54.5
		Total	613	100
3	What is your age? (in Years)	15–19 Years	25	4.1
		20–24 Years	107	17.5
		25–29 Years	74	12.1
		30–34 Years	107	17.5
		35–39 Years	80	13.1
		40-60 Years	174	28.4
		60 and above	46	7.5
		Total	613	100.0
4(a)	What is your nationality?	Armenia	1	0.2
		Bahamas	1	0.2
		Bahrain	493	80.4
		Belgium	1	0.2
		Bhutan	1	0.2
		Botswana	1	0.2
		Canada	2	0.3
		Colombia	1	0.2
		Denmark	1	0.2
		Egypt	15	2.4
		France	2	0.3
		India	23	3.8
		Iran (Islamic Republic of)	1	0.2
		Iraq	3	0.5
		Jordan	10	1.6
		Kenya	1	0.2
		Kuwait	2	0.3
		Lebanon	3	0.5
		Morocco	1	0.2
		Pakistan	5	0.8
		Palestine	3	0.5
		Philippines	10	1.6
		Saudi Arabia	18	2.9
		Sudan	2	0.3

(continued)

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No.	Question	Answer	Frequency	Percent (%)
		Thailand	1	0.2
		United Arab Emirates	3	0.5
		United Kingdom of Great Britain and Northern Ireland	1	0.2
		United States of America	2	0.3
		Yemen	5	0.8
		Total	613	100.0
4(b)	Nationality	Bahraini	563	91.8
		Non-Bahrain	50	8.2
		Total	613	100
5	What qualification currently	Other (please specify)	11	1.8
	do you have?	High school	88	14.4
		Diploma	58	9.5
		HND Diploma	9	1.5
		Bachelor's degree	285	46.5
		Master degree	115	18.8
		PHD degree	47	7.7
		Total	613	100
6	What is your employment	Other (please specify)	13	2.1
	status?	Employed FULL-TIME	331	54
		Self-employed/own Business	42	6.9
		Retired	71	11.6
		Student	117	19.1
		Unemployed	21	3.4
		Homemaker	18	2.9
		Total	613	100
7	Do you have any chronic or	Yes	189	30.8
	hereditary diseases or medical history? (You can select more	No	424	69.2
	than one)	Total	613	100
8	How many people live in your	0	8	1.3
	household?	1	23	3.8
		2	36	5.9
		3	63	10.3
		4	118	19.2
		5	124	20.2
		6	87	14.2
		7	50	8.2

(continued)

No.	Question	Answer	Frequency	Percent (%)
		8	40	6.5
		9	21	3.4
		10	15	2.4
		11	7	1.1
		12	6	1
		13	1	0.2
		14	6	1
		15	2	0.3
		17	2	0.3
		25	2	0.3
		40	1	0.2
		69	1	0.2
		Total	613	100

(continued)

Appendix 2: Descriptive Variable

Do you think the reaction of your country.9The reaction is much too extreme7The reaction is somewhat too extreme7The reaction is somewhat too extreme7The reaction is somewhat insufficient7The reaction is not at all sufficient10Extremely worriedNorriedNorried0Worried10Extremely worried10Extremely worried11Loworried11Loss than 7 days11Loss than 14 days11Longer than 14 days12I stayed at home	of your country's government to the current coronavirus outbreak is appropriate, too extreme, or not sufficient? 1 too extreme A9 B.0 what too extreme Printe Printe B00 B1 sufficient 100 1.6	ate, too extreme, e	or not sufficient?
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Worried Neither worried or not wor Unworried Extremely unworried Inworried Total Inversion In	130	30	21.2
Neither worried Unworried Extremely unworried Extremely unworried Total I Less than 7 days 7-10 days 10-13 days 14 days Longer than 14 days Longer than 14 days 2 1 stayed at home	23	30	37.5
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Extremely unworried Total Iow long is the quarantine or s 1 Less than 7 days 7-10 days 10-13 days 14 days 14 days Longer than 14 days Longer than 14 days 2 1 stayed at home		,0	10.8
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7-10 days 10-13 days 14 days 14 days Longer than 14 days Total 0 what extent do the following 2 1 stayed at home	12	2	2
10-13 days 14 days Longer than 14 days Longer than 14 days 70tal 2 1 stayed at home	22	5	3.6
14 days Longer than 14 days Total 0 what extent do the following 2	17	7	2.8
Longer than 14 days Total 0 what extent do the following 2 I stayed at home	428	28	69.8
Total 0 what extent do the following 2 1 stayed at home 1	13	34	21.9
o what extent do the following2I stayed at home	61	13	100
	To what extent do the following statements describe your behavior for the past week? (check all that apply)	ly)	
	459	59	74.9
I did not attend social gatherings	erings [388	88	63.3
I kept a distance of at least	neters to other people	72	44.4
If I had exhibited sympton	immediately informed the people around me	93	47.6
I washed my hands more f	more frequently than before 432	32	70.5

	What are use teasons for you where your nonce (check an that appry)			
13	Going to work	299	48.8	
	Doing physical activity (e.g. sport, exercising, jogging)	128	20.9	
	Purchasing food for yourself or family	452	73.7	
	Meeting friends or relatives	63	10.3	
	Getting tired of being inside of the house	71	11.6	
	Other	46	7.5	
How	How effective are social distancing measures (e.g., through a general curfew) to slow down the spread of the coronavirus?	down the spread of the corona	virus?	
4	Very effective	272	44.4	
	Effective	256	41.8	
	Neither effective nor ineffective	68	111.1	
	Not effective	16	2.6	
	Not at all effective	1	0.2	
	Total	613	100	
Iow	How worried are you about the effects of coronavirus on your household's economic situation?	situation?		
15	Very worried	143	23.3	
	Worried	232	38.0	
	Neither worried nor unworried	139	22.7	
	Unworried	71	11.6	
	Very unworried	26	4.3	
	Total	611	9.99	
How	How likely do you think that coronavirus will come back again?			
16	Very likely	106	17.3	
	Likely	321	52.3	
	Neither likely nor unlikely	120	19.6	
	Unlikely	41	6.7	
	Very unlikely	25	4.1	
	Total	613	100	

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	Very satisfied	314	51.2	
	Satisfied	220	35.9	
	Neither satisfied nor dissatisfied	54	8.8	
	Dissatisfied	21	3.4	
	Very dissatisfied	4	0.7	
	Total	613	100	
	To which extent do the following statements apply to you right now?			
	I am nervous whin I think about current circumstances	216	35.2	
		243	39.6	
	I am worried about my health	96	15.7	
	I am worried about the health of my family members	306	49.9	
	I feel stressed about leaving my house	151	24.6	
	Other	37	9	
No	Question	Frequency	Percent %	.0
1 1	Share with us what you have learned from this coronavirus crises			
	Patience	26	14.9	
	Responsibility	67	38.5	
	Cooperation	11	6.3	
	Learning	2	1.1	
	Precautious	58	33.3	
	Careless	5	2.9	
	Other	5	2.9	
	Total	174	6.00	
No	Statement	Value	Frequency	Percent %
	Do you think coronavirus is part of an international conspiracy?	Yes	194	31.6

		NO	162		26.4
		I don't know	257		41.9
		Total	613		9.99
No.	Question	Frequency		Percent %	
ase	Please add any comments reflecting your opinion toward the coronavirus				
	Crisis	51		17.3	
ł	A lesson for humanity	34		11.5	
<u> </u>	Caution is a must	20		6.8	
-	It has positive and negative impact	9		2.0	
-	Curfews is required	10		3.4	
	conomic struggle	12		4.1	
~	Veed cooperation	14		4.7	
-	Epidemic	14		4.7	
L	The situation needs effective treatment	e		1.0	
L	his is a man-made disease	31		10.5	
-	People should listen what the government policy release so that this virus will not spread	19		6.4	
-	From nature	5		1.7	
-	Divine destiny	7		2.4	
-	We have to be patient, pray and pray	7		2.4	
-	hope to find a treatment	25		8.5	
	luman is weak	1		0.3	
	May God keep this disease away from us	36		12.2	
r	Total	295		6.66	

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The Fourth Industrial Revolution, Cryptocurrency, Cybersecurity, Ethics and Corporate Performance

Risks, Advantages and Obstacles Associated with Bitcoin: The Perspective of Palestinian Banks



Bahaa Awwad and Bahaa Razia

Abstract The study aimed to identify the advantages, obstacles and risks of dealing with Bitcoin from the perspective of Palestinian banks. The study used the descriptive analytical method through a questionnaire that was prepared in accordance with previous studies and the theoretical framework. The questionnaire then distributed to the study sample consisting of 250 male and female employees working in Palestinian banks. The study reached numerous results, the most important of which are: that the advantages of Bitcoin were low, and one of its most important features is high privacy and confidentiality. While the obstacles came to a moderate degree. One of the most important obstacles is the inability to mine it. With regard to its risks, it was also moderate, the most important of which was its exposure to intense competition from other currencies. The results showed that there were no statistically significant differences for the advantages, risks and obstacles of dealing with Bitcoin due to the variable of gender, age and educational qualification. While there were statistically significant differences due to the variable of job title and experience. The study recommended the necessity of the initiative of international monetary authorities in general, especially the International Monetary Fund. This helps to take steps that provide practitioners, the business sector and banks with the rules and controls to ensure the integration of this new technology with the global monetary system. The Palestinian Monetary Authority issued educational directives showing the dangers of the bitcoin currency, while issuing mandatory instructions to prevent the circulation of this currency, until international controls are reached on it.

Keywords Bitcoin · Digital currencies · Palestinian banks

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B. Awwad (🖂) · B. Razia

Palestine Technical University, Tulkrem, Palestine e-mail: dr.awwadb@hotmail.com

B. Razia e-mail: bahaa.razia@ptuk.edu.ps

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1 Introduction

There is a comprehensive technical revolution in the world that has spread to all aspects of life and has greatly affected the various economic, social and cultural lifestyles, and contributed to the creation of a group of new phenomena such as: electronic commerce, and electronic means of payment, such as electronic money of various types, and as a result the emergence of means of A new method of financing trade exchange based on the use of electronic payment methods through the global information network "the Internet" and with the cooperation and facilitation of commercial banks, international financial organizations and networks (Tala, 2019). In addition, very many virtual currencies have appeared during the past ten years, and have estimated more than (1657) virtual currencies, the most famous of which is the Bitcoin currency, which first appeared in 2009 and is traded worldwide, and is characterized by speed, security and low fees (Shdeifat & Mohamed, 2018). Since its inception, it has been the subject of controversy, and warnings of risks about the spread of dealing in it come from many local and international organizations, and it is a currency that was born from the womb of the digital space, bypassing all the traditional financial systems that the world knew in previous centuries, its price achieved tremendous and unprecedented heights for any currency, as it rose from a few cents when dealing with it to thousands of dollars after a very few years, not exceeding eight years, doubling by more than a thousand percent compared to its price at the beginning of its appearance, and the Bitcoin currency was able to convince many companies to invest It is accepted and accepted in many countries and markets, and today it is on the throne of cryptocurrencies (Al-Jawarin, 2018).

Bitcoin has become a reality in people's lives, and many people deal with it in all their dealings around the world, in buying and selling, booking hotels, paying service fees and others, and it has become accepted by many segments of people, while others refuse from individuals, institutions and countries to deal. It is for many considerations, and the bitcoin currency is like everything new, we find it opponents, supporters, optimists and pessimists, and there is no unified opinion about this currency, and this is normal because of the different jurisprudence, estimates and predictions about the future of this currency (Amer, 2018). Based on the foregoing, and the fact that the Bitcoin currency came as a result of technological and digital development, and controversy is being held on it about the prohibition and analysis of dealing with it as it is a fake digital currency, it is necessary to delve into its study until the mechanisms and how to deal with them are determined. Hence, this study came to shed light on the pitfalls, obstacles and risks of Bitcoin from the perspective of banks in Palestine.

Since the current studies failed to identify the most important advantages, obstacles and risks of dealing with Bitcoin. Therefore, this paper presents a vital review of providing a holistic understanding of bitcoin from the point view of Palestinian bank sectors. A number of recommendations have been made, the most important of which is that the need for international monetary agencies in general and the International Monetary Fund in particular. This assists to take the initiative to provide individuals, business sector and banks with the rules and controls to ensure the integration of this new technology with the rules of the global monetary system. This chapter begins to provide a short introduction about bitcoin and its related aspects. Then it illustrates a critical review about previous related studies. Data collection methods and analysis will be viewed and discussed after that. In relation to this, findings start to emerge from this analysis. This chapter was then limited to a discussion to summarise and evaluate all ideas. Finally, numerous recommendations were identified that benefit current and future researchers and partitioners.

2 Theoretical Framework and Previous Studies

Bitcoin is the first practical application of the idea of cryptocurrencies that was first talked about in 1998, and the beginning of the Bitcoin currency dates back to 2008, when a man named "Satoshi Nakamoto" put forward its idea, but the mystery about the fact of the existence of this man made some researchers claim that the name It is not real and it is borrowed. Trading in this currency began via the Internet in 2009 AD, and the beginning of the trading price was \$0.0001. The price rose in the middle of 2011 to \$35, and at the beginning of 2017 it reached \$1,000, then the bitcoin escalated quickly and insanely to more than \$19,000 In the month of December 2017. It seems that those who invented the idea of these currencies wanted to reshape the monetary system in the world and create a new concept of money and ways of trading it, especially that the idea of bitcoin came directly after the global financial crisis that swept the world's economies in 2008 (Amer, 2018).

Bitcoin is defined as "the first digital currency in the world, among more than 700 currencies of the same type, that does not depend on a central bank or intermediaries, is not printed and is not traded in the country. At a time when paper currencies depend on a strategic stock of gold or foreign currencies, as well as on Interest rates set by the Central Bank of the currency to maintain its value. Hamoul (2018) defined it as "a digital currency that is not available in paper or metal form, and is generated by a computer program, and the program in particular determines the amount of issued units according to pre-defined criteria. Shdeifat and Mohamed (2018) considered that Bitcoin is an encrypted virtual currency that is electronically minted, and traded via the Internet, which has an intangible material and moral value, resulting in benefits that are subject to supply and demand, and is characterized by advanced smart software control that maintains all financial transactions that take place through it in the form of rules Accounting data called blockchain.

Al-Farhoud (2018) considered that Bitcoin is the latest economic revolution, and its emergence was a change in the concept of cash and the circulation of value among humans, as it became not dependent on money in its traditional form, whether paper or electronic, and the survival of Bitcoin depends on the future legislation of regulatory authorities around the world and the extent of people's confidence in this Currencies and the ways in which they are responsible. Also, one of the most prominent characteristics of Bitcoin, Razia et al. (2019) indicated that digital currency that does not have any tangible physical existence and does not have any intrinsic value. It is irregular in the sense that it is not supported by any official body, institution or international organization. All dealers have the possibility to mine it. It is also used through the Internet only and within the scope of institutions, companies, bodies and websites. It can be exchanged for official fiat currencies with encrypted operations over the Internet. With the monetary authorities in any country unable to control its supply or price.

Sunny et al. (2020) identified the most important advantages of Bitcoin, starting from the global level, as it is not linked to a specific geographical location, so it can be dealt with as a local currency, because it is available worldwide, and no country can ban it because it is not under its control in the first place, and therefore no one can book It cannot be subjected to freezing, confiscation or any other risks that transfers in traditional currencies may be exposed to if they are suspicious, or they are made to pay illegal transactions, because their owner is the only one who has the authority to determine the mechanism Or what we are and what kind of use it is. This reflects its degree of security as it is difficult to counterfeit or re-clone, and users can operate security practices to protect their money, or use service providers that provide high levels of security against theft or insurance against loss, so it has a very strong security record. The fees on it are also low, as it is characterized by the fact that the customer will not pay any transportation and transfer expenses, such as those usually charged by banks and credit card companies. There are also no transfer fees, exchange rate differentials for different currencies or other costs that are imposed through traditional money transfer channels. This provides speed, privacy and confidentiality due to its special nature. It is not possible to monitor or interfere with the buying and selling operations that take place through it, which is a positive point for those who want privacy, and on the other hand, it is possible to own many accounts without being connected to a name, address, or any information about their property. With regard to transparency, anyone can know the number of virtual currency units that he owns, and the number of transactions that were made through them, where everyone watches with complete transparency the movement of the currency, but at the same time no one will be able to know the identity of its owner, and this means that all dealers acknowledge the existence of this money and transfer of ownership.

This is confirmed by Brito et al. (2015), as one of the advantages of Bitcoin is the low cost of transactions, and it also serves as a platform for financial innovation and development, so the uses of Bitcoin may seem experimental mostly. It is useful to think of it, not necessarily as an alternative to traditional currencies, but as an alternative to new currencies in the payments system, and despite the benefits it offers, Bitcoin has some downsides that potential users should consider, including price fluctuations. And the risk of their bitcoins being locked out or even accidentally deleted if they aren't careful. Additionally, there are concerns about whether hacking could put the Bitcoin economy at risk (Jalal-Karim and Hamdan, 2010; He et al., 2017).

If we look at the defects and risks of Bitcoin, a study (Ahmed et al., 2018) showed that mining is one of the most important obstacles to the spread of the use of virtual

currencies in the world, as the difficulty of mining them by the average user due to the complexity of access programs and the complexity of the accounting operations necessary to perform mining operations, in addition to the doubts associated with the mining process. The price of virtual currencies and their large fluctuations also constitute a major problem for those dealing with them, as they may limit the extent of their spread and acceptance, and on the other hand, the fluctuating price of the currency encourages fraudsters to exploit this through fake currency exchange sites. Since the virtual currency is a digital currency and stored within a digital wallet, it is vulnerable to hacking, theft and manipulation of its users' accounts. The confidentiality and privacy feature reflects some negatives on the currency, because it gives a margin of ease for suspicious and illegal operations that take place through the Internet, the privacy provided by this currency made it. A destination for money laundering operations and the sale of stolen and prohibited products such as drugs. and tax evasion, as it will be difficult for government agencies in charge of tax collection to link the tax to those transactions that take place using virtual money, since these transactions are hidden via the Internet, in addition to that they are considered a means of smuggling money abroad (Bolt and Oordt, 2016 and Al-Dewaji, 1999).

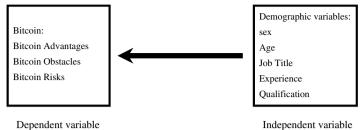
Whereas, Wisniewska (2016) has shown that knowledge of virtual currencies makes it possible to anticipate problems arising from their existence, such as potential threats to international security, difficulties related to taxation, etc. The popularity of virtual currencies and cryptocurrencies, including Bitcoin, is linked to the increasing importance of cashless payments on a global scale. Thus, Bitcoin may be the next step in the evolution of digital money. Bissessar (2016) examined the use of digital currency technology in the Caribbean with the aim of drawing attention to the opportunities and risks associated with this new phenomenon through a formal survey of central banks in the region to provide policy makers with information to begin the process of conducting a balanced assessment of opportunities and risks. The Caribbean can benefit from innovations in payments technology. Digital currencies, including Bitcoin, can contribute in this area. Shushan (2019) showed that the most prominent economic effects arising from the spread of cryptocurrencies, including Bitcoin, and their use as a modern means of payment, is the weak infrastructure of this money, which made it vulnerable to sharp fluctuations in its prices at the lowest situations and events. The absence of a central body that organises, supports and protects its issuance operations in times of crises contributed to the increase in the fluctuations of its exchange rates.

Tala (2019) confirmed that the exploitation of the benefits of Bitcoin represented in decentralisation and anonymity led to illegal transactions, including money laundering, drug sales, smuggling and the purchase of weapons, and that the growing concern of all governments about dealing with digital currencies is caused by money laundering crimes that were. It is carried out through electronic gold. Al-Najjar and Hashem (2019) provided exploratory information about the reality of encrypted virtual currencies in general, and the bitcoin currency in particular, focusing on four dimensions: the technical dimension and its threats, the economic dimension and its effects, the legal dimension and its ruling, the accounting dimension and its treatment. The study concluded that despite the safety of virtual currencies, surveys have proven the possibility of currency theft and fraud through their trading companies and platforms, in addition to the economic inefficiency of virtual currencies due to the instability they suffer as a result of sharp fluctuations in their prices and adoption. Directly on the forces of supply and market demand, but from the legal point of view, it is forbidden to deal with them because there is no legal and legislative coordination that controls their work and guarantees the rights of their users, or intangible assets, with their loss due to legitimate considerations that make them immovable funds that do not comply with the requirements and standards of Islamic accounting (Mohammed, 2017; Lasnouni, et al. 2020).

In the economic dimension, Kubat's (2015) confirmed that the volatility (and thus the risks) of Bitcoin is much higher than that of other currencies and assets. With regard to the accounting dimension of trying to reduce the risks of Bitcoin. Bin Awali and Belmashri (2020) showed that there is a diversification and rapid growth of virtual currencies, which created difficulty in reaching specific and controlled standards to deal with them accounting, due to the difficulty of conducting oversight on them on the one hand, and the difficulty of determining the value of the tax. For transactions made electronically. Moll and Yigitbasioglu (2019) touched on the impact of modern information technology, including blockchain technology, which represents a major component of the exchange of encrypted digital currencies from the reality of academic studies on the work of accountants. There is an urgent need for research to understand the new types of accounting needed to manage companies in the changing digital economy, and to identify new skills and competencies that accountants may need (Awwad & Razia, 2021).

McCalling et al. (2019) study confirmed the necessity of developing the design of accounting information systems, which is the basis for preparing financial reports using block chain technology, and it was concluded that this technology can be used by auditors to support their opinion in the audit or by stakeholders who They need reliable information about the facility. Ram et al. (2016) also aimed to identify a conceptual approach to accounting for the bitcoin currency, and concluded that the cost and fair value may be contradictory in terms of concepts, but in the eyes of experts in the field of financial reporting, any of them can be used to reach the economic rationale To hold a bitcoin this is determined in light of the business model of the facility.

The importance of this study stems from the importance of the issue of digital currencies, including Bitcoin. Through previous studies, it becomes clear to us the need to focus on investigating the risks, advantages and obstacles of dealing with Bitcoin in the Palestinian environment from the perspective of the most important economic and financial sectors, which is the Palestinian banking sector, and to present important proposals to financial scholars, specialists and decision-makers in How to deal with the wave of digital currencies, including Bitcoin, and with that this study came to answer the following main question: What are the advantages, obstacles and risks of Bitcoin: From the perspective of Palestinian banks? To achieve the objectives of the study and based on Fig. 1, which represents the study model. The main hypothesis of the study was developed as follows: There are no statistically significant differences for the advantages, obstacles and risks of dealing with Bitcoin



Dependent variable

Fig. 1 Study model

due to the demographic characteristics of the respondent (gender, age, job title, years of experience, educational qualification).

3 **Research Methodology**

This part of the paper provides a description of the study method, the community, the sample, the study tool, the study variables, the validity and reliability of the study tool, and the statistical treatments used.

3.1 Study Community

This study adopted the descriptive approach to describe the study sample and its variables, in addition to the analytical approach in order to identify the advantages, risks and obstacles of Bitcoin from the perspective of Palestinian banks. The study community consists of all managers, department heads and employees working in Palestinian banks for the year 2021.

3.2 Study Sample

The sample selection was adopted in a simple random sampling method for the purposes of representing the study population. The questionnaire was distributed to the study sample, where the number of distributed questionnaires reached (280) questionnaires, and the number of questionnaires that were retrieved and subjected to statistical analysis (250) questionnaires. Table 1 shows a description of the study sample.

Variable	Category	Frequency	Percentage (%)
Sex	Male	185	74
	Female	65	26
Age	Less than 25 years old	11	4.4
	26-35 years	130	52
	36-45 years	90	36
	Over 46 years old	19	7.6
Qualification	Diploma	15	6
	Bachelor's	220	88
	Master	13	5.2
	Ph.D.	2	0.8
Years of experience	5 years or less	50	20
	6-10 years	150	60
	11–15 years	30	12
	More than 15 years	20	8
Job title	Department employee	200	80
	Head of the Department	40	16
	Vice president	8	3.2
	President	2	0.8

 Table 1
 Description of the

 study sample according to the
 study variables

3.3 Study Tool

A questionnaire was prepared in accordance with previous studies and the theoretical framework in order to know the risks, advantages and obstacles of Bitcoin from the perspective of Palestinian banks. The study tool included two parts: The first section: concerning the demographic information of the study sample members (gender, age, educational qualification, years of experience, job title) and the second section: specific to (advantages, obstacles, risks) of Bitcoin. A five-year and graded Likert scale was used, where the respondent is asked to specify the degree of his agreement or disagreement with the selected options. So that it is as follows: (5: Strongly agree), (4: Agree), (3: Neutral or Neither agree nor disagree), (2: disagree) and finally (1: strongly disagree).

Table 2 Cronbach's alpha coefficient	Variable	Number of paragraphs	Cronbach's coefficient alpha (%)
	Bitcoin advantages	6	70.9
	Bitcoin obstacles	6	77.4
	Bitcoin risks	6	56.5
	Total summation	18	68.2

3.4 Authenticity and Stability of the Tool

The study tool was presented to a group of specialized arbitrators. The arbitrators were asked to express their opinion on the paragraphs of the study tool in terms of the formulation of the paragraphs, and their suitability for the field in which they were placed, either by approving them, modifying their wording, deleting them for lack of importance, or adding new paragraphs. The opinion of the majority of the arbitrators' committee members was taken into consideration in the arbitration process, and thus the validity of the content of the questionnaire was achieved, and the reliability coefficient reflects the quality of the questionnaire's paragraphs and its internal consistency, and the extent of its stability. Cronbach's alpha internal consistency coefficient has been used. The value of the alpha coefficient for the study variables was 68.2%. It is noted that the alpha values exceeded the minimum and reasonable percentage for the purposes of statistical analysis, which is 60% (Al-Najjar, 2018). This indicates the consistency between the study paragraphs, as well as the reliability of the study tool, and the possibility of relying on it to conduct statistical analysis. Table 2 shows the stability values for the study dimensions.

4 Statistical Analysis and Hypothesis Testing

4.1 Descriptive Analysis

This part deals with answering the main question of the study and then examining the hypotheses of the study: the main question of the study is what are the advantages, obstacles and risks of Bitcoin: From the perspective of Palestinian banks. To answer this question, the arithmetic averages and the relative importance of the study items will be calculated as shown in Table 3.

Table 3 indicates that the arithmetic averages of the answers of the sample members to the phrases related to the dimension of the advantages of Bitcoin ranged between 3.06 and 1.46. The total average of the answers was 2.18, which is a low degree. The statement came from the point of view of the sample members, Bitcoin is characterized by high privacy and secrecy. On the highest arithmetic mean 3.06 and standard deviation 0.878, and with an average estimate, which is one of the most

Number	nber Phrase		Standard deviation	Rank	Relative importance
Bitcoin ad	dvantages				
1	Bitcoin is available worldwide. It is not linked to a specific geographic location	2.19	0.754	3	Low
2	Bitcoin offers high levels of security against theft and loss	1.93	0.696	5	Low
3	Bitcoin fees are low	2.19	0.848	3	Low
4	Bitcoin is very fast	2.24	0.889	2	Low
5	Bitcoin is characterized by high privacy and secrecy	3.06	0.878	1	Medium
6	The ability to know the number of bitcoin currency units owned by its owner	1.46	0.719	6	Low
Total		2.18	0.511	20	Low
Bitcoin ol	bstacles				
7	The difficulty of mining bitcoin is one of the obstacles that accompany it	2.94	0.787	1	Medium
8	The fluctuating price of bitcoin is a real obstacle to dealing with it	2.78	0.529	6	Medium
9	Bitcoin helps with money laundering operations and the sale of stolen and prohibited products	2.80	0.855	5	Medium
10	Bitcoin works to break laws and fund terrorism	2.81	0.913	4	Medium
11	Bitcoin helps with tax evasion	2.87	0.698	3	Medium
12	The possibility of bitcoin exposure to hacking and manipulation of the accounts of its users	2.90	0.789	2	Medium
Total	,	2.83	0.673	21	Medium

 Table 3
 Arithmetic averages and standard deviations of the advantages, obstacles and risks of Bitcoin

Number	Phrase	SMA	Standard deviation	Rank	Relative importance
Bitcoin ri	isks				
13	There are few transactions per second in bitcoins	3.70	1.021	4	High
14	Bitcoin suffers from the absence of regulatory frameworks and the inability of regulators to monitor, track and control users of this currency	1.78	0.744	6	Low
15	Bitcoin is facing serious competition from other currencies	3.76	0.889	1	High
16	Bitcoin is not under the control of the central bank and therefore this poses a real danger to its dealers	2.33	1.009	5	Low
17	Bitcoin is boosting the digital economy and masking the traditional economy	3.75	1.001	2	High
18	It is difficult to obtain cryptocurrencies from any private company	3.74	0.992	3	High
Total		2.89	0.608	21	Medium

Table 3 (continued)

important advantages of the bitcoin currency according to the Palestinian banks' perspective. While the phrase was obtained from the point of view of the sample members "the possibility of knowing the number of bitcoin currency units owned by its owner". The lowest arithmetic mean was 1.46 with a standard deviation of 0.719, which is considered as low degree.

The arithmetic averages of the answers of the sample members to the phrases related to the dimension of the Bitcoin obstacles ranged between 2.94 and 2.78. The total average of the answers was 2.83, which is a medium degree. Where the phrase obtained from the viewpoint of the sample members: 'The difficulty of mining Bitcoin is considered one of the obstacles that accompany it with the highest arithmetic mean 2.94 and standard deviation 0.787, and with an average rating, that is, it is one of the most important obstacles to Bitcoin according to the Palestinian banks' perspective, while the phrase obtained from the viewpoint of the respondents.

The sample members 'The fluctuating price of the Bitcoin currency is a real obstacle to dealing with it'. The lowest mean was 2.78 with a standard deviation of 0.529, which is a low degree. While the arithmetic averages of the answers of the

sample members to the statements related to the dimension of Bitcoin risks ranged between 3.76 and 1.78. The average total answer was 2.89, which is a medium degree. Where the statement came from the point of view of the sample members, "Bitcoin is exposed to serious competition from other currencies." On the highest arithmetic mean 3.76 and standard deviation 0.889, and with a high rating, that is, it is one of the most important risks of Bitcoin according to the perspective of Palestinian banks. While the statement came from the point of view of the sample members, "Bitcoin suffers from the absence of regulatory frameworks and the inability of regulators to monitor, track and control users of this currency." The lowest arithmetic mean was 1.78 with a standard deviation of 0.744, which is of a low degree. We also note from the above table that the most influential factors in Bitcoin from the perspective of Palestinian banks are the risks of Bitcoin, where it was with an arithmetic average 2.89 and with medium relative importance and ranked first, while the factors related to the advantages came in the last rank with an arithmetic average 2.18 and low relative importance.

4.2 Hypothesis Testing

To test the main hypothesis of the study, which is that there are no statistically significant differences for the advantages, obstacles and risks of dealing with Bitcoin due to the demographic characteristics of the respondent. Gender, age, job title, years of experience, educational qualification. The (T-test) of independent samples was tested to find out the trends in dealing with Bitcoin according to the gender variable. Table 4 shows the results.

The effect is statistically significant at the significance level $P \le 0.05$. As shown in Table 4, there are no statistically significant differences at the level of significance $P \le 0.05$ for the advantages, obstacles and risks of dealing with Bitcoin from the perspective of Palestinian banks according to the gender variable; The calculated level of significance for all domains was higher than the significance level determined by the hypothesis $P \le 0.05$, which indicates that the hypothesis was not rejected; That

The field	Male = 185		Female = 65		T-test	Indication
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		level
Bitcoin advantages	2.20	0.518	2.05	0.485	0.861	0.869
Bitcoin obstacles	2.78	0.719	3.05	0.369	-1.131	0.061
Bitcoin risks	2.91	0.593	2.80	0.695	0.535	0.298
Total field	2.602	0.622	2.592	0.5586	0.1118	0.561

 Table 4
 Arithmetic averages and relative importance of the study areas on the gender variable

is, there are no statistically significant differences at a significant level ($a \le 0.05$) for the advantages, risks and obstacles of dealing with Bitcoin due to the gender variable. Table 5 shows the results of the other variables including age, job title, years of experience, educational qualification.

It is evident from Table 5 that there are differences in the arithmetic average in all areas, the advantages, obstacles and risks in dealing with Bitcoin. This is related to the age variable, job title, years of experience and educational qualification. Table 6 shows the results of the one-way analysis of variance to test whether these differences are statistically significant or not.

The effect is statistically significant at the significance level P < 0.05. It is evident from Table 6 that there are no statistically significant differences between the study sample members from their point of view due to the age variable at the level of morale P < 0.05 on all areas of the study including advantages, obstacles, risks. Where the calculated morale level was higher than the specific morale level. It can be also noted that there are no statistically significant differences between the study sample members from their point of view due to the job title variable at the level of morale at $P \le 0.05$ in all fields of study except for the risk variable, where it reached 0.003, which is less than the specified morale level. Table 6 also shows that there are no statistically significant differences between the study sample members from their point of view due to the experience variable at the level of morale $P \le 0.05$ on all fields of study except for the obstacle variable, where it reached 0.024 which is less than the specified morale level. Finally the results confirmed that there are no differences. Statistically significant among the study sample from their point of view attributed to the educational qualification variable at the level of morale P < 0.05 on all fields of study including advantages, obstacles, risks. In this case, the calculated morale level was higher than the specific morale level.

5 Discussion and Recommendations

The results of the study showed that the advantages of Bitcoin from the point of view of Palestinian banks were low, despite the high privacy and confidentiality that it enjoys, but the fears about its modernity and the difference in opinions about its economic effects, trust in it and its lack of acceptance by the Palestinian Monetary Authority played the most prominent role in disregarding its advantages, and with There are many obstacles, the most important of which is the inability to mine them. And the attendant special risks that expose them to dangerous competition from other currencies, with their prices fluctuating according to the forces of demand and supply in the market. All of these factors had a profound impact on its lack of acceptance by the Palestinian banking institutions. Despite the general difference in assessing its risks according to the job level and understanding its obstacles according to the years of experience in the Palestinian banking sector, there is a general consensus between the sexes and different age groups and with different educational qualifications on the obstacles and risks of dealing with Bitcoin.

Age variable				
The field	Age group	The number	Arithmetic mean	Standard deviation
Advantages	Less than 25 years old	11	2.14	0.618
	26-35 years	130	2.21	0.45
	36-45 years	90	2.16	0.582
	Over 46 years old	19	2.08	0.118
Obstacles	Less than 25 years old	11	3.02	0.607
	26-35 years	130	2.79	0.611
	36-45 years	90	2.81	0.844
	Over 46 years old	19	2.50	0
Risks	Less than 25 years old	11	3.05	0.485
	26-35 years	130	2.66	0.561
	36-45 years	90	3.14	0.508
	Over 46 years old	19	3.00	0.354
Total field	Less than 25 years old	11	2.18	0.511
	26-35 years	130	2.83	0.573
	36-45 years	90	2.89	0.608
	Over 46 years old	19	2.28	0.648
Job title vari	able			
The field	Job title	The number	Arithmetic mean	Standard deviation
Advantages	Department employee	200	2.21	0.492
	Head of the Department	40	2.17	0.558
	Vice president	8	2.27	0.785
	President	2	1.97	0.617
Obstacles	Department employee	200	2.86	0.689
	Head of the Department	40	2.73	0.675
	Vice president	8	2.79	0.652
	President	2	2.90	0.673
Risks	Department employee	200	3.04	0.531
	Head of the Department	40	2.36	0.692
	Vice president	8	2.98	0.745
	President	2	2.95	0.326
Total field	Department employee	200	2.672	0.5948
	Head of the Department	40	2.394	0.6794
	Vice president	8	2.014	0.741
	President	2	2.748	0.985

 Table 5
 Arithmetic averages and relative importance of the fields of study on the variable including age, job title, years of experience, educational qualification

Variable year	rs of experience			
The field	Years of experience	The number	Arithmetic mean	Standard deviation
Advantages	5 years or less	50	2.15	0.512
	6–10 years	150	2.22	0.452
	11–15 years	30	2.22	0.643
	More than 15 years	20	1.67	-
Obstacles	5 years or less	50	3.02	0.529
	6–10 years	150	2.44	0.737
	11-15 years	30	2.95	0.635
	More than 15 years	20	3.50	-
Risks	5 years or less	50	2.83	0.647
	6–10 years	150	2.78	0.544
	11–15 years	30	3.25	0.553
	More than 15 years	20	3.00	-
Total field	5 years or less	50	2.624	0.6084
	6–10 years	150	2.502	0.5802
	11–15 years	30	0	0
	More than 15 years	20	0	0
Qualification	variable	·		·
The field	Educational level	The number	Arithmetic mean	Standard deviation
Advantages	Diploma	15	2.27	0.556
	Bachelor's	220	2.13	0.48
	Master	13	1.67	0.871
	Ph.D.	2	1.26	0
Obstacles	Diploma	15	1.98	0.802
	Bachelor's	220	2.74	0.580
	Master	13	2.75	0.745
	PhD	2	1.98	0
Risks	Diploma	15	2.94	0.702
	Bachelor's	220	2.90	0.519
	Master	13	1.75	0.124
	Ph.D.	2	1.21	0
Total field	Diploma	15	2.662	0.6978
	Bachelor's	220	2.582	0.5542
	Master	13	1.11	0.145
	Ph.D.	2	1.01	0

Table 5 (continued)

Table 6 The results of the one-way variance analysis for the significance of the differences betweenthe averages of the advantages, obstacles and risks of dealing with Bitcoin from the perspective ofPalestinian banks

Age variable						
The field	Contrast source	Sum of squares of deviations	Degree of freedom	Average deviations	Calculated F	Indication level
Advantages	Between groups	0.076	3	0.025	0.091	0.964
	Within 13.781 247 0.276 groups					
	Total	13.856	247			
Obstacles	Between groups	0.671	3	0.224	0.479	0.698
	Within groups	23.329	247	0.467		
	Total	24	247			
Risks	Between groups	2.617	3	0.872	2.572	0.640
	Within groups	16.958	247	0.339		
	Total	19.575	247			
Total field	Between groups	0.273	3	0.091	0.595	0.621
	Within groups	7.639	247	0.153		
	Total	7.912	247			
Job title varid	able					
The field	Contrast source	Sum of squares of deviations	Degree of freedom	Average deviations	Calculated F	Indication level
Advantages	Between groups	0.255	2	0.127	0.477	0.623
	Within groups	13.602	248	0.267	_	
	Total	13.856	250		7	
Obstacles	Between groups	0.164	2	0.082	0.167	0.839
	Within groups	23.836	248	0.467		
	Total	24	250			
Risks	Between groups	3.914	2	1.957	6.373	0.003

uble o (com	indea)					
	Within groups	15.661	248	0.307		
	Total	19.575	250			
Total field	Between groups	0.557	2	0.279	1.931	0.155
	Within groups	7.355	248	0.144		
	Total	7.912	250			
Variable year	s of experien	се				
The field	Contrast source	Sum of squares of deviations	Degree of freedom	Average deviations	Calculated F	Indication level
Advantages	Between groups	0.315	3	0.105	3.88	0.762
	Within groups	13.541	247	0.271	_	
	Total	13.856	250			
Obstacles	Between groups	1.093	3	1.364	3.427	0.024
	Within groups	19.907	247	0.398		
	Total	24	250			
Risks	Between groups	1.619	3	0.54	1.503	0.225
	Within groups	17.956	247	0.359		
	Total	19.575	250			
Total field	Between groups	0.828	3	0.276	1.947	0.134
	Within groups	7.084	247	0.142		
	Total	7.912	250			
Qualification	variable					
The field	Contrast source	Sum of squares of deviations	Degree of freedom	Average deviations	Calculated F	Indication level
Advantages	Between groups	0.511	2	0.256	0.977	0.383
	Within groups	13.345	248	0.262		

Table 6 (continued)

	Total	13.856	250			
Obstacles	Between groups	0.701	2	0.351	0.768	0.469
	Within groups	23.299	248	0.457		
	Total	24	250			
Risks	Between groups	1.355	2	0.677	1.896	0.161
	Within groups	15.221	248	0.357		
	Total	19.575	250			
Total field	Between groups	0.445	2	0.223	1.520	0.228
	Within groups	7.467	248	0.146		
	Total	7.912	250			

Table 6 (continued)

Based on the previous results, the study recommends the need for international monetary agencies in general and the International Monetary Fund in particular to take the initiative to provide individuals, the business sector and banks with the rules and controls to ensure the integration of this new technology with the rules of the global monetary system. With the need for international legislative coordination and cooperation that works on developing frameworks to protect virtual money dealers, and formulating laws that control the issuance of this money and the mechanisms of its circulation. With regard to the Palestinian environment, the study recommends that the Palestinian Monetary Authority issue educational directives showing the dangers of the bitcoin currency, with mandatory instructions to prevent the circulation of these currencies, until international controls are reached. More studies and future research can be done to help understanding and developing the Bitcoin currency so that it can eventually reducing its risks and deal with it effectively.

6 Future Work

Bitcoin is a large portion of the growing digital asset market. Based on this study, there is a need to expand in all areas related to the future of virtual currencies in Palestine. This also includes its role in indicators of economic development and its acceptance by financial institutions, as well as the challenges and obstacles to its adoption by the Palestinian Monetary Authority. Therefore, it is important for Palestinian banks to consider digital currencies as a part of their future strategies.

7 Conclusion

The study aimed to identify the most important advantages, obstacles and risks of dealing with Bitcoin as one of the encrypted digital currencies from the point of view of Palestinian banks. It also focuses on studying the differences in the evaluation of these factors according to the demographic variables of the sample members. To achieve this goal, a questionnaire was distributed to a sample of 250 male and female employees in the Palestinian banking sector. This helped in answering the main question of the study and testing the main hypothesis. The results showed a low adoption of the advantages of Bitcoin despite the high privacy and confidentiality element that it enjoys, while the adoption of its obstacles, the most important of which is the difficulty and risks of Bitcoin mining, the most important of which is its exposure to dangerous competition from other currencies, average among the employees of Palestinian banks. And the different age groups and job structure towards adopting its advantages and obstacles and the risks of Bitcoin with a difference in compatibility according to the job title and years of experience.

The future of trade is bright, thanks to new emerging technologies that can help humanity. Users and industry participants can, of course, assess whether Bitcoin can help or hurt them based on their goals and expectations for possessing it. This article looked at the advantages of cryptocurrencies in terms of technology security, low transaction costs, and high investment returns. Law and regulation, excessive energy usage, the likelihood of a crash and bubble, and network attacks were all discussed as challenges. Improving the security protocol, working on proof of activity, employing the byproduct of proof of work, and implementing the knowledge management system are among the improvements and future work on cryptocurrencies. More in-depth studies on numerous elements of cryptocurrencies should be conducted, given the favourable outlook of blockchain technology and the likelihood of government regulation. Taking advantage of opportunities in cryptocurrencies and blockchain technology might be advantageous for researchers. The implementation of cryptocurrency to the best of its capacity would then become one of the most significant discoveries of the twenty-first century.

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The Impact of Major Technologies in Fourth Industrial Revolution



Samer Shorman

Abstract The Fourth Industrial Revolution (4IR) was revealed by researcher, Klaus Schwab, when he was serving as CEO of the World Economic Forum. This term is a title for the exceptional situation in which we live today, from the heavy reliance on various types of technology running our daily lives, such as factories, agriculture and motor vehicles. In addition, Artificial Intelligence (AI) has become a basic concept for public life, factories and life technology. The 4IR was built on the basis of the previous revolution, and the Fifth Industrial Revolution will derive its strength from the one that preceded it. In this research, we will present an analysis of the most important technology features that drive the 4IR, such as AI, big data, the Internet of things, and others. Each unit of this technology has a prominent role in influencing the scientific and industrial environment. Likewise, this technology merges with each other to produce new technology that contributes to solving scientific or industrial problems.

Keywords Fourth industrial revolution \cdot 5G Network \cdot Artificial intelligence \cdot Internet of Things \cdot 3D printing \cdot Big data

1 Introduction

Fourth Industrial Revolution (4IR) led the world into a new world concept based on cyber-physical technologies (like smartphones, robots, autonomous cars, etc.). In addition, where almost everything works via automation; computers, smart devices and robotics now carry out tasks that were previously performed by humans. this matter will affect on the humans and environment in many ways, and with recent technology, we could be making this matter worse or better.

When Klaus Schwab talked about the 4IR, he outlined it to include multiple aspects of different sciences, such as nanoscience, renewable energy, and digital technology based on computer science. He also mentioned the possibility of integrating different

S. Shorman (🖂)

Department of Computer Science, Applied Science University, Al Eker, Kingdom of Bahrain e-mail: samer.shorman@asu.edu.bh

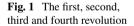
[©] The Author(s), under exclusive license to Springer Nature Switzerland AG 2022 A. Hamdan et al. (eds.), *Future of Organizations and Work After the 4th Industrial Revolution*, Studies in Computational Intelligence 1037, https://doi.org/10.1007/978-3-030-99000-8_23

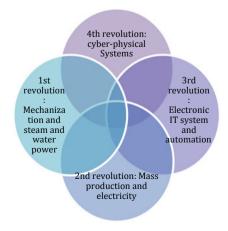
types of technology to enhance cooperation and improve performance. He also spoke about his concerns in two matters. The first is the leadership and management of companies and their ability to understand the requirements of the revolution, and the speed of response to the requirements necessary to switch to the use of modern technology at the local and global level. In the second matter, he talked about the story of the 4IR and its harmony with each other and how to present it to individuals and societies without events' reaction to possible changes that persist over time (Schwab, 2017).

The structure of this research will start with an introduction, then an overview of the 4IR, opportunities of the 4IR, technologies in 4IR, namely, AI and Machine Learning, Robotics, Blockchain, Big Data, The Internet of Things (IoT), the 5G Network, Cloud and Edge Computing, Virtual Reality and Augmented Reality, 3D Printing, Autonomous Vehicles, Genomics and Gene Editing and finally, the conclusion.

2 Fourth Industrial Revolution

The fourth industrial revolution, also known as Industry 4.0 or 4IR, was started based on ICT technologies such as computers, smart devices, networks and 3D printing. The Industry 4.0 means how to convert and implement the industrial business processes to automation and digitization. There are three industrial revolutions (see Fig. 1) have been occurred before this time for develop and enhance the life style characteristics by using various technologies, those revolutions changed the industry's techniques and productions methods. Those revolutions, namely the third revolution, was based on an electronic IT system and automation. The second revolution, used the mass production and electricity, while the first revolution was based on mechanization, steam and water power. Each revolution made some changes and progress in social





and economic life, and humanity. 3D printing and internet, for instance, stems from the main characteristics of industrial revolutions. The Industry 4.0 consist of velocity, scope, and systems impact (Xu et al., 2018). The term 4IR was coined by Klaus Schwab (Schwab, 2015), founder and executive chairman of the World Economic Forum (WEF) held in Davos annually at the end of January. The WEF used the term "cyber-physical systems" to characterize the Industry 4.0. Moreover, Klaus Schwab describes the Industry 4.0 as a world where individuals move between digital domains and the machines domains, it is an era of human–machine, where human capabilities are enhanced by machines, and machines acquire human-like characteristics. It is an AI era (David et al., 2021).

3 Opportunities of the Fourth Industrial Revolution

In every new scientific discovery, there is a kernel of new opportunities for development and improvement. The Fourth Industrial Revolution is a mine of new technologies that offer different solutions and many opportunities (see Fig. 2) (Schwab, 2017). Below we will discuss the most important of them.

First, the approximation of distances between companies and users and the possibility of reaching new technologies and inventions to customers and putting them to work quickly. This will contribute to improving the quality of service provided to customers as well as benefiting from new products, for example, 3D printing and what it can offer to users of prototypes or final.

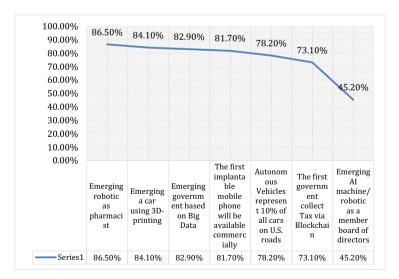


Fig. 2 Tipping points expected by 2025

Second, increasing reliance on Ai to solve problems in general, because AI algorithms provide multiple solutions, especially for economic problems. In addition, just as it offers a solution, it is also considered a threat to employment and its replacement.

Third, merging new technologies with different scientific fields to meet the needs of technical disciplines and create new solutions and areas of application that can enrich the disciplines, and produce new job opportunities that help solve various economic or social problems.

Fourth, adding robots to public life or to educational centers or universities will contribute to the formation of a culture based on direct experimental and applied science, as well as the potential for robots to help improve and solve problems that workers may be one of them, especially in factories, agriculture or construction.

Fifth, the Internet of Things (IoT), which has become one of the main addresses of the great industrial revolution through which a group of devices can be connected through networks; where these devices exchange information for the purpose of improving operations and making the appropriate decision (Xu et al., 2018).

4 Technologies in Fourth Industrial Revolution

Many technologies led to the emergence of the era of the 4IR, which made the world go faster than before. As the spread and superiority of this technology changed, most of the concepts of doing business and the duties related to building relationships, work and trade also changed. Below we discuss the most important technology that is driving the new industrial revolution and will shape the future, including axes in AI, networks, processing of large data, and others.

4.1 Artificial Intelligence (AI) and Machine Learning

AI refers to the ability of machines to act intelligently or to perform the work of experts such as manufacturing experts and to prepare different materials according to specializations, and here they are called expert systems. In addition, machines that work based on AI algorithms are able to process data in professional ways, with high speed and accuracy, according to the required task. As for machine learning, the most important is the algorithms that are able to learn and predict the future according to the previous data that is learned and studied; and the validity of these data is an important indicator of the adoption of the results and expectations resulting from machine learning algorithms (Helmold & Terry, 2021).

There is no doubt that Ai has imposed itself in most of the marginal sciences, as essential for the advancement and progress of these areas, building new links with the sciences that support them, clarifying the relationships and clarifying their accuracy, strengths and weaknesses. AI and machine learning algorithms have entered Internet search engines, e-commerce sites, trade recommendations, and network security (Al-Shoqran & Shorman, 2021a; Kakani et al., 2020).

4.2 Robotics

Robots is the model through which software can be transformed into simulation models that do functions based on rule-based knowledge, and robots are a state of convergence between technology (software and equipment), mathematics, physics and engineering, where building robots is the result of interaction and harmonization between different fields of science. In addition, the manufacture of robots, their development and putting them into use represents a unique scientific phenomenon that confirms the human success in automating jobs and tasks. Moreover, robots became performing basic tasks in the industry that were the preserve of the intelligent person who is aware of what he is doing (Karabegović, 2017).

In addition, robots took different forms depending on the nature of the task required; some of them took the form of an arm that is interested in arranging the pieces or in the form of industrial machines. As will, in the form of a human being and put a mask and clothing for him to be more adapted to the surrounding environment. And robots have entered multiple fields, for example, the field of manufacturing, especially the automobile industry, transportation in general, large equipment, the food and beverage industry, the clothing industry of all kinds, the technology industry, smart devices, electronics devices, education and health systems and their experiences (Karabegović, 2017).

4.3 Blockchain

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4.4 Big Data

Big data refers to the huge amount of data resulting from the interaction of humans and smart devices, as this interaction results in a large amount of data entered into the devices and stored in databases. An example of this is human interaction with social media platforms, which was one of the most important causes of big data because of its great influence in this field through friends sharing text messages, photos and videos with each other. It is worth noting that part of individual social media accounts turned into commercial accounts (https://intellipaat.com/blog/10-big-data-examples-applic ation-of-big-data-in-real-life/). The role of processing large data emerged from the inability of the devices to deal with this big amount of data all at once because it exceeded the capacity of the devices in terms of physical components and software. For example, processor speed, memory, hard disk, or software whose task is to process and classify data using smart algorithms and extract important information from them. To predict what will happen in the future and find new relationships and patterns or support in the intelligent decision-making process depends on the analysis of the data available to the company (Petrillo et al., 2018).

Moreover, the intelligent decision-making process is linked to the concept of business intelligence, which works to provide decision makers with the best possible information and graphics about the data available in the company, which would help in making an intelligent decision. In addition, many of the missions that causes of big data, such as for social media platforms, such as mechanisms for discovering consumer habits through shopping stores, as this data is very large, continuous monitoring operations using deployed cameras.

In addition to cyber security, monitoring operations by recording and analyzing movements to maintain the security and confidentiality of information and transmission processes. Moreover, there are various of sectors deal with big data, such as information security, cryptocurrency exchange and e-commerce, Education, Healthcare, Government Sector, Media and Entertainment, Weather Patterns, Transportation, Banking Sector, Marketing and Space (Yin & Kaynak, 2015).

4.5 The Internet of Things (IoT)

The Internet of Things (IoT) is a concept that refers to connecting things around us with each other through networks and the Internet in order to collect and share data between devices. The IoT aims to improve the service provided by each device, because the devices individually provide a specific service based on the directives of the direct responsible for it, and in some devices the ability to collect data from their surroundings depending on the sensor, cameras and microphone. In addition, other data entry tools that cross the external senses of the devices. Today, with the development of smart devices and their great concern with human movement and their constant communication with them day and night, the possibility of controlling and monitoring has made it more effective, as many surveillance cameras today connect with the smart phone (Al-Shoqran & Shorman, 2021b).

Moreover, the possibility of linking smart devices or smart watches with many different devices has become more powerful and realistic, and it is important to note that all devices such as refrigerators and televisions will become smart because they will be able to communicate with other devices and exchange data processing and decision-making or recommendations. An example of that connect is the cooling device with the refrigerator or alarm devices.

The IoT community have various companies working to enhance this field, such as Connected Cars which works to connect cars with their owners or with friends to send a message or notification of a certain type when a breakdown or any similar event occurs. There is a company called Airbiquity operating in the United States for this purpose. There are also systems that monitor the performance of cars while driving using GPS fleet tracking, and there are companies that offer smart cooking ovens that estimate the best time to cook a specific meal (Dash et al., 2019; Magomadov, 2020).

4.6 The 5G Network

The fifth generation (5G) is an extension of the data transmission technology that started with the first generation to the fifth generation, which aims to enable smart devices to communicate and transfer data and multimedia faster and more securely. This technology will become the main tool for transferring data, browsing websites, as well as messaging between devices and using the IoT (Zunino et al., 2020).

4.6.1 First Generation (1G)

This refers to the telecommunication standards introduced in the 1980s. At this time, the signals sent were still in an analog format, and large radio towers were used to propagate the signal. The first 1G network was launched in Japan in 1979. "Brick phones" were the first mobile phones and they had very low battery lives, poor sound quality, incompatibility with other mobile networks, and were very expensive when first launched (Shukla et al., 2013).

4.6.2 Second Generation (2G)

2G networks were the first to switch from analog to digital, which also allowed for encryption of data transferred for the first time. The radio frequencies used were of a much wider band, allowing for many more users to be connected at a time. Services, including text and multimedia messages, were also available for the first time, causing a revolution in personal communication. Later on, even very slow and basic internet access was possible. Devices for connecting to 2G networks also became much more small and portable, and the later versions began to feature colored screens. Despite originating in the 1990s, in many parts of the world, 2G is still a "fallback" network for when more modern networks fail or are not available, and as such many countries have not yet dismantled their 2G infrastructure (Shukla et al., 2013).

4.6.3 Third Generation (3G)

3G was introduced in the early 2000s, though 2G was so widely in use that it took a few years before it properly spread. 3G used spread-spectrum technology for a wider bandwidth. 3G allowed for data connections in megabits per second for the first time, which meant better internet browsing, video conferencing, and many more previously infeasible features could now be implemented. The 3G devices began to feature proportionally larger, more high-resolution screens, and prompted the development of the first "smartphones." Besides mobile devices, 3G was also used in laptops and for setting up more long-term WiFi networks (Vora, 2015).

4.6.4 Fourth Generation (4G)

4G LTE (Long Term Evolution) was first introduced in 2009, and rose to prominence along with the mass-market development of touchscreen smartphones. Using Orthogonal Frequency-Division Multiple Access (OFDMA) rather than spread spectrum, allowed for much faster speeds than 3G. In addition, 4G uses only Internet Protocols for connection between devices and networks, rather than circuit switching (Shukla et al., 2013).

4.6.5 Fifth Generation (5G)

The 5G technology is considered a continuation of the fourth and third generation technology with a great potential to improve speed and introduce new features such as saving energy and increasing the number of users within a single geographical area. This new technology comes to contribute to meeting the increasing demand for mobile phones and smart devices, especially with the activation of IoT technology, which requires a great deal of communication speed between devices (Dao et al., 2017). In the 5G there are five components:

A. Millimeter Wave

Millimeter wave or "mmWave" is a wave (24 and 100 GHz) that has the ability to serve a large number of users with the ability to meet the demand for a large amount of data at a high speed. It thus meets the needs of large population groups or mass events such as festivals, sports games, universities and institutes that require the transmission of a large amount of data.

B. Massive MIMO

Massive MIMO (Multiple Input and Output) technology is considered to be the fifth generation radioactive. The new technology is based on adding a larger number of antennas in one main station, which increases the number of beneficiaries and reduces the energy used. Knowing that MIMO technology has been used previously and has proven to be very effective, the antennas will be doubled in the fifth generation.

C. Small Cells

Small cells, and cells in general were used in previous generations, but the 5G cell will be smaller than before, which contributes to reducing power and covering a smaller area for the main stations. These small cells actively contribute to the speed of data transmission in the 5G and improves performance in IoT technology.

D. Beamforming

Beamforming is a directional wave enhancement technique that was previously used to enhance ocean communications.

E. Non-orthogonal multiple access

Non-orthogonal multiple access (NOMA) is a multiple-use technique, whereby a larger number of users can be served within the same frequency, resources and time.

4.7 Cloud and Edge Computing

Cloud computing is an approved method for storing data on computers or servers outside the framework of the organization through the use of networks that enable companies to communicate with data storage centers. These centers can store large amounts of data and perform some operations and processing within real time. Examples of companies that provide cloud computing services are Amazon, Google, and Microsoft, which offer this service for fees. This reduces the general cost to companies such as software, protection and maintenance (Dao et al., 2017; Petrillo et al., 2018).

4.8 Virtual Reality and Augmented Reality

Virtual reality (VR) is a simulation of a computer-created environment to transport the user to that world through specially designed equipment such as glasses, headphones, gloves and various sensors. Virtual Pain Reality technology has been used in various fields, including video games, cinema shows, healthcare, virtual travel, professional sports, and the virtual social world (Alrababah & Shorman, 2021).

As for augmented reality (AR), it is the interaction of the virtual world with the real world, where three-dimensional objects are created using a computer and placed in an appropriate environment for them. In augmented reality, there are three basic elements, which are the integration between real and virtual reality, three-dimensional objects, and interaction in direct in real time (Romero et al., 2016).

4.9 3D Printing

3D printing is the process of building a three-dimensional object using computers. This involves converting computer designs and graphics into physical objects by creating machines and linking them to a computer. Examples include models of objects in general, toys, building components, and manufacturing equipment (Schwab, 2017).

3D printing is becoming one of the most popular methods in manufacturing and 4IR. The manufacturing materials that is used in 3D printing have many implications on the socioeconomic and environmental fields. 3D printing or Additive Manufacturing (AM) contributes an increase in the effects of new plastic products. Moreover, the 4IR and industry of the future based on new technologies in devices and networks that used an automation and digitization in business industrial processes. D printing is one of Industry 4.0 technologies currently used in various fields as art, architecture, education, medical, dental, and more industries. Likewise, 3D printing and computing-aided design (CAD) combined to lead the digital modeling and fabrication processes, in addition to entrepreneurship and its applications (Xu et al., 2018).

4.10 Autonomous Vehicles

An autonomous vehicle is one that operates independently of human intervention. It is a car or any type of transportation such as a truck, ship, or other vehicle that can sense what is going on around it (Philbeck & Davis, 2018; Xu et al., 2018).

4.11 Genomics and Gene Editing

Genome editing is based on gene editing which is the technique of altering the DNA of an organism. This change would produce a living organism that carries new or double traits between two organisms or an organism that carries modifications in certain locations. This technology is considered a key to solving the problems facing humans through the prevention and treatment of diseases. Despite the ethical reservations associated with this type of genetic changes that have a negative character, the occurrence of undesirable changes may cause unexpected distortions. There are positive expectations in finding a cure for cancer, heart disease, cystic fibrosis, and HIV (Schwab, 2017).

5 Conclusion

The 4IR and the application of modern technology in life, education and industry will become a title for development and keeping pace with modern technology. Many countries and companies are striving to be the leaders in every one of the technologies discussed in this paper. Likewise, the 5G technology, expresses the basis for the infrastructure of modern networks, as countries seek to be the first to adopt this technology, which would contribute to the economy and public life. The AI and Machine Learning was the technologies most used for this time, mostly used in scientific fields such as industry, commerce, education engineering, agriculture and medicine.

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The Usage of Financial Technology Payments During the Pandemic of Covid-19



Mohammed Alchuban, Allam Hamdan, and Sayed Mohamed Fadhul

Abstract Financial Technology (Fintech) is the implementation of the latest technology advancement to enhance financial operations. It is used to automate these operations and make them more simple, improve their productivity and quality and reduce human interactions. Fintech payment is used widely to perform financial transactions electronically through many channels and products. Fintech is used to advance Payments by implementing technology in Credit and Debit Cards, constantly improving mobile and online payments and banking, attaching new features in ATMs, and allowing customers to initialize digital wallets. During the pandemic of Covid-19, there has been an increase in the usage of Fintech payments technologies. In addition, many payment services have been introduced to help with the procedures implemented to reduce the spread of the virus. This literature review concentrates on Fintech payments and focuses on factors affecting the usage of these payments. The factors which will be focused on are Covid-19, Regulations, Customer Experience, and Quality of payments products and services.

Keywords Fintech · Payment · Covid-19 · Banking · Artificial intelligence · Data science · E-wallet · Mobile payment · Debit card · Credit card

1 Introduction

Business sectors are evolving daily due to the latest technological advances, and finance has also been implementing these technologies to enhance financial processes and services. Financial Technology (Fintech) is a term used when improving or automating a financial operation using technology. Fintech is using applications, hardware, and advanced Information Technologies like "Artificial Intelligence (AI),

M. Alchuban (🖂)

A. Hamdan · S. M. Fadhul Ahlia University, Manama, Bahrain

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College of Business and Finance, MBA, Manama, Bahrain e-mail: allamh3@hotmail.com

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Machine Learning, Robotic Process Automation (RPA), etc...." to improve and enhance the experience of businesses and customers.

The term Fintech was first introduced in a project conducted by Citibank to simplify technological cooperation. However, it gained the most attention of investors, customers, and regulators only since the beginning of the 2010s. Fintech can be found these days in investments services, digital currencies, mobile and digital payments. Fintech first focused on the back-end system of financial entities. Still, later the focus shifted to applications intended for the customers of these entities, and it has also been applied to non-financial entities (Kagan, 2020).

Fintech Payments products and services are developed and distributed to enhance the customer experience by automating the procedures and replacing the traditional financial services with modern services using advanced Information Technologies. These products and services are developed on the customer's requirements to offer a fast and easy experience (Barbu et al., 2021a).

By the end of 2019, the world had faced a massive pandemic due to the Coronavirus. And the world had to make some changes and measures. Measures included procedures like social distancing between the people to prevent the spread of the virus. The financial sector in Bahrain had many regulations and technological implementations to help with these measures and invested heavily in Fintech Payment services and products to reduce the spread of the virus.

In the Kingdom of Bahrain, the Central Bank of Bahrain (CBB), alongside Banks and other financial institutions, had taken the initiative to support and implement Fintech Payment services and products. CBB and in cooperation with other financial institutions, have introduced a fintech lab called FinHub973 and helps both individuals and corporations develop and provide financial services and products (Central Bank of Bahrain, 2020a).

The usage of Fintech Payments can change due to many factors and can be influenced by many situations. This proposal will focus on the Fintech Payments products and services implemented in the Kingdom of Bahrain during the pandemic of Covid-19. Which elements of them have been implemented because of the pandemic. What regulations have been introduced to ensure that such features are implemented to help with the procedures introduced to prevent the spread of the virus? Also will focus on the customers' behavior changes when using Fintech Payments Products and Services during the Covid-19.

2 Literature Review

2.1 Financial Technology

In recent years, the FinTech business has exploded, offering convenient, safe, and online financial services with the highest quality. FinTech is a technological innovation used with finance that offers new products, applications, and business models that have the potential to inspire the provision of financial products and services and the expansion of the financial sector, as well as create a competitive and reputational market culture among service providers (Daragmeh et al, 2021). Currently, we hear several new terms, the majority of which are becoming increasingly popular. Online banking, Peer-to-peer (P2P), Cryptocurrencies, E-Wallets, and other specialized words have become so commonplace that we begin to use them in our daily lives. They may appear unfamiliar at first, but after we learn more about them, we will comprehend them immediately (Ryabova, 2015).

Financial Technology (Fintech) is defined by the Financial Stability Board (FSB) as "technologically enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services" (Financial Stability Board, 2021) Kelvin Leong and Anna Sung defined Fintech as the combination between the knowledge and expertise of Finance, Information Technology, and Innovation by introducing innovative ideas and technologies to improve the financial processes (Leong & Sung, 2018). In The Evolution of FinTech: a New Post-Crisis Paradigm? research paper, Fintech is described as a marriage between Financial Services and Information Technology (Arner et al., 2016).

FinTech is a growing industry that includes pioneering financial products and services made possible by Information and Communication Technology (ICT) (Al Nawayseh, 2020). The advancement of technology has produced innovative approaches in financial services, most notably leading in the development of FinTech, which combines technology and finance to provide payment products that consumers find extremely useful. FinTech is a term used to describe a financial operation that combines technology and finance (Razzaque et al., 2020).

For the reason of the number of fintech inventions and investment flow, London is currently renowned as the capital of FinTech. FinTech development in the United Kingdom is aided by four primary factors: extensive infrastructure, a well-informed legal framework, a transparent tax system, and government investment assistance. However, there are other markets like the United States and Europe that are following the UK and concentrating a lot on the development of Fintech (Ryabova, 2015).

The term Fintech has been recognized for a period of time; in the 90 s, it was referred to as "financial technology", and in the 2000s, it was labeled as "Digital Finance" or "E-Finance." From credit cards, chip cards, and Automated Teller Machine (ATM) to online platforms that mobilize mobile and app services, FinTech has been evolving rapidly in the financial sector (Razzaque et al., 2020). Barclays Bank's launch of the Automatic Teller Machine in 1967 is widely regarded as the start of today's FinTech evolution. This has led the former chairman of the US Federal Reserve to release the following statement, "The most important financial innovation that I have seen the past 20 years is the automatic teller machine, that really helps people and prevents visits to the bank and it is a real convenience" (Arner et al., 2016). FinTech applications have recently grown to incorporate financial literacy and education breakthroughs. FinTech proposes new kinds of value creation models by reorganizing and managing the flow of financial data, despite the fact that Information Technology (IT) involvement in financial firms is not recent. In FinTech, IT is transforming the entire traditional financial system, not just as a facilitator (Al Nawayseh, 2020).

FinTech is powered by different cutting-edge technologies. It refers to a set of innovative business models, technological aspects, and innovative products and services that have a substantial influence on the financial sector and the provision of financial products and services. It has sparked widespread interest due to the following benefits: enhancing operational productivity, effectively decreasing operating costs, disrupting the current industry framework, creating additional avenues for private enterprise, and modernizing access to financial services. Fintech includes services and products that include the usage of advanced technologies like the Internet of things and web of things, Artificial Intelligence (AI), Big Data, Data Science, Bots, and Automation (Li & Xu, 2021).

2.2 Types of Fintech

Fintech has many types and can be used for multiple functions. It can be used for lending money, where the customers apply for loans online without the need to visit a branch. Also, banks and financial institutions can automatically verify the credit status and analyze the financial history of the borrower (Techslang, 2021). The second type of Fintech is Blockchain, where the information is stored in different secured locations to avoid a single point of failure. Using blockchain for transferring funds can reduce the transaction's time and costs. In 2020, Banking accounted for 29.7% of the global blockchain share (nix, 2021). Digital Wealth Management is another type of Fintech, this type enables customers to create accounts from and manage them from their homes using a website or mobile application (Yield, 2021). In addition, this type uses AI algorithms and Machine learning to give financial advice for customers on how to manage their assets (Nonninger, 2021). The last type of Fintech is Payment which will be explained in the next section.

2.3 Fintech Payment

System Designers have been fascinated by Fintech Payment systems because of the important role it has in the implementation of systems, especially when including Payment systems in E-Commerce applications. Fintech Payments are defined as using an electronic medium to perform a financial transaction between a seller and a customer (Abrazhevich, 2004).

Due to the fast development of IT technology and the growing need for simple payment ways, payment services that were formerly only available through financial institutions have evolved into a variety of Fintech payment services. Payment services, unlike classic payment services, may be utilized with a single password or biometric identification, and it has allowed payment using an individual payment service by delivering payment functions within the same system without the need for separate payment action for every financial transaction (Kang, 2018).

According to a study by Singapore's biggest largest bank, digital payments, which was implemented recently, considerably reduced the cost of business-to-consumer payment transactions, increasing mobile payment usage, the number of customers who signed up/used mobile payment jumped by about 54% in the first year following the technology's introduction (Agarwal et al., 2020).

2.4 Mobile Payments and Digital Wallets

Debit and Credit Cards have been developed in the past few years to include Near Field Communication (NFC) Technology, and the same technology has been included in mobile phones that can be used to make payments. NFC or Contactless technology allows the customers to wave the mobile or the cards near the Point-of-Sale (POS) device and complete the money transfer (Altwairesh & Aloud, 2021). And according to Li, Hanna, & Kim, mobile payment is the usage of applications on a mobile or a smart device to transfer money to another person or entity, like paying for a purchased order or paying bills. Mobile payments include paying for items online as well as using the mobile to pay for purchases through POS and other payment methods in actual stores. To perform a payment, the customer needs to link a debit or credit card to an account in the application installed on the mobile phone. The financial sector entities have invested and continue to invest lots of effort to increase the spread of mobile payments and enhance the customer experience while using such payments (Li et al., 2020).

These days there are lots of Mobile payments service provides around the world. Some provide their services locally, and some provide them globally. Alipay is an application developed by Alibaba, the biggest E-Commerce company in China. It supports any mobile device with any operating system, and the application support Bar and Quick Respons (QR) codes and Near Field Communication (NFC) methods for fund transfer. WeChat pay is another Chinese mobile payment application that supports QR codes and payments in offline and online stores. Both Alipay and WeChat pay are famous in China; however, they have no presence outside the country (Kang, 2018).

Apple has introduced Apple pay as a Mobile Payment application which is the most payment application used around the world if we exclude China. It supports only iOS devices and can be used without the need to unlock the device. Apple pay supports only NFC as a payment method; for that, any device that does not support NFC payments cannot be used with the application. Samsung Pay is another Mobile Payments software that is supported by the latest Samsung device. It supports NFC and Magnetic Secure Transmission (MST) as payments methods. Samsung has implemented the most advanced security methods to avoid and exposure or leak to the financial information of the customer (Kang, 2018).

In 2020 revenues from Mobile Payments have increased about 26%, from 1.1 trillion US dollars in 2019 to 1.39 trillion US dollars. 64% is the increase of the number of Mobile Payment applications around the world from 1.4 billion users in 2019 to 2.3 billion users in 2020. This was mainly due to the pandemic of Covid-19, which led the vendors to increase the number of Fintech Payments and forced people to use these technologies more to prevent the spread of the virus. China has the largest percentage of Mobile Payments application users, with 87.3% of the population of China. South Korea is second with 45.6%, and the United States comes third with 43.2%. Even though London is considered the capital of FinTech, the United Kingdom has a low percentage of Mobile Payments applications, where only less than a quarter of the UK's population are using such applications (Curry, 2021).

Digital wallets or E-Wallets are the same as having a physical wallet, but all the money and financial cards are stored digitally and accessed from a mobile device. Digital wallets are managed and retrieved quickly, the data are very secured, and they are protected from loss or stealing (Balan & Ramasubbu, 2009). An Electronic Wallet (E-Wallet), which is also called a digital wallet, is a sort of electronic card and accounts that may be used to make online purchases using software, electronic devices, or any online service that supports electronic transactions. It works in a similar way to a credit or debit card. To make payments, it would need to be linked to your bank account or a physical card (Gulf-Insider, 2021).

In 2025 it is expected that spending using E-wallets will reach 10 trillion US dollars, which will account for an 83% increase compared with spending in 2020. More than half of this spending will be by China and other far-east countries. In addition, it is expected that 50% of the E-wallet spending will be from contactless devices and E-Commerce payments (juniperresearch, 2021). Furthermore, in the United States, 84.6% of Generation Z have already used E-wallets for payments, while 81.3% of the Millennials and 65.4% of Generation X has done the same. In the US also, 62% of males and 56% of females have used E-wallets as a payment method.

2.5 Fintech in Bahrain

The economic vision of the Kingdom of Bahrain was released in 2008 is as follows: "We aspire to shift from an economy built on oil wealth to a productive, globally competitive economy, shaped by the government and driven by a pioneering private sector—an economy that raises a broad middle class of Bahrainis who enjoy good living standards through increased productivity and high-wage jobs" (Bahrain Govrenment, 2008).

For that, the economic vision objective is to increase the dependence on multiple and different sectors of the economy and decrease the dependence on oil and gas as the primary income for the country. A productive corporation between the private and public sectors is required to achieve these objectives. That will eventually lead to economic growth and a better stander for the citizens and residents of the country. Welcoming the investors and entrepreneurs is one of the objectives of the economic vision of the Kingdom of Bahrain to increase the value of the Kingdom in the Global Economy (Bahrain Govrenment, 2008).

After the oil industry, the finance industry is one of the most valuable sectors. It is the second industry after the oil sector to contribute to the Kingdom of Bahrain's Gross domestic product (GDP) (Mohamed et al., 2021). Bahrain has more than 400 local, regional and international financial organizations. Regulating and supervising these organizations are the responsibility of the Central Bank of Bahrain, which was established in 2006 (eGovernment, 2020). A great and welcoming environment has been selected for the international and regional financial organizations by the regulations introduced by CBB. In the mission statements of CBB, they are ensuring to improve the competitiveness of the organizations of the financial sector by encouraging them to use technology in their processes and operations (Central Bank of Bahrain, 2021a).

CBB established FinHub973 as a center for innovations using Fintech. It has tools that enable the users to collaborate with other institutions globally and locally. CBB has created this platform to strengthen financial organizations in Bahrain and support them technically. This platform's objective is to increase the position of Bahrain as a financial center in the Gulf region (finhub973, 2021).

In 1997, a local operator organization for the Automated Teller Machine (ATM) and Point of Sale (POS) Machines was created by cooperation between 17 banks. It was named Bahrain's Electronic Network for Financial Transactions (Benefit). Also, it has been assigned the role of connecting local banks with the ATM network in other Arab Gulf Countries (Benefit, 2021).

Benefit have developed, published and they are managing and constantly enhancing a mobile application that allows citizens and residents to send money to local accounts, pay for utilities, and request money payments. The application is called Benefit Pay, and it also uses technologies like NFC and QR to enhance the speed of payment in stores (Benefit, 2021). Benefit Pay support adding debit and credit cards and banking accounts to be used for payments, and it supports peerto-peer fund transfer using mobile number or QR codes (Gulf-Insider, 2021). The application also has the option of creating a wallet, top-up this wallet, and using it for car fuel payment in stations around the Kingdom (Sadeem, 2019).

Benefit has also developed an Electronic Funds Transfer System (EFTS) system. It is used to transfer funds between local banks and has three main modules. The first module is Fawri + which transfers a small amount of money in less than 30 s. Fawri is used to transfer small to medium amounts, but it takes more time than Fawri + . The third module is called Fawateer, which is used for utility payments. These modules can be accessed through banks' online banking systems or benefit Pay application (Benefit, 2021).

In Bahrain, there are other E-wallet applications similar to Benefit Pay. BWallet is an application developed by Batelco which enables customers to send and receive money using QR code, perform goods and services payments and transfer international funds. STC Pay is an application by STC which is similar to bWallet. It permits users to pay for goods and services and request money from other STC pay customers using QR codes. Also, it supports adding funds to the wallet using debit cards or by using Sadad kiosk devices (Gulf-Insider, 2021).

In Bahrain, Fawri and Fawri + services of the Electronic Funds Transfer System (EFTS) from Benefit transactions increased 317% in 2020, from 13.462 million transactions in 2019 to 56.173 million in 2020 (Central Bank of Bahrain, 2019; Central Bank of Bahrain, 2020b). Contactless transactions in Bahrain increased 70.2% in October 2021, and the total value of these transactions has increased 43.1% (Central Bank of Bahrain, 2021b).

Benefit also has created Benefit Fintech Lab to help institutions develop innovative products using the tools offered by the lab. These tools can increase the productivity of the operations within the organizations. These tools are not limited to financial sector organizations, but any other sector can use them within the Kingdom (Benefit, 2021).

Another example of Fintech in Bahrain is Ila Bank, where all the customer operations are done using a mobile application. Customers do not visit a bank branch as they do not have any branch. The customer needs to download the application from the mobile applications store, register by uploading the required documents through the application, apply for accounts, and request a debit or credit card. All these steps are done from the mobile application. In addition, they have been digitalizing some traditional manual methods of fund management and saving. The application has a function called Jamiya, where users can establish a saving community (ilabank, 2021).

Recently Batelco announced that CBB had approved their request to enter the financial sector by releasing a Fintech application called BEYON Money. This application takes advantage of Fintech and Open Banking technologies to provide the best experience for the customer. The customers can register their Bank Accounts in this application and use them to send funds in real-time from within the application. It centralizes the access to all accounts of the customer in one place, which is available 24/7 and enables customers to manage and review transactions from a single position (beyonmoney, 2021).

Fintech Payments services and products are increasing every day, which increases the need for experienced and skilled employees in this field. Bahrain Institute of Banking and Finance (BIBF) is an institute that provides financial professional degrees and certificates (BIBF, 2021). BIBF has a partnership with Strathclyde Business School to offer a Master's Degree in Strathclyde Business School. This degree provides the knowledge and skills required for people interested in pursuing a career in Fintech (BIBF, 2021).

2.6 Fintech Payments and Covid-19

Advanced Information Technology like Artificial Intelligence (AI) has been used heavily to assist with the lifestyle implemented because of the procedures introduced to fight Covid-19. Many countries worldwide have developed applications to trace contact between people to find the spread of the disease using technologies like GPS and Bluetooth (Lalmuanawma, 2020). Different products and services have been implemented, from analyzing and tracking epidemiological peaks to the advancement of contactless payments. The transformation in technologies introduced in a few months is equal to two years of adaptation if the pandemic did not occur (Piccialli et al., 2021).

Performing financial transactions was and still is a big issue during the peaks of the Covid-19 spread; however, Fintech Payments applications made it easier to access these transactions. Such applications were implemented fast with the help of government regulations and the users' support to use Fintech Payments products during the pandemic, especially using digital wallets as the primary source for payments (Al Nawayseh, 2020).

During the pandemic of Covid-19, the number of debit and credit cards has increased due to regulations from the Central Bank of Bahrain. As a result, many merchants have replaced their POS devices with new smart POS devices that support NFC payment and many other features. Banks also had upgraded their ATMs to include NFC scanners so that the customer is only required to hover the card in front of the ATM in order to withdraw funds.

2.7 Fintech Payments and Regulations

The banking and financial sectors have seen significant changes in recent years. There are various causes for this, including the aftermath of the 2008 financial and economic crisis, more regulation of existing firms, and customer social and behavioral shifts. The digital revolution has been the essential trigger for the fintech phenomena in recent years. From that, it was realized that major financial institutions could have a systemic risk. As a result, many risk-quantification measures have been developed. The regulation provided guidance and enforced helping to overcome the problem (Nicoletti, 2017).

The Central Bank of Bahrain (CBB) is the entity responsible for regulating the financial sector in the Kingdom. They have been regulating and introducing rules to help and assist financial institutions with their operations and implement the best practices and enhance their security. In 2015, I was working in a Bank in Bahrain and was responsible for a project to upgrade the operating systems of ATMs to the latest version (Central Bank of Bahrain, 2014). This upgrade was demanded by CBB because the support provided by Microsoft for the version installed on the ATMs will expire soon. This upgrade to the latest operating system version is to prevent any

security breach, issue, a vulnerability that can be found and avoid someone hacking into the system.

CBB has launched the Regulatory Sandbox Framework to increase Fintech innovation as part of that. CBB has created a FinTech and Innovation unit to ensure that best practices are followed in Fintech and regulate them in the financial sector. The Regulatory Sandbox can test and deliver innovative services for financial and banking institutes. Furthermore, the initiatives of CBB include regulating Crowd-funding issuance (Central Bank of Bahrain, 2020a; Mohamed et al., 2021). Regulatory Technology (RegTech) is part of Fintech, which consists of technologies that force the implementation of Regulatory requirements. RegTech makes it easier for financial institutions to monitor customer behaviors to detect crimes like money laundering (Turki et al., 2021).

In 2020, CBB released several regulations to reduce the financial situation during the Covid-19 pandemic. They have increased the transaction amount limit when using a contactless card without entering the PIN and postponed the installment of loans for six months without extra fees or additional interests (Central Bank of Bahrain, 2020c). In the same year also, CBB has requested from all financial institutions to replace debit and credit cards with the ones supporting NFC without any charge on the customer to avoid any unnecessary contact and reduce the spread of the Covid-19 virus (Central Bank of Bahrain, 2020d).

2.8 Fintech Payments and Customer Experience

According to Shimiao Li, Service Quality, Self-Service Technologies, and Corporate image positively correlate with Customer Experience, increasing customer intention to revisit (Li, 2020). Fintech Payments products and services are developed to improve the customer's experience and eliminate the traditional techniques of financial operations. A good customer experience increases customer satisfaction and loyalty (Barbu et al., 2021b). Individuals may be afraid of using Fintech Payments products and services due to risk concerns; however, because of situations like the pandemic of Covid-19, these concerns may be reduced and increase the number of Fintech Payment users (Al Nawayseh, 2020). Self-Service Technologies (SST) is part of Fintech products and services, and the customer will be satisfied with them when the service has a good quality, has a good demonstration, and is easy to use (Shim, 2020).

According to a study by Ahmad Daragmeh, Csaba Lentner, and Judit Sági, about the usage of mobile payments by Generation X in Hungar, they have concluded that subjective norms, perceived usefulness, and perceived COVID-19 risk have significant effects on the use of mobile payments. Perceived ease of use is the only factor that does not have an effect on the use of mobile payments (Daragmeh, 2021). Furthermore, a study by Reem Altwairesh and Monira Aloud examines the aspects that have an effect on Merchants' intentions to implement Mobile Payments in the Kingdom of Saudi Arabia. It had concluded that compatibility and perceived usefulness have significantly positive effects on the Merchants' intentions to use Mobile Payments while Trust, Cost, and Perceived Ease of Use do not (Altwairesh & Aloud, 2021).

2.9 Quality of Fintech Payments Products and Services

Given the importance of IT in Fintech innovation, customers may see the quality of IT as a benchmark for the overall quality of Fintech; if users perceive the quality of IT in Fintech to be great, the chance of future Fintech usage could increase. That is, IT quality may be a critical component in facilitating users' desire to utilize Fintech, resulting in Fintech's long-term durability (Ryu & Ko, 2020).

Hyun-Sun Ryu and Kwang Sun Ko have concluded in their research that Information and Services Quality has positive effects on the trust of Fintech, which leads to Fintech Continuous intention. On the other hand, System Quality did not have the same positive effect on trust (Ryu & Ko, 2020).

2.9.1 Fintech Payments Challenges and Risks

Fintech Payment products and services have many advantages, but there are some challenges and risks when using these items. Financial institutes could have cyberattacks that target customers' funds, data, and privacy (Hollanders, 2020). Hackers can expose customers' security data and preach un-secured mobile payment services. Creating complex Fintech Payment services and products can negatively impact their usage, and customers will shift to competitors (Kang, 2018). Loose or tight Fintech regulations can hurt the development and use of Fintech Payments. Financial institutes will either neglect data privacy and protection procedures with loose regulations or shift away from developing such products and services if tight regulations are implemented (Firmansyah & Anwar, 2018).

Authorization and authentication, atomicity, privacy, integrity, and availability are all required for a mobile payment service to be secure. More than any other service, the financial services should be evaluated carefully since if a weakness is found in the service, it immediately impacts the business. If it fails to attain those standards, it will not only be committing a basic service failure, but it will also be triggering severe harm to the customer. While the requirements of security for traditional payment services and mobile payment services are comparable in various ways, mobile payment services run through a wide range of operating systems and devices, and it will have a shortage in the resources to execute security programs. Furthermore, because it is mobile and not anchored in a single place, it is harder to develop a security mechanism than conventional payment systems. Because several firms are continually introducing mobile payment services, it is vital to build services that consider all of these aspects in order to stay competitive (Kang, 2018).

A study by Norma Diana and Farah Margaretha Leon concluded that the continuance of intention FinTech payment is affected significantly and negatively by the perceived risks. Also, the perceived risks are affected positively by financial, legal, and security risks. For that, any increase in these risks will result in a decrease in usage of Fintech Payments usage between Millennials in Jakarta (Diana & Leon, 2020).

3 Conclusion

Fintech has been an essential part of the daily life of the financial and non-financial institutes and the customers of these institutes. This Literature Review explained the Financial Technology concept briefly and stated some examples from the types of Fintech.

The main focus of this research is the payments type of Fintech, where technology is used to transfer funds between two entities. Fintech Payments products and services have improved financial operations by increasing the speed of transactions, enhancing the quality and performance of financial procedures, and reducing human interactions.

Fintech Payments products and services include Debit and Credit cards using the latest technologies like NFC, E-Wallet applications, and POS and ATMs using the latest and advanced technologies.

This research also stated some examples of Fintech products and services in the Kingdom of Bahrain and how they align with Bahrain's Economic Vision 2030. Both of the public and private sectors in Bahrain have implemented Fintech products and services and encouraged their usage. Fintech is very important for the financial operations in Bahrain, which led BIBF to introduce a Master's Degree in Fintech to enhance the skills and knowledge of employees in the financial sector.

This Literature Review focused on four factors that affect the usage of Fintech products and services. The Pandemic of Covid-19, Regulations, Customer Experience, and the Quality of Fintech products and services, all these factors have effects on the use of Fintech in Bahrain. Finally, the research has concluded with the challenges and risks that could have negative effects and can result in rejection of Fintech usage by the customers.

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The Influence of Cybersecurity on the Firms' Financial Performance



Nuha Sulaiman, Allam Hamdan, and Abdulmutallab Al Sartawi

Abstract The acceleration of cyber-attacks in the past few years certainly has negative influences on the investors and shareholders' trustworthiness in the firms' abilities to protect their interests. This is likely to be reflected on the firms' shares price. Thus, the influence of cybersecurity on firms' overall performance is a questionable issue. To be able to proceed through the cyber risks, firms face the challenge of enhancing their cybersecurity to avoid and combat against the endless cyber-attacks. Further to that the studies that cast light on the relationship between cybersecurity and firms' performance from a holistic perspective are lacking.

Keywords Cybersecurity · Firms' financial performance · Cyber-attacks

1 Introduction

In spite of the fact that different investors and shareholders of different firms expect that their organizations do their best to protect them against all types of risks, there are guarantees that this comprehensively takes place in the present era (Al-Sartawi, 2020). Under the umbrella of the information technology revolution and the rise of the internet and artificial intelligence applications, information turned to be amongst the most significant assets that any organization possesses. However, this information is vulnerable to attacks from different unknown sources (Reber, 2016). Due being vulnerable to theft, most of the world's organizations that possess valuable data about its processes and assets tend to employ a cybersecurity strategy to protect the privacy of its shareholders and investors. Moreover, and on a country basis, more than fifty countries have their own cybersecurity strategies according to which they can

N. Sulaiman

Ministry of Works, Manama, Bahrain

A. Hamdan (⊠) · A. Al Sartawi Ahlia University, Manama, Bahrain e-mail: allamh3@hotmail.com

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confront the endless threats coming from the cyberspace. The kingdom of Bahrain is one of those countries that have a strategy for its cybersecurity (Ali, 2019).

Khalil et al. (2020) claim that the contexts of the current business environment witness the occurrence of various disruptive technologies that include social computing; next generation mobile computing and cloud computing. These technologies do continually shift the how information technology can be employed for the purpose of sharing and reserving information. There are current reports indicating that around 70% of the transactions are conducted online. This is in fact a major source for increasing the likelihood of data vulnerability as well as increasing the need for a high level of secured systems through which transparency of the online transactions can be guaranteed. ensure transparent and best transactions (Al-Sartawi & Razzaque, 2020). The concepts that are employed for referring to the security issues of information and digital devices involved "Computer Security", "IT Security", and "Information Security". Nevertheless, and at the most recent times, the concept that is most widely used all over the world is "Cyber Security".

One of the worldwide recognized definitions for the concept of cybersecurity refers to it as "the protection of internet-connected systems such as hardware, software and data from cyberthreats. The practice is used by individuals and enterprises to protect against unauthorized access to data centers and other computerized systems" (Ryan, 2018). Based on the findings of Rayan (2018), it is ensured that cyber security constitutes a superset of security practices that include IT security; information security as well as some other related practices. Consequently, the security of enterprises IT systems are not included within the scope of Cyber Security. In addition to that the cybersecurity scope covers the cyber space itself plus its critical infrastructure (Solms & Van Niekerk, 2013).

The significance of cybersecurity occurs when its contributions to the development of information technology and Internet services are recognized. When firms are not able to secure their information and the transactions, they are then vulnerable to numerous cyber risks. These risks grew both in terms of number and criticality in the past few years (Wang et al., 2013). Accordingly, firms' boards of directors have always to be aware of this danger. They must make sure that their firms apply the appropriate adequate cybersecurity measures so that they can manage any related cyber fraud risks. Boards are recommended to make sure that their firms disclose material cyber risk and breaches (Radu & Smaili, 2021).

1.1 The Research Problem

1.2 Research Objectives

The key objective of the present research is to assess the influence of cybersecurity on listed firms' financial performance in the kingdom of Bahrain.

1.3 Research Questions

Based on the research problem above, the key research question of the present research will be:

Is there a significant influence of cybersecurity OF on the listed firms' financial performance in the kingdom of Bahrain?

Literature Review

2 Introduction

There is no doubt that the third and fourth industrial revolutions have made great technological improvements that benefited firms in all sectors. Thanks to the two revolutions, most of the transactions are digitalized. Firms' growth enhanced due to these developments, and they are able to be more global than ever before. However, the fruits firms ripe from these two technological informative revolutions were not all beneficial. Many drawbacks accompanied the merits of the technological advancements (Khalil et al., 2020). A growing community of hackers managed to exist and threaten the security of firms' information that is reserved on the cloud as well as the security of the transactions conducted online. Different types of institutions face too many cyber risks due to the transmission from traditional transactions to digital ones within the past few years relying on the technological innovations that are currently part and parcel of the world of business (Haupert, Maier, & Tilo, 2017).

Cyberattack attacks can be defined as "any offensive maneuver that targets computer information systems, computer networks, infrastructures, or personal computer devices" (Finnemore & Hollis, 2020). Through these attacks, hackers employ the technological means they possess for the purpose of having access to firms or persons' data, operations, or any other restricted domains of the system without having the authorization, potentially with malicious intentions (Koppel, 2015). Through cyberattacks specific targets are stolen, altered, or destroyed. Amir et al. (2018) assume that the nonstop cyberattacks that confront firms will certainly lead to losing valuable and sensitive data, hacking, ransomware, insider threat and phishing for these firms. These attacks represent creates a problematic issue and numerous questions concerning the ability of these firms to perform well.

There are claims that firms have to be ready to ready to deal with the threats related with the continuous cyberattacks that threaten them and that grow fast in the present era (Abraham, Chatterjee, & Sims, 2019). Through having an enhanced cybersecurity systems firms are expected to mitigate the threats related to the cyberattacks that face them. Breaches are to a great extent prevented and they grow more and more able to deter cyber threats effectively. They are recommended to apply the procedures and policies that help them recognize any unauthorized internal or external practices;

keep their software continually updated; and allow their employees or any third parties to identify cyber incidents (Symantec Corp, 2016).

One of the most problematic issues related to understanding cybersecurity is the identification of an accepted definition for the concept. Exploration of the related literature shows that there is a scarcity of what the term 'Cybersecurity' does actually mean and how it is placed within different contexts. It goes without saying that absence of universal agreement on the definition that involves all the possible dimensions of cybersecurity represents a challenge for specialists to determine the best technological and scientific means through which dilemmas related to cyberattacks can be resolved Al-Sartawi.

Amongst the procedures that firms tend to adopt to avoid cybersecurity threats, a cyber risk assessment is conducted. Through this assessment, firms employ firm's critical and confidential data are checked. Their abilities to identify vulnerable areas is enhanced. Employees are also trained to find out cyber threats and vulnerabilities (Ali, 2019). Firms in different industries are no able to ensure that they employ the adequate preventive controls as well as the right training courses for the employees. They have their own incident response plans developed so as to be able to deal with numerous types of potential cyber threats. Many firms own threat neutralization strategies plus some data recovery procedures (Naj, Chinckus, Mostafiz & Najaf, 2020).

Owing to the possible harmful results that are linked to cyberattacks, firms do now understand that cybersecurity represents the top enforcement of their own priorities. Cybersecurity is currently highlighting the firms' ability to defend their own interests and the interests of the shareholders and the investors. That is why governments ensure that it is mandatory for firms to have their cybersecurity strategies. In the kingdom of Bahrain, there is a national cybersecurity strategy according to which the majority of firms adopt their own (Ali, 2019).

2.1 Cybersecurity

Owing to the ever increase in people and firms reliance on digital technologies and Internet-of-Things (IoT), numerous issues related to the security of the data shared and reserved on the internet arise especially in the first and the second decades on the twenty first century (Li et al., 2015). Much suffering is observed as result of the incidents related to unauthorized access to the data, attacks from different types of malware; zero-day attack; breach of the reserved and shared data; services denial (DoS); and or phishing, etc. (Sun et al., 2018).

Cyber risks have witnessed exceptional increase during the first and the second decades on the twenty first century. To clarify, in the year 2010, the security community only knew that there were a number below 50 million unique malware executables (McIntosh, Jang-Jaccard, Watters, & Susnjak, 2019a). The number of these malware executables was doubled by the end of the year 2012 and reports ensured that it reached about100 million. Expectedly, after seven years and specifically in

the year 2019, there were roughly 900 million malicious executables which were identified to the security community all over the world (Sarker, et al., 2020). Based on studies conducted on this domain of knowledge, there are expectations that this number will grow (Av-test institute, 2021).

There is an agreement that many losses are connected to the occurrence of the cybercrime as well as the cyberattacks. These losses may lead to catastrophic financial losses for all types of firms and consequently for nations. Firms as well as people are victims of such attacks. There are estimations that, the breach of data costs 8.19 million \$ only for the United States of America. The average losses for all the world countries reaches 3.9 million \$ on an average per annum (IPM, 2019). The economy of the entire world incurs financial losses of the cybercrime to reach 400 billion \$ (Sarker, et al., 2020). The total number of the records that are vulnerable and breached yearly is expected to roughly triple through the next 5 years. Thus, it's essential that organizations need to adopt and implement a strong cybersecurity approach to mitigate the loss. Based on what is introduced by Papastergiou, Mouratidis and Kalogeraki (2019), security of any nation is measured by the individual, firms, and government ability to have secure access to applications and instruments. The capacity to identify and get rid of the cyber-threats as soon as possible also determines the level of security they enjoy. Consequently, one of the most critical issues that must be resolved as soon as possible especially for firms to is to effectively identify the numerous cyber threats which are seen or unseen before, and to avoid any cyberattacks that are likely to harm all the relevant systems (Fischer, 2014).

2.1.1 Definition of Cybersecurity

There have been great evolvements in Information and Communication technology knowledge domain through the past fifty years. This is the main factor behind the improvements that are observed in the information and communication technology industry. This industry is currently a popular one that is closely integrated with the modern society. This means that, policymakers are greatly concerned with protecting ICT systems as well as its applications against threats of cyber-attacks (Rainie, Anderson, & Connolly, 2014). The practices undertaken to protect ICT systems against all types of cyber-threats or attacks is recognized as cybersecurity (Fischer, 2014). As a matter of fact, there are numerous issues that can be linked with cybersecurity. These issues involve the applied measures through which information and communication technologies are protected; the raw data plus information that is involved and their processing and transmitting; the linked virtual and physical components of the systems; the level of protection coming from the implementation of such measures; and finally, the linked domain of professional endeavor (Fischer, 2005).

Vague as the concept of cybersecurity is, not many attempts were made to provide definitions for it (Sun et al., 2018). One of the definitions that were provided to the concept pf cybersecurity referred to it as "a set of tools, practices, and guidelines that can be used to protect computer networks, software programs, and data from

attack, damage, or unauthorized access" (Craigen, Diakun-Thibault, & Purse, 2014). A second definition refers to it as "a set of technologies and processes designed to protect computers, networks, programs and data from attacks and unauthorized access, alteration, or destruction". Based on these definitions, cybersecurity is to a great extent concerned with the recognition of the different cyber-attacks and coming across strategies for defense that contribute to preserving many of the properties that are referred to as below.

- (1) The first is "confidentiality" that refers to the "property used to prevent the access and disclosure of information to unauthorized individuals, entities or systems" (Jang-Jaccard & Nepal, 2014).
- (2) The second is "integrity" that refers to "a property used to prevent any modification or destruction of information in an unauthorized manner" (Council et al., 2017).
- (3) The third is "availability" that refers to "a property used to ensure timely and reliable access of information assets and systems to an authorized entity" (Bilge & Dumitraş, 2012a, 2012b).

Mukkamala, Sung, and Abraham (2006) ensure that the concept of cybersecurity is employed in different contexts, including business and mobile computing. The concept is possibly classified into various common categories. These categories involve: (1) network security which does basically concentrate on securing the computer network against cyber attackers or intruders; (2) application security that that focuses on protecting software and the hardware against risks or cyberthreats; (3) information security that casts light on security as well as privacy of any related data; and (4) operational security that entails the processes of addressing and protecting data assets. There is an agreement that cybersecurity systems are made up of network security systems and computer security systems that entail a firewall, antivirus software, or an intrusion detection system (Sarker, et al., 2020).

2.1.2 Cyberattacks and Security Risks

Fischer (2014) assumes that there are three security factors that consider risks which are typically linked with any attack. These three factors are: (1) "threats" such as the person that attacks; (2) the "vulnerabilities" such as the fragile points that are attacked; and (3) the "influences" such as what results from the attacks. The security incident represents the practices that influence the confidentiality, integrity, or availability of information assets and systems. There are various categories of cybersecurity incidents that are likely to lead to security risks on the systems of the firms and the networks or on the individual (Sun et al., 2018). These incidents include:

 Unauthorized access: In this type, information is delivered in the network or on the systems. This delivery of the data that takes place without authorization leads to some kind of violation of the security policy (Alazab, Venkatraman, Watters, & Alazab, 2010);

- (2) Malware: It is recognized as malicious software and that refers to any program or software that is designed on purpose so that it creates damage to the software, the customer, the hardware, or computer network. There are many examples of that represent the various categories of malware such as viruses of the computer, worms, Trojan horses, adware, ransomware, spyware, malicious bots, etc. (Jang-Jaccard & Nepal, 2014). The ransom malware, which is also known as ransomware, refers to that novel form of malware that deprives users from having access to their systems or personal files, neither the hardware components. It requires the other party to pay a sum online. This payment is anonymous so as to restore access (McIntosh, Jang-Jaccard, Watters, & Susnjak, 2019b);
- (3) Denial-of-Service: It is the incident that represents a category of the attack used to force a machine or network to be locked, leading it to be inaccessible by its specified users through the process of flooding the target with traffic that triggers a crash (IPM, 2019). The Denial-of-Service (DoS) attack can perfectly make use of one computer that is connected to the internet, and at the same time distributes denial-of-service (DDoS) attack makes use of various computers and internet connections to flood the targeted resource (Sarker et al., 2020);
- (4) Phishing: It represent the category of social engineering, that is employed for multiple malicious activities that are fulfilled via human interactions, through which the fraudulent attempt contributes to collect sensitive data including details about the customer banking activity; data about the credit card; credentials for login; data about identifying the users' information through disguising oneself as a trusted individual or entity by an electronic communication including email, text, or instant message, etc. (Jang-Jaccard & Nepal, 2014);
- (5) Zero-day attack: This type of incident is regarded as the concept that is employed for providing descriptions for those threats that seem to be unknown by the developers of the application (Bilge & Dumitraş, 2012a, 2012b).

In addition to the incidents that are mentioned above, there are others that include privilege escalation; password attack; insider threat; man-in-the-middle; advanced persistent threat; SQL injection attack; crypto jacking attack; web application attack; etc (Jovičić & Simić, 2006). These are well-identified as security incidents in the cybersecurity domain. The data breach constitutes another category of security incidents, identified as a leak of data, that is included in the unauthorized access of data through the individual, application, or service (Shaw, 2009). consequently, all breaches of data can be considered as security incidents; nevertheless, all the security incidents cannot be regraded as data breaches. The majority of data breaches that take place in the banking industry include the credit card numbers, personal data (Khraisat, Gondal, Vamplew, & Kamruzzaman, 2019).

2.1.3 Cybersecurity Defense Strategies

Khraisat et al. (2019) ensures that there is a need to have specific defense strategies so as to protect firms' data; information systems, and networks against the cyberattacks or against any other interventions. More preferably, these strategies are in charge of data prevention; data breaches; or security incidents as well as monitoring and dealing with the interventions that can be identified as any type of unauthorized practice that generates damage an information system. Another thing is the intervention system that is known as "The intrusion detection system (IDS)" typically refers to "the hardware or software application which is used to monitor a computer network or systems for the identification of any malicious practices or policy violations" (Johnson, 2013). Those traditionally identified solutions for security incidents that firewalls, anti-virus, access control, data encryption, user authentication and cryptography systems, can sometimes be ineffective based on the current criteria in the cybersecurity domain (Mohammadi, Mirvaziri, Ghazizadeh-Ahsaee, & Karimipour, 2019). Further to that this intrusion detection system (IDS) is used for the purpose of resolving any problematic issues through analyzing security data via various significant points in the computer network or system. To add, intrusion detection systems grows more likely to help identify both internal and external attacks (Ou et al., 2019).

There are various types of the intrusion detection systems (IDS) based on the scope of applicability. One example is the "host-based intrusion detection system" (HIDS). Another example is the "network intrusion detection system" (NIDS). These two examples are definitely the commonest types accordance to the scope of single computers to large networks. In the first example which is the HIDS, the system control and keeps an eye on those critical files that exist on an individual system, and at the same time this system analyzes and controls the connections of the network to avoid any suspicious traffic in a NIDS. Likewise, and in accordance to methodologies, the signature-based IDS, and anomaly-based IDS represent the most popular components (Brahmi, Brahmi, & Yahia, 2015). These IDS include:

- (1) Signature-based IDS: It is a signature that is can be like a series, pattern, or rule that is established in advance and handles a well-defined attack. A special pattern can be recognized as the identification of specific attacks in a signature-based IDS. One example for a signature is possibly those patterns or a byte sequence in a network traffic, or sequences employed by malware. To identify the attacks, anti-virus software some categories of sequences or patterns are employed as a signature at the same stage when the matching operation is conducted (Liao, Lin, Lin, & Tung, 2013). Further to that signature-based IDS is identified as knowledge-based or misuse detection. Efficiency of this technique is applicable in order to deal with a huge amount of network traffic; nevertheless, it is solely confined to the identified attacks. Therefor, recognition of new attacks or unseen attacks ones represent a massive challenge that confronts this signature-based system.
- (2) Anomaly-based IDS: Alazab, Venkatraman, Watters, and Alazab (2010) ensures that the system of anomaly-based detection is planned to enable users

address all the challenges that are identified when signature-based IDS are employed. The first thing to do when the anomaly-based intrusion detection system is applied, is to investigate the behavior of the network. This is intended to recognize the dynamic patterns. This is followed by generating a data-driven model automatically to describe the normal behavior, and consequently identifying any deviations. Based on Alazab et al. (2010) this mean can that anomalybased IDS can be dealt with as a dynamic approach, that pursue the behaviororiented detection. The key merit of anomaly-based IDS is its capacity to find out those unidentified or zero-day attacks (Dutt, Borah, Maitra, Bhowmik, & Maity, 2018a). Notwithstanding, the point is that the recognized anomaly or abnormal behavior can not always be thought of as an indicator of intervention. This is possible to happen at certain times due to the numerous factors that including policy shifts or offering a novel service (Cao, 2017).

Further to the above, (Viegas et al., 2016) ensures that the hybrid detection approach considers the demerits of the misuse and anomaly-based techniques that are aforementioned and that are applied to identify the intrusions. In the hybrid system, the misuse detection system is applied for the purpose of identifying the recognized categories of intrusions and anomaly identification system is employees for new attacks (Dutt, Borah, Maitra, Bhowmik, & Maity, 2018b). Plus these systems, there is a stateful protocol analysis that is possibly applied to identify intrusions that recognizes deviations of the state of the protocol just like the anomaly-based method; notwithstanding, it employs previously designed global profiles that are based on accepted definitions of benign activity (Liao, Lin, Lin, & Tung, 2013). In the following Table 1, the commonest approaches are summarized so as to refer to their merits and demerits. When the identification process is finalized, the intrusion prevention system (IPS) that is planned to deprive any malicious events, is applied to minimize the risks in various means such as providing notification, manual, or automatic process (Cao, 2017). These systems include the automatic response system

Approach	Pros	Cons
Signature-based IDS	A method that looks the simplest and the most effective to identify the known threats	Ineffective for identifying unknown attacks
Anomaly-based IDS	Shows effectiveness in the process of recognizing novel and unforeseen attacks	Not always applied as an indicator of intrusions, and possibly maximizes false positive rate
Hybrid approach	Mitigates the false positive rate of unidentified attacks	The model is possibly complex
Stateful protocol analysis approach	Know and pursue the protocol states	Unable to identify attacks looking like benign protocol behaviors

 Table 1
 Cybersecurity defense strategies

that is probably more effective since it never entails any human interface amongst the systems of detection and response.

This table summarizes the cybersecurity defense strategies presented in this section

2.1.4 Cyber Security in Firms of Bahrain

Expectedly and with the increased reliance on the information technology in the Bahraini society that is taking great steps towards being a knowledge society, the Bahraini firms in different domains adopt these technological and informative advances so as to improve the quality of the services and products provided to the Bahraini consumers. With these shifts both on the societal and firm levels, immense amounts of data is shared and kept to be utilized for various reasons. Data is thus accessible and confront multiple risks that are described above. Hackers' ability to influence the security of the data is not a questionable issue anymore (Ali, 2019).

One evidence for the drastic influences of the cyberattacks that are assessed in the kingdom of Bahrain is the report issued by Trend Micro Incorporated. The annual report of the leading firm in the field of cloud security, has been released concerning the status of Cybersecurity in Bahrain during the year 2020. This report was under the title "The Streaming Security Threats". The report highlights the most prominent features of cybersecurity and security threats witnessed in the past year in the kingdom, providing those concerned with the necessary strategic information to take protection and detection measures, especially in light of the new reality resulting from the repercussions of the Covid-19 pandemic.

Statistics showed that Trend Micro managed to stop 62.6 million attacks last year allover the entire world, 91% of which were attacks targeting email. The report also showed that about 119,000 cyberattacks were detected every minute in 2020, with most employees heading to work from home, which resulted in great pressure on the security infrastructure as a result of these attacks (Trend Micro, 2021).

In Bahrain, Trend Micro's innovative solutions have detected and stopped more than 6.2 million email threats, and prevented more than 600,000 attacks using malicious links, as well as approximately 1,171 attacks via host links. Trend Micro has also contributed to identifying and stopping more than 200,000 malware attacks, as well as blocking and stopping nearly 140 malware attacks targeting banking and banking sites.

According to the report of Trend Micro (2021), home networks in Bahrain constituted the main source of attracting cybercriminals who target systems, devices and networks. Across the country, with its Smart Home Network solution, Trend Micro has stopped more than 31,000 internal and external attacks, as well as prevented nearly 1.6 million incidents that could be targeted by hackers, taking control of home devices with malware, or obtaining sensitive information. and mission, or intercept communications, or launch external attacks. It is ensured that remote work has become the new reality, so there was a need for firms to adopt all digital tools and solutions that would enable them to confront the advanced threats associated with this new landscape (Trend Micro, 2021).

Having been exposed to the facts above, there is no way to escape the reality that multiple risks threaten the ability of these firms to protect the interests of the Bahraini shareholders an investors since many cyberattacks were discovered (Economic Times, 2016). The most significant areas that cyber security covers include security of the application; security of data; recovery of disaster; and security of the network.

To deal with the risks related to the cyberattacks, the kingdom decided to adopt basic technological shifts and to implement the IT services everywhere : in the public and private sectors. Based on the leadership orders in the kingdom, the government has been transferring towards the digitalized economy that is keen on generating specific novel pillars to depend on Schlienger and Teufel (2003). It is agreed that numerous categories of services are provided through the government and different of firms have been delivered through these digitalized platforms. These services are mainly established on the principle of systems cointegration; cyberspace; data; and the availability of the infrastructure. Though this increasing reliance of the public sector on the digitalized services, it is possible that confidence linked to the services obtained to be lost. Once confidence is missed, the gains collected from applying these digitalized services are lost (Ali, 2019).

2.1.5 Problems with Cyber Security in Firms of Bahrain

Cybersecurity has become an integral part of the transformation towards a digital economy in Bahrain, the region and the world. Experts pointing to the importance of strengthening cooperation between the public and private sectors to ensure they are adequately prepared to confront the growing cybersecurity threats, and to sustain and securely provide ICT services.

Al-Alawi, Al-Bassam illustrated a conceptual model which shows the factors affecting cybersecurity in the banking sector in the Kingdom of Bahrain. The factors were categorized as independent and dependent including management support, budgeting, policies, compliance and culture of cybersecurity within the businesses which all relate to cybersecurity awareness, i.e., dependent variable.

Ali (2019) suggests that the factors that may have direct and/or indirect effect on cybersecurity issues in the Bahraini firms include the external environment such as political situation, pandemics, and economic situation, nature of the business operations, such as telecom, health, banking, manufacturing, and employee mindset, whether employees are familiar with technology, educated, biased or are of multinational background. Furthermore, management actions, the nature of HR policies and processes and the overall company culture are factors that can elevate or demolish the cybersecurity in the firms. For example, unclear HR communication of guidelines, biased management actions favoring staff over each other will not support best practice to obtain the finest cyber security culture within the firm.

2.1.6 Addressing Cybersecurity Issues in Bahrain's Firms

There is an increased importance for giving cybersecurity more attention by firms and different institutions that operate in critical sectors as energy, finance, health, education and others. In the era of the digital revolution and the emergence of modern technologies, most institutions, including government institutions, saw the need to reconsider the methods of providing services and customer experience, which leads to a qualitative shift in the services provided and the creation of new channels for these services on the one hand, and a higher potential for cybersecurity risks on the other hand (Mirza, 2021).

The Kingdom of Bahrain is characterized by the existence of a clear system for the governance of cybersecurity or electronic security represented by the General Department for Anti-Corruption and Economic and Electronic Security under the umbrella of the Ministry of Interior. The efforts made by the Information and eGovernment Authority in this regard as the body responsible for protecting and securing information in the government data network are praised. These entities make sure that through they apply the latest technologies as well as ensuring the quality of information security for all government institutions. Several programs and workshops are launched so that information security is ensured. In addition to those supporting services are provided as well responding to information security incidents in government institutions (Mirza, 2021).

Ali (2019) assumes that more attention is being raised by the Bahraini firms to improve their capacities to prevent malware attacks such as "ransomware" and others, which have begun to intensify and increase recently, and to discover the latest systems and tools for detection and prevention of intrusion. In addition to a machine learning-based approach to detecting and avoiding cyber-attacks in its infancy (Finnemore & Hollis, 2020).

2.1.7 National Cyber Security Strategy

The national cyber security strategy that has been introduced by the Bahraini government is probably the most significant endeavour in the kingdom to achieve information technology security. The strategy is in fact is comprehensive national strategy that is presented to handle the present and increasing cyber-threats so that such IT risks are minimized.

To be to the point the national cyber security strategy is in fact a commitment through which the authorities in charge can protect Bahrain's interests in cyberspace. This strategy is contrived to find solutions for the present Bahraini cyber-threats.

In addition, this strategy shows Bahrain's vision and presents the objectives that can be achieved in the domain of cybersecurity from the implementation of the strategy. The main pillars upon which this strategy is built include the leadership most prominent principles; the shared values as well as the responsibilities. There are impacts for this strategy on the national and international best practices. Most importantly, this strategy adheres to the rules that preserve the individuals' rights and values.

2.1.8 Increasing Awareness About Cyber Security

It is possible that one of the most important procedures that is adopted in order to handle cyber security issues in Bahrain is adopted by the E-Government Authority. In the E-Government, there are numerous programs as well as some initiatives that address information security issues. These programs have been launch since 2016 to increase the awareness of the government employees against cyber security. Various systems have been presented through these programs to protect the technologies employed.

2.1.9 National Cybersecurity Committee

There are various responsibilities that tis committee undertake. These include:

- 1. Creating a governance structure through which Cybersecurity issues are handled at the highest level.
- 2. To follow the means through which the National Cybersecurity Strategy is implemented.
- 3. To increase the Bahraini people's awareness about risks related to cybersecurity.
- 4. To present different activities that lead to improving the national Cybersecurity endeavors.
- 5. To lead the public and private sector organizations towards applying the best cyber-agenda.

There is no doubt that different entities and personals are confronted with various IT threats. These usually stem from the increasing dependence on technological facilities when carrying out different tasks. The malicious acts are confronted through national strategy and a committee for the cybersecurity in the kingdom of Bahrain. There are specific objectives and vision for the cybersecurity interventions in Bahrain.

Zimmermann focused on the staff ability to become a significant contributor to the cybersecurity of the business rather than being the cause of the problem; furthermore, management must view the cyber system of the company as a sociotechnical system with a lot of players including employees, technology, processes and factors such as governance guidelines, organizational structure and interaction levels. A comparison between the of problems facing government and industry entities and the role of humans in such factors. The study revealed that government sector problems were related to employee level i.e. human is viewed as problem in reality; whilst Zimmermann recommends that humans are part of the solution, focusing on success, encourage learning, collaboration and communication. However, the study assumes that employees are trustworthy which is unrealistic and future research should be made on to find out correct measures that can positively support shifting to a new attitude towards humans and cybersecurity (Winder, 2018).

Cybersecurity needs a lot of knowledge and requires a lot of participants, with a spectrum of background, to deal with it and take decisions on spot, in addition to being complicated in its nature. Tisdale needs that viewing cybersecurity at a technology point of view is not enough and that it is in fact a complex system where all levels of employment should participate, and that the functions of such system should be recognized by starting with the business problem at hand (Jannsen, 2014).

2.2 Financial Performance

2.2.1 The Concept of Performance

The concept of 'Performance' represents one of the most significant terms and has a worldwide focus socially in the world of business and finance. Much concentration has been to the concept particularly from researchers and experts. By definition, Performance can specifically refer to "the process or action of performing a function or task" (Harelimana, 2017). Further to that, 'Performance' can be defined as, 'the accomplishment of a given task measured against pre-set known standards of accuracy, completeness, cost, and speed" (Dash, 2017). Thus, Performance can be understood as a task or operation that is perceived based on the rate its success. When 'performance' is mentioned in a contract it is recognized as "the state of fulfilment of an obligation in a manner that releases the performer from all liabilities under the contract" (Bain & Company, 2018). Moreover, the term of 'Performance' has been identified as, 'the action or process of performing a task or function', (Arshad, Othman, & Othman, 2012).

When organization Performance is to be defined, many processes and procedures are concentrated on. Organizational performance entails an analysis for the firms performance against a criterion showing how well the objectives and goals are reached, or to what extent these objectives are fulfilled. Simply, organization performance reflects the real outcomes and compared to the actual outputs in comparison with designed plans previously. Such analysis does basically cast light on three major outputs which are: the shareholder value performance; the financial performance; and the market performance, (Font, Walmsley, Cogotti, McCombes, & Häusler, 2012).

2.2.2 Financial Performance

There is an agreement that financial performance mainly shows the outcomes of any business organization as well as the results reflect the organization's overall financial health through a particular period of time. Financial performance gives an image of how well the organization is proceeding, and how well it is concerning utilizing the available resources. It reflects the organization ability to increase wealth of the shareholders wealth as well as their profitability (Naz, Ijaz, & Naqvi, 2016). Despite a comprehensive assessment of the firm's financial performance can essentially consider various and different measures, the commonest of these measures employed in the domain of finance and statistical inference is financial ratios (Thachappilly, 2009).

Firms' financial performance can be defined as "the process of measuring all the firms' policies and operations in monetary terms" (Prasad & Ahmed, 2011). Firms' financial performance is often employed for the purpose of measuring the efficiency and efficacy of the firm. In addition, it always involves all the repetitive practices carried out by the firms' management to reach its organizational objectives, observe progress in the direction of these objectives, and make the required amendments to fulfil those objectives in a more effective and efficient manner. In other words, measuring the firms' processes in terms of value in dollars, pounds, euros, etc. Thus, the level of the firms' financial performance is judged and evaluated through reviewing the return on assets and its return on investment. In addition, the firms' financial performance could be judged by measuring its value added.

2.2.3 Shareholder Value

The domain of shareholder value performance assesses how much a firm is able to increase the wealth of its shareholders. Many studies ensured that the shareholder value is possible considered as the final firm's performance measure, and that it is recommended to be located in the top priority of the firms' senior management. In other words, shareholder value refers to "the firms' market capitalization" (Mallin et al., 2014).

2.2.4 The Significance of High Firm Performance

Organizational Performance is one of the most well-known concepts in the world of business and management. Organizational Performance mainly refers to how successfully an organized group of people with a purpose perform a function. Several researchers assure that this concept comprise several areas. Organizational Performance has become one of the most popular terms in the terminology of the world of business nowadays, and the idea of managing organizational performance has become widely accepted all over the world. There are several authors who have highlighted the importance of organizations achieving high performance for business organizations. They assure that achieving high level of organizational performance would result in ensuring long-term survival for the organization on all levels, especially the economic and environmental ones. Besides, the high level of organizational performance could turn to be the firm's competitive advantage as it means better financial results in comparison with its competitors (Gentry & Shen, 2010).

Furthermore, accomplishing high organizational performance leads to better employee attitude, as it urges employees to feel and take more responsibility for improving the organization's processes, products, and services. Moreover, the high organizational performance motivates the employees to cooperate more and better both internally with their colleagues and externally with the firm's suppliers and customers and makes them more open to the different ideas from other people. In addition, accomplishing high level of organizational performance naturally leads to better financial results as it increases productivity and profitability as the same people do more with more success and as the costs become lower and the company's turnover becomes higher, Artiach, Lee, Nelson, & Walker.

3 Conclusion

This study is a quantitative one that collects real data about the cybersecurity practices adopted by listed firms in Bahrain and about their financial performance. These data are collected for the ended financial year 2020. This is expected to help the researcher explore the influence of cybersecurity on listed firms' financial performance in the kingdom of Bahrain.

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The Fact of Corporate Governance in the Palestinian Territories



Mohammad Kamal Abuamsha 🕑

Abstract The study aimed to identify the main features of the governance of public shareholding companies listed on the Palestine stock Exchange until the end of the year 2020 and for all 47 companies, With the aim of providing the necessary information for decision makers regarding the basic aspects related to the governance of these companies. The study concluded that the minimum number of shares that a shareholder must own for the purpose of running for membership in the Board of Directors has increased, which makes the majority of shareholders ineligible to run for membership in the Board of Directors as a result of their lack of the required minimum number of shares. Which may be one of the reasons for the concentration of the membership of the companies' boards of directors in a specific category of shareholders (major shareholders). It is necessary to point out that there are other reasons for this phenomenon, the most important of which is the lack of a large percentage of shareholders attending the meetings of public bodies, and some shareholders owning large numbers of shares Listed company.

1 Introduction

The issue of corporate governance has become one of the most important topics currently discussed, specifically after the repercussions of the global financial crisis and the Covid-19 pandemic recently (Eklund, 2021), so that hardly any economic event or forum is devoid of addressing in one way or another the issue of corporate governance and the importance and role of corporate governance in promoting transparency and building the system through which companies are run and defining relationships and communication mechanisms between the company's board of directors, the executive management, shareholders and stakeholders related to the company (Almaqtari et al., 2021). The importance of corporate governance was highlighted

M. K. Abuamsha (🖂)

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Finance and Banking Computerize Department, Business and Economics Faculty, Palestine Technical University-Kadoorie, Tulkarm, Palestine e-mail: m.abuamsha@ptuk.ed.ps

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by some financial shocks and the emergence of the Covid 19 pandemic that affected economic societies, especially in the economies of developed countries, administrative and financial corruption cases witnessed by major global companies (Hashed & Almaqtari, 2021), and the salaries and bonuses of the executive management and the lack of correlation of these rewards with the results of companies actions, this is in addition to the lack of transparency and disclosure (Amore et al., 2021), to the point of manipulating the financial statements of major international companies, which was, for only a few years, something unexpected to get a launch even in some emerging economies (Gerged et al., 2021a, 6).

As a result, there has been an increase in interest in the issue of corporate governance, specifically by the supervisory authorities in both developed and developing economies (Levy, 2021), as these authorities worked to review the laws, regulations and instructions governing the work of the economic sectors (Klausen & Winsvold, 2021). specifically those that govern the work of public shareholding companies, and work to bridge the gaps and breach after their discovery, in many emerging countries (YAMAC, 2021), work has been done to develop blog of governance that include guidelines for the purpose of strengthening the governance of public and even private joint-stock companies in some of them. The Arab countries (Queiri et al., 2021), including Palestine Abdelkarim (2017), were not isolated from these developments, as the supervisory authorities in these countries called for the development and elaboration of guides and rules for corporate governance. According (Asmar et al., 2018) Palestine is considered one of the first Arab countries that worked on building and developing a blog of governance rules for companies operating in the financial system, both banking and non-banking, Show (Abdeljawad et al., 2020) in paper where the National Committee for Governance headed by the Palestinian Capital Market Authority worked on preparing and issuing the blog of Corporate Governance Rules in Palestine at the end of 2009. Whereas, the Palestinian Monetary Authority issued guidelines for the governance of banks operating in Palestine according (PMA, 2018).

According (Asmer et al., 2019) despite the issuance of the Corporate Governance blog of Corporate Governance in Palestine at the end of 2009, there are many steps and programs that must be implemented for the purpose of enforcing the provisions of the blog and thus its reflection on strengthening the governance of public shareholding companies listed on the Palestine Stock Exchange (Abdelkarim & Ijbara, 2010), in this context, the institutions in Palestine, including the Capital Market Authority and the Palestinian Monetary Authority, acted in their capacity as the bodies responsible for implementing the governance rules for public joint-stock companies (Saleh et al., 2021), by taking many measures and developmental programs necessary to create the infrastructure for governance in Palestine, the effects of which are expected to be evident in the coming period, despite some difficulties and obstacles that led to the delay in enforcing governance rules on public joint-stock companies.

This chapter aims to identify the main features of the governance of public shareholding companies listed on the Palestine Stock Exchange, this is in order to provide the necessary information to decision-makers regarding the basic aspects related to corporate governance, here, it must be pointed out that this chapter does not aim to measure the extent of companies' compliance with the provisions of the Governance blog or the reflection of the application of governance rules on the performance of public joint-stock companies listed on the Palestinian Stock Exchange. Similar to previous studies in this field, but aims to study and analyze the following:

- 1. Knowing the composition of the boards of directors of the listed public jointstock companies and the executive management
- 2. The committees emanating from the boards of directors
- 3. Disclosure of the benefits granted to the board of directors and executive departments, and the mechanism for such disclosure
- 4. Disclosure, transparency, and providing other stakeholders, particularly shareholders, with the necessary basic information related to corporate governance, with a focus on the mechanisms used in disclosure.
- 5. Auditing and focusing on the internal audit function and audit committees
- 6. Concentration of ownership and the minimum number of shares that a shareholder must own for the purposes of nomination to membership of the Board of Directors.

With the necessity to note that the above-mentioned objectives will be studied at the level of all 47 public joint-stock companies listed on the Palestine Stock Exchange until the end of 2020, in addition to studying them at the sectoral levels and the size of the listed companies on the basis of the subscribed capital.

2 Corporate Governance

2.1 Origins and Evolution

According (Abuamsha, 2013) the emergence of corporate governance goes back to the beginning of the last century, and the importance and necessity of corporate governance emerged as a result of the consequences of the so-called agency problem resulting from the separation of ownership from management, Abu Amsha (2011) adds, (Al-Haddad & Whittington, 2019) researchers Berle and Means were the first to address the issue of separating ownership from management in 1932, as a result of the growth and increase of public shareholding companies in developed countries, the problem of agency has emerged (Gerged & Elheddad, 2020), which is based on the principle that shareholders in public joint-stock companies assign the task of managing the company to an agent board that is elected, who in turn will be responsible for the executive management of the company on the assumption that the Board of Directors will do its utmost to implement the goals of the shareholders (Gerged et al., 2021a, b), but the reality indicated that it is not necessarily identical to the goals of the shareholders and the goals of the company's management, and thus the problem of conflict or conflict of interest arises, which is called the Agent Problem, where the objectives and interests of the company's management may be

to achieve short-term returns on the company's investments because of the benefits and advantages that they obtain are linked to the profits achieved according (Jordaan et al., 2018). Which is not necessarily aligned with the interests and objectives of the shareholders and investors who wish to achieve long-term growth for the company this is in addition to the problems that have accompanied the lack of transparency and disclosure, and in some cases (González & García-Meca, 2014), administrative and financial corruption, specifically with the higher executive management, hence, the importance of corporate governance has emerged in that it clarifies the relationship with which these companies are managed and provides the shareholders, adds (Saleh et al., 2021) investors and stakeholders with the necessary mechanism to know and follow up how the company is managed by the executive management through disclosure, transparency and complete clarity in all matters related to the company in terms of transactions and relationships.

According (Gelter et al., 2021) There has been a lot of interest in corporate governance at the end of the last decade in developed countries. Especially in light of the financial and economic crises such as the one that hit the US financial markets at the end of the 1980s, the Asian countries crisis in 1997, the mortgage crisis that occurred in 2008 and led to the collapse of giant financial companies and institutions, in addition to the global economic shutdown during our days due to the Covid-19 pandemic, showed (Pemberton & NG, 2021) the regulatory authorities in developed countries worked to respond to these shocks and work to strengthen corporate governance and issued a set of important laws and reports that effectively affected the composition of the supervisory and regulatory framework that governs the work of capital markets and public shareholding companies such as the cadbury report, which was issued in 1992 in the United Kingdom to confirm The importance of governance in increasing investor confidence in the process of preparing and reviewing financial statements. The report included a set of principles related to the board of directors and financial reporting. In the year 2002, the (Sarbaney-Oxely) Law was issued in the United States of America, which focuses on the role of governance in combating and eliminating financial and administrative corruption. And that is by activating the role that non-executive members play in company boards of directors, (Kabaja and others, 2008) presented a detailed historical account on the origins and development of governance in developed and developing countries.

Oh (2021) in his study provided evidence that at the end of the nineties of the last century and as a result of the repercussions of the financial crisis that afflicted the countries of Southeast Asia and the collapse of some giant American companies such as Enron and World com, the relevant international institutions and organizations were invited to follow up and study governance practices at the state level, including the World Bank, the International Monetary Fund and the Organization for Development and Cooperation. Bauer et al., (2021) adds in their study that the economist, which worked on issuing a set of guiding principles for corporate governance in the year 1999, after the G7 declaration of the seven industrialized countries in the year 1992 the tendency to focus on governance and incentives granted to management (Corporate Behavior and Incentives) and the Organization for Economic Cooperation and Development worked to review and amend these principles in the year 2004,

which became the basis for most countries in preparing their corporate governance blog.

2.2 Definition of Corporate Governance

The Organization for Economic Cooperation and Development (OECD) defined corporate governance (Abdelkarim, 2017) in the narrow sense that it is the system by which companies are directed and controlled, and thus it is a set of relationships between the executive body of a company's management, its board of directors, and its shareholders. As for corporate governance in the broad sense, it means a set of rules and procedures according to which the company is managed and controlled, by regulating the relationships between the Board of Directors, the executive management, the shareholders, and other stakeholders, as well as the social and environmental responsibility of the company (Blog of Corporate Governance Rules in Palestine, 2009). Accordingly, corporate governance is mainly concerned with the manner in which the company is managed and controlled, and examining the capabilities of the board of directors to set policies and set goals for the company that are consistent with the interest of shareholders and other stakeholders (Abuamsha, 2013).

From the definition referred to above, it is noticed (Abuamsha, 2013) that corporate governance is not only concerned with adhering to the legal and supervisory frameworks under which companies operate, but rather goes beyond the culture of management and its belief in the importance of governance, transparency and disclosure, and the positive implications of that on the company's long-term performance. Consequently, corporate governance According to (Abuamsha, 2011) is supposed to reflect the management's desire for governance, disclosure and transparency about all matters related to the performance of the company, its dealings and relations, and communication with other stakeholders, (Abuamsha, 2011) mainly the shareholders, and not only for the purposes of adherence to the requirements of laws, regulations and instructions to avoid any Fines or penalties imposed by the regulatory authorities for failure of these companies to comply with the requirements of laws, regulations and instructions. For this reason Adds AbuAmsha (2013), we find many blogs of governance rules that adopt a set of optional rules whose implementation requirements exceed the minimum required by laws, regulations and instructions, and that they do not conflict with them.

It is necessary to According (Saleh et al., 2021) point out that there is no model or system for corporate governance that is suitable for all countries and all companies. One Model Fits All, for this reason, the Organization for Economic Cooperation and Development (OECD) has worked to issue general principles of governance so that countries work to issue rules that are compatible with the specificity of each country and within the framework of the general principles of governance.

The principles of corporate governance issued by the Organization for Economic Cooperation and Development (OECD) Abuamsha (2011, 2013) in accordance with the amendment in 2004 include the following principles:

- Ensuring the basis for an effective corporate governance framework.
- Shareholder rights and basic ownership functions.
- Equitable treatment of shareholders.
- The role of stakeholders in corporate governance.
- Transparency and disclosure.
- Responsibilities of the Board of Directors.

2.3 Corporate Governance in Palestine

Interest has grown in recent years in Palestine in corporate governance (Abdelkarim, 2017), and institutional work has begun in corporate governance since the establishment of the Palestinian Capital Market Authority and the formation of the National Committee for Governance in Palestine, which includes representatives of various regulatory, economic, legal and academic bodies, and is chaired by the Chairman of the Board of Directors of the Capital Market Authority (Kabaja and others, 2008). The National Committee for Corporate Governance worked to form a technical team to work on drafting a blog of corporate governance rules in accordance with the foundations and a plan of action developed by it, and the team's goal was to prepare rules for corporate governance (Asmer et al., 2019), consistent with the prevailing conditions and legislation in Palestine, taking into account the established principles in the field of corporate governance. At the regional and international levels (Abdelkarim & Ijbara, 2010).

The blog of Corporate Governance Rules was issued in Palestine at the end of 2009, so that it became effective since that date, the National Committee for Corporate Governance is the supreme body that has approved and issued the Blog of Corporate Governance Rules, since this Blog applies to public shareholding companies and financial institutions that are under the supervision and control of the Capital Market Authority (Asmar & Alia, 2018), the Authority is the authority authorized to monitor the implementation and compliance of companies with the rules contained in the Blog. With regard to the banking sector, the Palestinian Monetary Authority has worked to issue guidelines for the governance of banks operating in Palestine (PMA, 2018). The Blog of Corporate Governance Rules was based on the basic principles issued by the Organization for Economic Cooperation and Development, whereas the blog included two types of rules, mandatory rules (which are rules that are based on explicit legislative texts, here, the application is mandatory by companies under penalty of legal liability) (Abdeljawad et al., 2020). There are optional rules, which consist of two parts according the opinion of the author: Optional rules consistent with international practices in the field of corporate governance and do not conflict with any an explicit legislative text, or at least it is one of the possibilities that a legislative text permits, here, the application is voluntary by companies within the category of "commitment and interpretation of non-compliance," while the other part of the optional rules includes a set of rules that are consistent with international practices in the field of corporate governance, but it contradicts explicit legislative

texts, and here it was recommended that the existing legislation should be amended to suit these practices and rules.

Since the issuance of the Corporate Governance Blog, see researchers in Palestine (Kabaja and others, 2008) and (Asmar et al., 2018) and (Abdelkarim & Ijbara, 2010), the Capital Market Authority, in its capacity as the authority responsible for implementing the provisions of the Blog, has worked to create the necessary infrastructure to implement the rules of governance and strengthen the governance of public joint-stock companies by ensuring that companies adhere to the implementation of the mandatory rules through the enforcement of laws, regulations and instructions Related to the optional rules, whose application requires great efforts and the use of effective tools and means in order to convince companies of their importance and the positive reflection of their application on the performance of the companies themselves.

3 Applying to Implement the Following

- Determine the optional rules that are the most priority in implementation and the least controversial.
- Determining the obstacles to the application of these rules by public shareholding companies by studying a sample of listed companies and drawing lessons and identifying the obstacles that prevent their application.
- Implementing a set of corporate governance awareness and education programs.
- Measuring and following up the commitment of public joint-stock companies to the rules of governance in an objective manner based on quantitative and scientific principles in accordance with the best international practices in this field, and then working on presenting the results of the companies index in terms of commitment to implementing the rules of governance, which provides accurate and reliable information to users of financial data, investors and shareholders about corporate governance Public shareholding included in the Palestine Exchange was prepared by the Palestinian Capital Market Authority in cooperation with the International Finance Corporation.
- Reviewing an action plan for the years 2021 and 2022 regarding governance, which this plan was approved by—the National Governance Committee, with the aim of determining the activities and tasks to be implemented with the aim of creating and preparing the necessary infrastructure to implement the rules of governance according to a clearly defined action plan.
- Building and developing a corporate governance website.
- From the foregoing it is noticed that the authority has taken a set of practical steps with the aim of creating the environment and the necessary infrastructure to implement and enforce the rules of governance by public joint-stock companies, whose tangible results are expected to appear in the foreseeable future, and certainly there are still many steps and activities that must be taken by the authority and in coordination and cooperation with related parties.

4 The Main Features of Corporate Governance of the Joint Stock Companies Listed on the Palestine Stock Exchange

Below is a review of the results of the analysis of the main features of the governance of public joint-stock companies listed on the Palestine Stock Exchange, and in order to achieve this, the basic factors that help in achieving the basic principles of corporate governance identified by the Organization for Economic Cooperation and Development (OECD) and which were relied upon in preparing a governance blog were studied. Companies in Palestine Kabaja and others, (2008) and Asmar et al., (2018) and Abdelkarim & Ijbara, (2010) and Abuamsha, (2011, 2013).

5 Board of Directors and Executive Management

The issue of company management is one of the basic pillars of corporate governance, which can be considered one of the most important factors affecting corporate governance, and when talking about company management, it is necessary to mean the board of directors and executive management. In this context, this unit devoted a wide area to study and analyze the management of public shareholding companies listed on the Palestine Stock Exchange in terms of the composition of the boards of directors and the committees emanating from these boards and the disclosure of the benefits granted to their members and the executive management (Kabaja and others, 2008).

6 The Composition of the Boards of Directors of the Listed Joint Stock Companies

The following are the results of analyzing and studying the composition and components of the boards of directors of the listed public joint-stock companies, according to the data available and officially published until 24/6/2020. It is reported that 59% of the total number of public shareholding companies listed on the Palestine Stock Exchange do not combine the chairmanship or membership of the Board of Directors and the position of Director General (Fig. 1).

While 19 listed companies, 41% of the total companies, combine the position of director general with the presidency or membership of the board of directors, of which 6 companies are the chairman of the board of directors who is the general manager of the company, while 13 companies whose general manager is at the same time a member of the board of directors of the same company.

Figure 2 refers to the sectoral distribution of companies that combine the chairmanship or membership of the board of directors and the position of general manager, where the industry and services sectors come at the fore with 5 companies each,

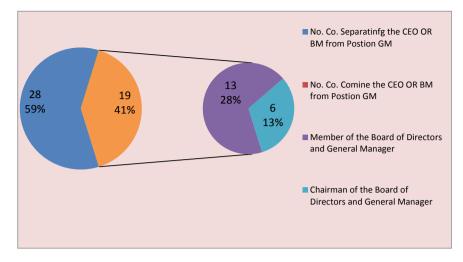


Fig. 1 Separation between the chairmanship or membership of the board of directors and the position of the general manager



Fig. 2 Sectoral distribution of companies in which a chairman or a member of the board of directors occupies the position of general manager, 19 companies

followed by the insurance and investment sectors with 4 companies each, while there is one bank listed on the Palestine Exchange that occupies The Chairman of the Board holds the position of Director General.

If the size of the company is taken into account, it is noticed that the vast majority of companies that combine the chairmanship or membership of the board of directors and the position of general manager of the company come under the category of small-sized companies (15 of 19 companies), followed by 3 large-sized companies and one medium-sized company that combines chairmanship or membership. The

board of directors of the company and the position of general manager of the same company (Fig. 3) (Asmar et al., 2018).

Whereas, Figs. 4 and 5 refer to the sectoral distribution of companies in which the Chairman of the Board of Directors holds the position of Director General and those in which a member of the Board of Directors holds the position of Director General, respectively.

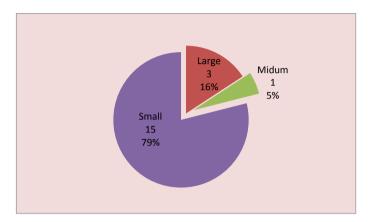


Fig. 3 Distribution of companies in which a chairman or a member of the board of directors occupies the position of general manager according to the size of the capital, 19 companies

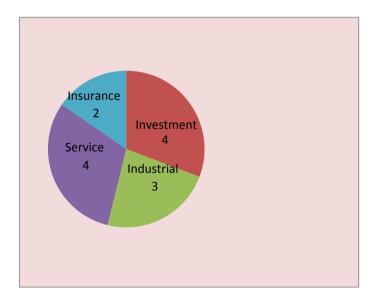


Fig. 4 Sectoral distribution of companies in which Chairman holds the position of General Manager, 6 companies

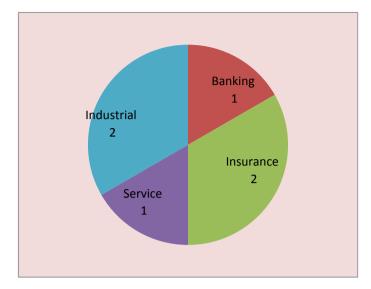


Fig. 5 Sectoral distribution of companies in which the a member of the Board of Directors holds the position

Of General Manger, 13 companies.

The necessity to separate the position of the General Manager from the chairmanship of the Board of Directors or its membership is one of the basic pillars of corporate governance, whereas, a company's general manager or chief executive is accountable to the board of directors for implementing policies, and directives of the Board of Directors, the presence of the general manager of the company in the board of directors, whether in the chairmanship or membership of the board, constitutes a clear conflict and inconsistency with the principles of governance, accountability and transparency. The above results indicate that 41% of the public shareholding companies listed on the Palestine Stock Exchange combine the chairmanship or membership of the Board of Directors and the position of General Manager of the same company, this constitutes a major conflict with best governance principles and practices and poses a challenge to regulators, responsible for implementing the rules of governance, with the necessity to point out that the Companies Law is in effect permitting this, the matter that requires taking this into account in the new draft corporate law, which is actually what was recommended by the authority mainly in its observations and recommendations on the proposed draft corporate law (Abdelkarim & Ijbara, 2010).

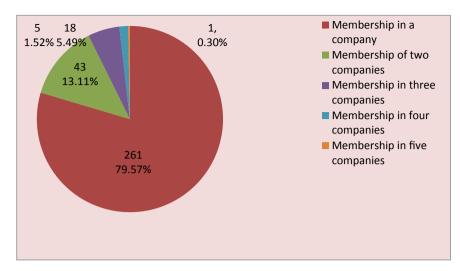


Fig. 6 Number of memberships in the boards of directors of listed public joint-stock companies

7 Membership of the Boards of More Than One Public Shareholding Company Listed

Figure 6 below indicates the number of memberships enjoyed by members of the Board of Directors in the public joint-stock companies listed on the Palestine Stock Exchange according to the data published on the official websites (Capital Market Authority and the Palestine Stock Exchange until 6/24/2020).

Where the results indicate that the total number of members and boards of directors of companies listed on the Palestine Stock Exchange reached 426 members, either in their personal capacity or in their representative capacity for the consideration members, 80% (261 members) of the total board members are members of the board of directors of one of the listed companies, 13% (43 members) of the total members of the board of directors of two companies, 5.5% (18 members) of the total members are members of the boards of directors of three companies. Whereas 5 members ignite the membership of the boards of four companies and one member ignites the membership of the boards of five companies at the same time, this may constitute a conflict with the Companies Law No. 12 of 1964 in effect, specifically Article 118.¹ While the average number of members of the board of directors of public joint-stock companies listed on the Palestine Exchange was 9.06 members for each company.

¹ Article 118 of Companies Law No. 12 of 1964 states that no person may be a member of the board of directors of more than three public joint stock companies, nor may he be a director of more than one public joint stock company.

8 Committees Emanating from the Board of Directors

The specialized committees emanating from the board of directors play an important and vital role in following up and ensuring that the executive management adheres to the policies and directives of the board of directors, the existence of such committees and the effective and efficient performance of their role are among the important factors that work to enhance the governance of the public shareholding company, the Corporate Governance Blog recommended the existence of these committees and touched upon the most important of them, which are the Audit Committee, the Remuneration Committee and the Governance Committee. With the need to point out that the mention of these committees in the Blog of Governance Rules does not mean that the committees are limited to them only, but rather that the company's board of directors work to form committees that it deems appropriate and necessary in addition to the ones mentioned above and according to the nature of the company's work, we find there are some companies that have an investment committee, an executive committee, and others.

In this context, the committees emanating from the boards of directors of public joint-stock companies listed on the Palestine Stock Exchange were studied and analyzed, based on the information and data contained in the annual reports issued by these companies for the year 2020 and the information contained on their websites. The results presented in Table 1 indicate that only 21 companies out of the total listed companies have an audit and risk committee emanating from the board of directors, while only 12 companies have a governance committee and two companies have a remuneration committee.

If we look closely at the sectors to which the companies that have committees emanating from the Board of Directors belong and their size, it is noticed that the banking sector ranks first in terms of the existence of the Audit and Risk Committee and the Governance Committee (8 and 5 companies respectively) while there are 4 companies listed in each of the investment, insurance and services sectors have an audit committee, and with regard to the remuneration committee, it was noticed that it has only two insurance companies (Fig. 2). Given the size of the companies, the results may be unpredictable, as it is observed that small-sized companies dominate in terms of the number of main committees (10 audits, 2 bonuses, 4 governance), followed by large companies (8 audits, 4 governance). Whereas, medium-sized companies

	Main committees			Other commi	ttees
Total listed	Audit and risk *	Rewards	Governance **	Executive	Investment
companies	21	2	10	13	13

 Table 1
 Committees emanating from the Board of Directors

*It came under the name of the Audit Committee. **No information was available about the leadership of the Governance Committee for all companies. The Blog recommends that the Governance Committee be chaired by the Chairman of the Board of Directors. *Source data* Palestine Capital Market Authority (PCMA) are ranked last in terms of the presence of the main committees emanating from the board of directors, according to the information provided in Figs. 7, 8.

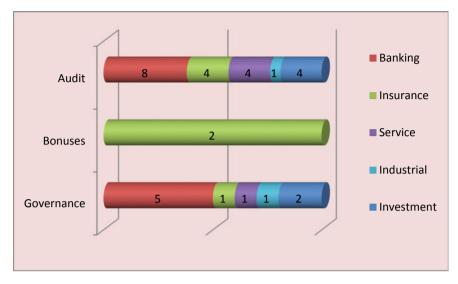


Fig. 7 Committees emanating from company boards of directors according to sectoral distribution

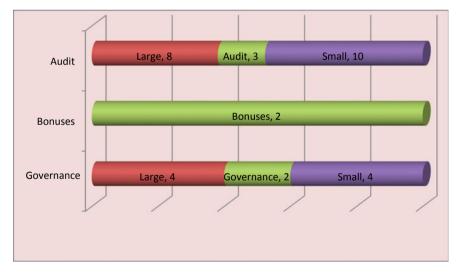


Fig. 8 Committees emanating from company boards of directors according to size

9 Disclosure of the Benefits Granted to the Board of Directors and the Executive Management

The results in Table 2 illustrate the mechanism followed by the public shareholding companies listed on the Palestine Stock Exchange in terms of disclosure of the benefits granted to members of the Board of Directors and the Executive Management, whether in terms of disclosure of salaries, allowances and bonuses.

With regard to the executive management, the results of analyzing the data contained in the annual reports for the year 2020 and issued by the listed public jointstock companies indicate that 32% (18 companies) of the total companies listed on the stock exchange did not disclose the salaries granted to the executive management, either in total or in detail.² While 24 listed companies disclosed the salaries of the executive management in total in their annual reports for the year 2020, and only 5 listed companies disclosed in detail, and for each person, the salaries of the executive management, and these five companies include a bank, an insurance company, a company listed in the industry sector and two within the services sector.

As for the disclosure of the remuneration and allowances granted to the executive management, the results in Table 2 indicate the reluctance of 32 listed companies to disclose, even in total, the remuneration granted to the executive management, while 12 listed companies disclosed in total the remuneration of the executive management, and the detailed disclosure was limited to The remuneration of the executive management is for five companies only. Table 3 shows the distribution of these companies by sector or on the basis of size.

As for the disclosure of the fees and rewards granted to the members of the Board of Directors, the results indicate that 30 listed companies disclosed these fees in total, and 15 listed companies disclosed these fees and rewards in detail, while two companies did not disclose the fees granted to the members of the Board of Directors at all in their reports. Annual for the year 2020. It is also noted that 35 listed companies disclose the number of shares owned by board members in the company.

The above results indicate that the majority of public joint-stock companies listed on the Palestine Stock Exchange do not disclose the remuneration and allowances granted to members of the Board of Directors or the salaries and remuneration of the executive management in detail, with the necessity to point out that the laws in effect do not oblige companies to publish such information. An indication of the extent of the evolution of the governance of these companies and the degree of transparency and disclosure enjoyed by them. This matter requires the completion of the necessary efforts by the relevant authorities to motivate companies to publish such information in detail.

 $^{^2}$ The disclosure of salaries or bonuses and allowances included in the general and administrative expenses notes in the financial statements was not considered sufficient, as it does not meet the intended purpose in the governance rules.

Board of directors	rectors						Executive	Executive management	nt				
	Disclosur	Disclosure of salaries		Disclosure allowances	Disclosure of bonuses and allowances	s and	End of ser	End of service benefits	s	Disclosure allowances	Disclosure of bonuses and allowances	and	Disclosure of share ownership for board members
	Non disclosed	Full disclosed	Detailed disclosure	Non disclosed	Full disclosed	Detailed disclosure	Non disclosed	Full disclosed	Detailed disclosure	Non disclosed	Full disclosed	Detailed disclosure	
Total listed companies	18	24	5	30	12	5	2	30	15	1	31	15	35
Investment (8)	4	4	0	~	0	0	0	5	3	0	5	3	5
Banks (9)	2	6	1	4	4	1	0	7	2	0	7	2	6
Service (12)	4	6	2	6	4	2	1	6	2	0	10	2	7
Industry (11)	4	6	-1	6	1	1	0	4	7	0	4	7	10
On the basis of size	s of size												
The category is large in size (9)	e	S		S	e	1	0	9	e	0	9	e	4
The middle category (6)	e	e	0	4	5	0	0	4	7	0	4	7	ۍ
													(continued)

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 Table 2 (continued)

Board of directors	ectors						Executive	Executive management	nt				
The	12	16	4	21	7	4	2	20	10	1	21	10	26
category is small in size (32)													

Source data Palestine Capital Market Authority (PCMA)

Table 3 The sub-indicators,	The sub-in	dicators, 1	their weights, and the elements related to each of them, in order to build the overall indicator for effective website standards	nd the el	ements relat	ed to each of	them, in or	der to build	d the overall ir	idicator for ef	ffective wel	bsite stands	rds
	Website		Effective Website Standards	site Stand	lards								
	availability	ity	Regular update of the website (news, financial data, facts) 30%	e of the w %	ebsite (news		Corporate governance 40%	governance	40%		Communication with other interested parties 30%	ation interested	efficient website 100%
	Is he working	ls he In working English and it works	Continuously Facts feed the site and (%) figures (%)		Periodic disclosure of financial statements (%)	PeriodicPublicationCompanyBoard ofExecutivedisclosureofArticlesstrategyDirectorsmanagemenofof(%)(%)(%)(%)financialAssociationstatementsand bylaws(%)(%)(%)(%)(%)(%)	Company strategy (%)	Board of Directors (%)	Board of Executive Public Directors management of the (%) (%) Ethics Ethics Docurr	ation ss hent	Customer Investo service Service angle (%) Corner (%)	Investors Service Corner (%)	
Relative weight of the sub-index	1	1	25	25	25	25	25	25	25	25	50	50	
Relative weight of the overall index	1	1	7.5	7.5	7.5	7.5	10	10	10	10	15	15	100%
Source date	a Palestine	: Capital N	Source data Palestine Capital Market Authority (PCMA)	(PCMA									

10 Having an Effective Website

The presence of an active and updated website with information is one of the most important factors that enable the company to communicate effectively with shareholders and other stakeholders, in addition to being one of the communication and communication channels that enables the company to enhance disclosure and transparency by displaying information and data about the company through the website, such as performance data The financial and operational company of the company, the company's vision and administrative philosophy, the information of the board of directors and the executive management, in addition to the development of the use of the website by the joint-stock companies so that it provides mechanisms for direct communication with shareholders, investors and customers through interaction and communication with the company through it.

In this context, this study aimed to analyze the efficiency and effectiveness of the websites of all companies listed on the Palestine Stock Exchange, where a composite and weighted index was built to measure the efficiency and effectiveness of the websites of the listed public shareholding companies. Table 3 indicates the components of the sub-indicators and the relative weights of each. Through which the total index value was calculated according to the mechanism described in the study methodology.

Where, as is evident from the above table, a higher relative weight has been given to those elements that are considered a qualitative addition in strengthening the company's governance, such as the existence of the customer service angle, the investor service angle, and the disclosure of information related to the company's governance, such as the publication of a work ethics document, the publication of such information on the website is important, since the website is the only source for obtaining and disseminating this information so that it reflects the corporate governance culture, as the publication of this information is often not considered compulsory according to the laws, regulations and instructions similar to the financial statements of companies that can be obtained from sources Others, such as the Authority's websites or the Palestine Exchange.

The companies that have a website were counted from the total companies listed on the stock exchange as they were during the month of April of 2020, where Fig. 9 indicates that 74% (35 companies) of the listed companies have a website that can be accessed, while it was found that 26% (12 companies) of the listed companies have their electronic websites not working as 6 companies do not have a website while 6 other companies have a link to a website, but it is not working.

While Fig. 10 indicates that half of the companies that do not have a website or a website that are not working come within the services sector, and that all companies that do not have a website come under the category of small-sized companies (based on the mechanism of distributing companies according to the size of capital Subscribed and explained in the study methodology).

The results of the analysis indicate that out of the 35 companies that have a website, only 27 companies have an English-language website (see Fig. 11).

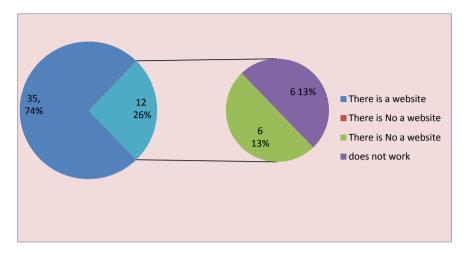


Fig. 9 Availability of a website for companies listed on the Palestine Stock Exchange

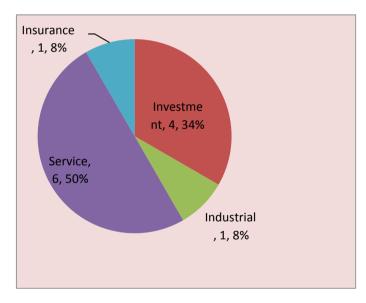


Fig. 10 The number of companies that have a do not have a website 12 companies website in the English language

For the purpose of calculating the overall indicator of website effectiveness (which ranges from 0 to 10 points), the informational content of the websites of all listed companies that have a website has been studied and analyzed, this is done by calculating the values of the components of the sub-indicators, and then calculating the relative weight of that indicator, leading to the calculation of the total index value

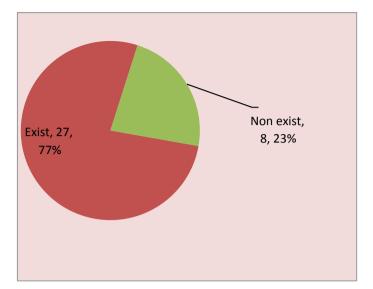


Fig. 11 The number of companies that have a website in the English language

using the arithmetic averages of all listed public joint-stock companies, then the overall index was calculated on the basis of sectoral distribution and on the basis of the size of the listed companies in terms of subscribed capital.

With regard to the company's governance, which is a sub-index that occupies 40% of the total index, all companies' websites were examined in terms of the constituent elements of this sub-index, such as the company's clear deployment of its strategy, so that it defines the vision, mission and strategic goals, does the company work to publish the names of the members of the board of directors and an introductory profile of each of them, as well as the members of the executive management, and does the company publish the work ethics document on the website? A mark is given to each of these elements, and then the sub-index is calculated, and so on, regarding other sub-indicators, such as the periodic update of the site, is the company working to regularly and continuously feed the site with the latest news and activities? Does the company publish on the website a summary of the most important facts and quarterly, semi-annual and annual figures, and does the company publish the articles of incorporation and bylaw on its website?

Table 4 presents the results of the calculation of the overall index and the subindicators for all public joint-stock companies listed on the Palestine Stock Exchange, as it is known, the overall index ranges from 0–10, so that the more the company gets a higher score, the more effective its website will be.

The results indicate that the average value of the overall index for all public jointstock companies was 4.23 out of 10 points, which is the upper limit of the index. which indicates that the websites of the listed public shareholding companies are in low locations according to the overall measurement index (less than 5°), which indicates

	Active website, key indicator 10	Regular updating of the site, Relative weight sub-index 30%	Corporate Governance, Index Sub Relative Weight Sub 40%	Communicate with related parties Relative weight sub-index 30%
Arithmetic average	4.23	1.19	1.53	1.51
Highest value	10	3	4	3
The lowest value	1	0	0.1	0
Standard deviation	2.20	0.94	0.95	0.83
Mediator	1.5	1.5	1.5	1.5

 Table 4
 The results of calculating the overall index and sub-indicators for the websites of the listed public joint-stock companies

Source data Palestine Capital Market Authority (PCMA)

the weakness of the informational content of these websites in general and at the level of all listed companies, and its failure to provide investors, shareholders and other stakeholders with basic information about the governance of the public shareholding company, and if we take the economic sectors that make up the Palestine Stock Exchange into consideration, we notice that the banking sector is in the highest rank compared to other sectors in terms of the effectiveness of the websites of the banks listed on the Palestine Exchange (average of the overall index 5.37) followed by the services sector (the average of the overall index 4.78) while the industrial sector comes last in terms of the effectiveness of the website of the companies that make up the sector (the average of the overall index is 3 points). Sectoral, where the average overall index for any sector did not exceed 6 points (see Table 5).

If we take the size of the company into account, a large difference is observed in the results from what was mentioned above, as Table 6 indicates that large companies have effective websites (the average of the overall index is 8.66 points), while the average of the overall index for small-sized companies is only 3.54 points, which indicates There is a great variation in the quality and content of websites if we take into account the size of the company, and this result is not surprising if we look at the companies that make up the large-sized category, as it is noticed that they consist of telecommunications companies and major banking, services and investment companies.

In general, the above results indicate that, with the exception of some listed companies (large-sized companies), most of the companies listed on the Palestine Stock Exchange do not have effective websites, in addition to that 26% of the total listed companies do not have websites or they do not work, which gives an indication of the loss of shareholders and other stakeholders, one of the important tools, such as the website of the listed company, in communicating with the company and obtaining the

		A functioning website, A key indicator 10	Regular updating of the site, relative weight sub-index 30%	Corporate governance, index Sub relative weight sub 40%	Communicate with related parties Relative weight sub-index 30%
Investment sector	Arithmetic average	3.66	0.81	2.03	0.83
	highest value	8.25	2.25	3.00	3.00
	The lowest value	1.10	0.00	1.00	0.00
	Standard deviation	2.76	0.88	0.98	1.26
	Mediator	2.64	0.49	2.05	0.15
Banking sector	Arithmetic average	5.37	1.67	2.03	1.67
	highest value	10.0	3.00	4.00	3.00
	The lowest value	3.60	0.75	0.60	1.50
	Standard deviation	1.83	0.59	0.97	0.47
Insurance sector	Mediator	4.50	1.50	2.00	1.50
	Arithmetic average	4.40	1.49	1.33	1.58
	highest value	6.80	2.25	2.60	1.95
	The lowest value	2.85	0.75	0.60	1.50
	Standard deviation	1.22	0.52	0.69	0.17
	Mediator	4.29	1.50	1.30	1.50
Services sector	Arithmetic average	4.78	1.63	1.33	1.83
	highest value	9.20	3.00	3.20	3.00
	The lowest value	1.00	0.00	0.60	0.00
	Standard deviation	2.98	1.26	0.85	1.28

 Table 5
 Results of calculating the overall index and sub-indicators for the websites of public joint-stock companies listed according to the sector

(continued)

		A functioning website, A key indicator 10	Regular updating of the site, relative weight sub-index 30%	Corporate governance, index Sub relative weight sub 40%	Communicate with related parties Relative weight sub-index 30%
	Mediator	5.00	1.88	1.00	2.33
Industry sector	Arithmetic average	3.00	0.47	1.12	1.41
	highest value	4.80	1.50	2.10	1.80
	The lowest value	1.00	0.00	0.10	0.00
	Standard deviation	1.08	0.58	0.75	0.48
	Mediator	3.11	0.11	1.25	1.50

Table 5 (continued)

Source data Palestine Capital Market Authority (PCMA)

necessary information, specifically that information related to corporate governance, consequently, these listed companies must work to activate and enrich their websites in order to strengthen their own governance, as it is known, one of the optional rules contained in the blog of Corporate Governance Rules urges the need for an effective website for the company.

On the other hand, the supervisory authorities responsible for implementing the rules of governance must find ways to urge companies to pay attention to their websites by providing them with the necessary information and data that contribute to increasing transparency and disclosure and thus reflect the culture and philosophy of the management of that company and its belief in the importance of communicating with shareholders and stakeholders and providing them with information. And data related to the company's performance and its management mechanism, which is one of the basic principles of corporate governance.

11 Internal Audit

Internal audit is considered one of the main functions in companies that contribute effectively to strengthening corporate governance, specifically through the presence of the internal audit committee emanating from the board of directors, which directly supervises the Internal Audit Department to ensure the implementation of the policies and directives of the Board of Directors regarding the internal control environment, auditing, including internal auditing, is considered one of the main principles of corporate governance. In this context, the study and analysis of public shareholding

		A functioning website, a key indicator 10	Regular updating of the site, relative weight sub-index 30%	Corporate governance, index Sub relative weight sub 40%	Communicate with related parties Relative weight sub-index 30%
The category is large in size	Arithmetic average	8.66	2.81	2.85	3.00
	highest value	10.00	3.00	4.00	3.00
	The lowest value	7.20	2.25	1.20	3.00
	Standard deviation	1.05	0.32	1.02	0.00
	Mediator	8.73	3.00	3.10	3.00
The category is medium in	Arithmetic average	3.90	1.20	1.44	1.26
size	highest value	6.25	2.25	2.50	3.00
	The lowest value	1.10	0.00	0.60	0.00
	Standard deviation	1.72	0.76	0.57	0.82
	Mediator	4.43	1.50	1.30	1.50
The category is small in size	Arithmetic average	3.54	0.87	1.32	1.34
	highest value	6.80	2.25	3.00	1.95
	The lowest value	1.00	0.00	0.10	0.00
	Standard deviation	1.40	0.73	0.85	0.56
	Mediator	3.60	0.75	1.10	1.50

 Table 6
 Results of calculating the overall index and sub-indicators for the websites of public joint-stock companies listed according to size

Source data Palestine Capital Market Authority (PCMA)

companies listed on the Palestine Stock Exchange in terms of the existence of a job Internal audit, whether through the establishment of a specialized department or the presence of a person responsible for the task of internal auditing, this is based on the information and data contained in the Listed Companies Directory for the year 2020 or the annual reports for the year 2020 issued by the listed companies, in addition to the information contained on the websites, electronic to these companies.

lable / The a	LADIE <i>I</i> The availability of an internal audit department in the companies listed on the Palesune Exchange	nternal audit de	partment in	the companie	ss listed on t	the Palestine	Exchange		
	Total listed companies	Total listed The audit department provides according to the sectoral companies distribution	partment pro	ovides accord	ing to the se	ectoral	Provides an intern of the companies	Provides an internal audit department according to the size of the companies	cording to the size
		Investment (8)	Banking (9)	Insurance (7)	Services (12)	Industrial (11)	The category is large in size (9)	InvestmentBankingInsuranceServicesIndustrialThe category isThe category is(8)(9)(7)(12)(11)large in sizemedium in size (6)small in size (32)	The category is small in size (32)
The existence of 25 an internal audit department	of 25 lit	ĸ	7	5	7	ю	2	4	14
Source data Pa	Source data Palestine Canital Market Authority (PCMA)	arket Authority	(PCMA)						

comnanies listed on the Palestine Exchance
 Table 7
 The availability of an internal audit department in the

Source data Palestine Capital Market Authority (PCMA)

The results contained in Table 7 indicate the existence of an internal audit department in 25 of the 47 companies listed on the Palestine Stock Exchange, while the sectoral distribution of the listed companies shows that the listed companies are within the two investment sectors, the industry comes at the bottom of the listed companies which have an internal audit department (3 companies from 8 companies, 3 companies from 11 companies respectively), and it is noticed that only 44% (14 out of 32) of the small-sized companies have an internal audit department.

It should be noted that there are 5 listed companies. Internal audit tasks are carried out by an external party, either through contracting with a legal external auditor or through the parent company in the event that the company is affiliated with one of the other companies.

From the foregoing it is noticed that 32 companies out of the total listed companies have an internal audit department or audit tasks are carried out by an external party according to what the study data indicate, which is useful, according to the published data, that there are 17 public joint-stock companies listed and the internal audit function is not activated, this matter should raise the alarm about the importance of having an internal audit department, or at least that this task be carried out by an external party, whereas, internal auditing is considered a safety valve in following up the implementation of the policies and directives of company boards of directors, and it is an early warning system for corporate administrations, specifically with regard to risk management and protection of the rights of shareholders and investors.

12 Disclosure of Social Responsibility

The disclosure of social responsibility by public joint-stock companies is one of the recommendations mentioned in the Corporate Governance Code, as it is stated in one of the optional rules that it is desirable for the company to disclose its social and environmental responsibility at least once a year and through the annual report, in addition, the company's social and environmental policies are clearly stated and applicable in the long term. In this context, the results indicate that 37 of the listed companies disclosed their social activities in their annual reports for the year 2020 or on their own websites, while only 21 companies were keen to disclose their policies regarding (Social Responsibility) Table 8.

Disclosure of policies and activities related to social and environmental responsibility by public joint-stock companies, reflects this company's desire and culture to interact with the community in which it operates, which is necessarily reflected positively on the performance of the company by enhancing the positive outlook of the community towards the company and thus its attractiveness to investors, it also contributes to conveying the company's message in its bias towards the issues of the society in which it operates and its contribution to addressing these issues, and that the company does not only seek to achieve profits and maximize the wealth of its owners.

Table 8Disclosure of socialand environmentalresponsibility by companieslisted on the Palestine		Disclosure of activities in the annual report	Disclosure of the company's policies	
Exchange	Total listed companies	37	21	
	On a sector basis			
	Investment (8)	7	3	
	Banks (9)	8	5	
	Insurance (7)	6	3	
	Services (12)	7	4	
	Industrial (11)	9	6	
	Based on size			
	Large in size (9)	8	8	
	middle-sized (6)	5	2	
	small size (32)	24	11	

Source data Palestine Capital Market Authority (PCMA)

However, on the other hand, the disclosure of the company's social responsibility reflects positively in return on the company's financial performance by making use of these activities in the marketing of its products and services it provides, in addition to the tax benefits that companies obtain as a result of their social activities, consequently, we must work to urge companies, first of all, to contribute to the community by promoting the culture that the company is responsible towards this society in which it operates and that this is of great benefit to it in the long term in addition to the economic benefits, so to speak, that the company obtains.

One of these means may be to oblige companies to disclose their social responsibility in the annual report, as a basic requirement for disclosure imposed by the regulatory authorities, even if the company does not have any community contributions, this must be explicitly disclosed in the annual report, the matter is expected to generate an impetus for those companies that do not have any societal contributions to engage, develop and increase their activities related to social and environmental responsibility, with the necessity that the disclosure of the policies that the company follows in implementing these activities should be clear and announced to the public.

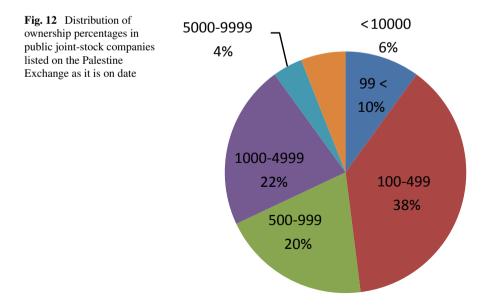
13 Concentration of Ownership

One of the important factors that affect the performance of capital markets is the degree of concentration of ownership in the listed public joint-stock companies, as it affects the degree of market liquidity through its effect on the number of shares available for circulation, on the other hand, the extent of ownership concentration

and the distribution of shareholders according to the number of shares they own in the public shareholding companies listed on the Palestine Stock Exchange are important factors for decision-makers and the bodies responsible for implementing the governance rules, as they clarify the size of small investors in the stock exchange, and the extent of their ability to find representatives for them on the boards of directors of the listed companies, specifically, if it is compared to the minimum number of shares to be owned by the shareholder who wishes to run for membership in the Board of Directors, which is determined in accordance with the articles of association of the company.

For this purpose, the study and analysis of the ownership distribution in the public shareholding companies listed on the Palestine Stock Exchange was studied and analyzed, first as a whole and then at the sectoral levels and the size of the listed companies, this analysis was based on data issued by the Deposit and Transfer Center at the Palestine Stock Exchange on the number of shares owned by shareholders in public joint-stock companies, as they are on 3/31/2020, in addition to the minimum number of shares to be owned by the shareholder if he wishes to run for membership in the company's board of directors, in accordance with the statutes of the listed public joint-stock companies and as stated in the Listed Public Shareholding Companies Directory issued by the Palestine Stock Exchange for the year 2010.

Comparing the results in Fig. 12 (the minimum number of shares eligible to run for membership in the Board of Directors), it is noted that only 32% of the total number of shareholders in listed companies can run for membership in the boards of directors of 45 listed companies. In other words, and according to Companies Law No. 12 of 1964, which is in effect in the West Bank, where Article 106 states that the company's bylaw specifies the number of shares that are entitled to own in order



to qualify the owner to run for membership in the Board of Directors, as 62% of the total shareholders in companies listed on the Stock Exchange Palestine does not have the minimum qualification to run for membership in the boards of directors of 45 out of the 47 listed companies.

These results may contribute to explaining the current reality of the concentration of board memberships in public joint-stock companies in a specific group of shareholders, and most of the time they are within the framework of specific names,this gives the impression of public shareholding companies as if they were family companies, in which a group of families or relatives acquires a high percentage of their board memberships.

It is necessary to point out that there are other factors that contribute to the phenomenon of concentrating membership of boards of directors in a specific group of people, the most important of which is the ownership of some shareholders for large numbers of the shares of the listed company and for long-term investment objectives (blocks) which reduces the percentage of shares available for trading in the share of that company (free float) in addition to the reluctance of a large number of shareholders to attend the meetings of public bodies and to exercise their right to vote and elect members of the Board of Directors, due to their conviction that the absolute majority of the number of shares is owned by a specific group of shareholders, and thus there will be no effect of their participation in the voting process and the election of members of the Board of Directors.

And to know the details of the distribution of shares ownership in sectorally listed companies and according to the size of the companies,

The results in Fig. 12 indicate that 38% of the total number of shareholders in companies listed on the Palestine Stock Exchange, totaling 111,829 shareholders, own 100–499 shares, while the percentage of those who own 500–999 shares is 20% of the total number of shareholders in companies. Listed on the stock exchange in other words, the percentage of shareholders who own, less than 1,000 shares in listed companies equals 68% of the total number of shareholders, which indicates that the vast majority of shareholders can be considered small shareholders and the protection of their rights comes in the priorities of internationally recognized corporate governance principles by ensuring their right to be represented on company boards of directors and their right to attend meetings. Public bodies, vote and add items to the agenda. While 4% of the total shareholders own between 5000–9999 shares, and 6% own more than 10,000 shares of the total number of shareholders in the listed companies.

The situation is not much different if we take into account the sectoral distribution and the size of the listed companies, as it is noticed that the vast majority of shareholders own less than 5,000 shares in the companies that make up each sector. The results in Table 9 and Fig. 13 indicate that 95% of the total shareholders in the sector companies Services have less than 5,000 shares each and 92% of the total shareholders in the industrial sector own less than 5,000 shares each, while this percentage is 79%, 86%, and 85%, for each of the investment, banking and insurance sectors respectively.

	99< (%)	100–499 (%)	500–999 (%)	1000–4999 (%)	5000–99999 (%)	10,000> (%)
All companies listed	9.50	38.26	17.72	22.33	3.90	6.29
On sector Bas	is					
Investment (8)	4.63	23.45	14.09	36.51	7.69	13.63
Banking (9)	2.45	40.52	20.55	22.27	5.11	9.10
Insurance (7)	15.85	30.87	14.97	23.42	4.06	10.83
Service (12)	7.75	44.72	23.77	18.65	2.27	2.84
Industrial (11)	29.79	32.03	12.38	18.26	3.30	4.24
On size Basis						
The category is large in size	3.28	24.44	28.65	29.47	5.45	8.71
The category is medium in size	1.57	43.51	22.34	23.35	3.54	5.69
The category is small in size	19.92	51.32	8.62	13.95	2.34	3.85

 Table 9
 Distribution of shareholders according to the number of shares they own in companies

 listed on the Palestine Exchange as on 3/31/2020
 3/31/2020

Source data Palestine Capital Market Authority (PCMA)

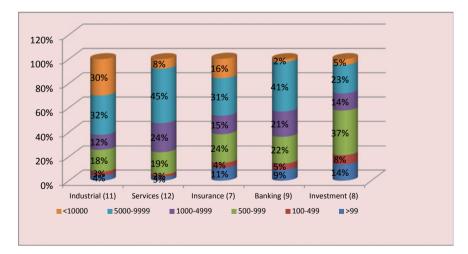


Fig. 13 Percentage distribution of ownership by sector

According showed image similar if we take into account the size of the company, as 86% of the total shareholders in large companies own less than 5,000 shares each, while this ratio is 91% and 94% for each of the medium and small companies, respectively.

From the foregoing it is noticed that the vast majority of shareholders in companies listed on the Palestine Stock Exchange own less than 5,000 shares each, regardless of the sector to which the company belongs or its size. These are expected results, as most of the investors in the Palestine Stock Exchange can be described as small investors, and there is almost no institutional investment. These results also reflect the current reality of public shareholding companies listed on the Palestine Stock Exchange. The matter which constitutes a major challenge in applying the principles of governance and the rules stemming from it, specifically in relation to protecting the rights of small shareholders and their representation in the boards of directors of public joint-stock companies, where the Code of Corporate Governance Rules mentioned the cumulative voting process in the election of the members of the Board of Directors of the company and recommended amending the Companies Law in effect since the cumulative voting process constitutes a conflict with the law, However, this approach must be coupled with the companies' research and conviction of the necessity to reduce the minimum number of shares that must be owned by a candidate for membership of the Board of Directors or to cancel it permanently to enable small shareholders to be represented in the membership of the boards of directors of public joint-stock companies, especially since they represent the vast majority of the total number of shareholders. With the necessity to take into account other factors, the most important of which is the phenomenon of (blocks) in ownership of shares, and the reluctance to attend meetings of public bodies by many shareholders, whereas if the legal component has been addressed and the number of shares eligible to run for membership in the Board of Directors has been reduced, this may contribute, but does not guarantee, that the problem of concentration of board membership will be addressed. This matter should be among the priorities of the supervisory authorities and the bodies responsible for implementing the rules of governance, specifically the Capital Market Authority, this may contribute to increasing the representation of small shareholders in the membership of the boards of directors of public joint-stock companies listed on the Palestine Stock Exchange.

14 Conclusion

This chapter aims to examine and analyze the main characteristics of the governance of public joint-stock companies listed on the Palestine Stock Exchange, this is done by focusing on the management of these companies in terms of the composition of the boards of directors and the committees emanating from them, disclosure of the benefits granted to the executive management and members of boards of directors, and the minimum number of shares that must be owned by the shareholder in order to run for membership in the board of directors, combining the position of the general manager with the chairmanship or membership of the board of directors.

Our study of the state of governance in the Palestinian territories also aimed to present a composite and weighted index by studying and analyzing the informational content of websites for the year 2020 issued by the Palestinian Capital Market Authority with a focus on matters that contribute to strengthening corporate governance, considering that the company's website and the annual report Its issuance is considered one of the main tools in enhancing disclosure, transparency and communication with stakeholders and related parties.

Also monitoring and following up the existence of the internal audit function in the company, as the internal audit function is a safety valve and early warning device that enables the company to follow up its work and monitor the risks it is exposed to, determining ways to remedy it and strengthening the internal control environment, the internal audit is complementary to the external audit function that is carried out by an independent legal auditor appointed by the shareholders during the company's general assembly meetings.

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Malay Ethnic Directors, Board Attributes and Ownership Structure on Firm Performance: Corporate Governance Evidence from an Emerging Market



Razali Haron, Naji Mansour Nomran, and Anwar Hasan Abdullah Othman

Abstract The influence of board attributes (ethnicity, size, board independence and board remuneration), CEO duality and ownership structure on firm performance in Malaysia is examined in this study. Data of 743 non-financial firms is utilized for 2000–2015 using the GMM. The CG issues are discussed according to four theories; the agency (AT), stewardship (ST), resource dependency (RDT) and the stakeholder theories (SHT). The study finds the high presence of Malay (ethnic) directors on board positively influences firm performance. Managers are considered trustworthy and the best navigator to bring the firms to maximum performance, functioning in a smaller board size and are comfortable with CEO duality, with good remuneration policy. The Code on Corporate Governance (MCCG) should consider the attributes of family-owned firms being the dominant ownership identity in Malaysia especially when revising the Code. Having half of the board filled with independent directors may not be the practice agreeable with family-owned firms. The influence of Malay (ethnic) directors on the board has not been well established in the literature yet, thus this study offers new insights in the literature pertaining to the high presence (ratio) of certain ethnic on board and impact on the performance of firms in Malaysia, an emerging market so much replete with institutional voids.

Keywords Malay (*bumiputra*) • Ethnicity • Board attributes • Corporate governance • Firm performance

R. Haron (🖂) · A. H. A. Othman

N. M. Nomran Department of Finance and Accounting, College of Business Administration, Kingdom University, Riffa, Bahrain

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IIUM Institute of Islamic Banking and Finance, International Islamic University Malaysia, Kuala Lumpur, Malaysia e-mail: hrazali@iium.edu.my

1 Introduction

One of corporate governance (CG) most eminent entities is board composition. Being the top level management in charge in devising operational strategy, a well composed board of director (BoD) can have significant influence on performance of firm (Jensen & Meckling, 1976). The downfall of several prominent cases like Enron, WorldCom and Adelphia have been popularly addressed as the manifestation of power abuse by top management and CG failures (Aslam et al., 2019; Harjoto et al., 2018; Haron et al., 2020) thus demands urgent attention (Black et al., 2014; Haron et al., 2020; Kao et al., 2019).

Most investigations started mainly on the developed economies (Bhatt & Bhatt, 2017). Nevertheless attention began to shift to the emerging market particularly in the Southeast Asia region, where the hit of the 1997/98 financial crisis was reported to be at its worst. Poor CG and mismanagement were found to be among the major reasons for the crisis then (Black et al., 2014; Haron et al., 2020). Malaysia, being one of the emerging economies that were badly injured in the crisis also suffered from poorly structured and managed CG system. Black et al. (2014) believe that there is no one size fits all CG structure thus further investigations are necessary.

BoD serves as an effective and economical monitoring system. Jensen and Meckling (1976) highlight that the management needs monitoring mechanism to ensure smooth operation of the firm and to minimise potential agency conflicts within the management. Board diversity is acknowledged as an important attribute to a sound board composition (Alazemi & Alazemi, 2021; Ali et al., 2018; Linda et al., 2018; Nassar, 2018; Shamsudin et al., 2018).

Malaysia, an emerging market with multiracial, multi religion, multi ethnic and multi culture society provides favourable setting to examine the impact of board diversity with its three main ethnics; the Malays (*bumiputra*) (67%), Chinese (25%), Indians (7%) and other minority ethnics (1%) (DOS, 2019). Hassan and Marimuthu (2016) and Gul et al. (2016) highlight that ethnic diversity in the BoD encourages efficiency in the management. Thus the current study intends to examine further the influence of certain ethnic on board, in this instance the presence of Malay directors (the biggest ethnic group) on the performance of firms in Malaysia.

According to Gul et al. (2016), literature lacks of adequate evidence to characterize the impact of Malay (ethnic) directors on board and impact on firm performance in Malaysia. The body of knowledge also lacks in generalization purposes where prior studies generally employ short period of observations to represent the influence of Malay (ethnic) directors on performance of firms perhaps due to limitation in data collection. In addition to that, Hooy and Ali (2017) comment that endogeneity issue is often neglected in past CG studies. Looking at Gul et al. (2016), their study examines the impact of ethnic diversity on board incorporating four main ethnics in Malaysia; the Malay, Chinese, Indian and foreigners. Nevertheless apparently the study uses a shorter study period (2005–2010) and suffers from the endogeneity as well because they employ the Ordinary Least Square (OLS) method in the analyses, which is not capable to tackle the endogeneity issue. Abdallah et al. (2015) and Aslam et al. (2019)

argue the study on board structure and performance of firms must deal and adjust for endogeneity to avoid wrong and bias inferences of results and findings. They argue that the current firm board structure almost reflecting the result of past firm performance and consequently will influence future firm performance, thus should not ignore the endogeneity concern.

Therefore, the current study aims to close the gap in the literature with three important objectives. Firstly, to evaluate the presence of Malay (ethnic) directors and its impact on firm performance being the biggest ethnic group in Malaysia (67.4%). Secondly, this study controls for endogeneity which is often being neglected in past studies of CG thus employs the Generalize Method of Moments (GMM) to analyse the data since this method can control for endogeneity to avoid bias inferences of results (Abdallah et al., 2015). Thirdly, the current study is to examine quite a sizable number of sample firms (743 firms) for longer period of study of 16 years (2000-2015) for better inferences and generalization especially on the emerging market. This study attempts to expand and improve further from that of Gul et al. (2016) in two ways. Firstly, this study uses a much wider study period (2000-2015) and secondly, this study employs the GMM to address the endogeneity concern in the data analyses. This study differs from Gul et al. (2016) since the current study specifically deliberates on the presence of Malay (ethnic) directors on board. Other equally important attributes like board size, board independence, board remuneration, CEO duality, ownership identity and ownership concentration are also incorporated in this study, controlling for firm specific factors as well such as leverage, growth, size and age (see, e.g., Hassan & Marimuthu, 2016; Hooy & Ali, 2017; Shamsudin et al., 2018; Harjoto et al., 2018), also the crisis (non-crisis) periods (see, e.g., Saghi-Zedek & Tarazi, 2015; Cordazzo et al., 2017). The outcomes of this study will assist in characterizing the influence of Malay (ethnic) directors on the performance of firms in Malaysia, thus fills the gap in the literature.

The structure of the study is as follows. The following section briefly outlines the review on literature pertaining to CG attributes most specifically on board diversity then follows by hypotheses development. Next is the data and methodology and follows by discussion on findings. The last section provides the conclusion and recommendations for future research and policy implications.

2 Literature Review and Development of Hypotheses

2.1 The Code of Corporate Governance (MCCG)

The MCCG was introduced by the Securities Commission of Malaysia (SC) in 2000 and expected to inspire positive reformation of CG practices in the country. The MCCG was revised in 2007 with BoD functions and responsibilities, audit committee and the internal audit task being strengthened to make sure that the codes are relevant with the present CG practices worldwide. The MCCG was revised again in 2012,

giving particular attention to the structure and composition of board imposing all listed firms in Malaysia to comply with the MCCG (2012) doctrines in their annual reports. In 2017 another revision has taken place highlighting the duties and responsibilities of BoD on value maximization which include improving the integrity of the company's internal control systems and enhancing competency by adopting strategic and best practice plans (MCCG, 2017).

2.2 The Governing Theories of Corporate Governance

Four theories are referred to in this study; the agency (AT), resource dependency (RDT), stakeholder (SHT) and stewardship (ST) theories (Aslam et al., 2019; Sanda et al., 2010). AT stresses on the conflict between managers-shareholders thus sees BoD as an effective yet economical monitoring mechanism (Fama & Jensen, 1983; Jensen & Meckling, 1976). The RDT sees BoD as resourceful person and resources of information of the firm. The SHT concerns on issues relating to stakeholders' interests, thus sees the BoD as stakeholders' representatives (Freeman, 1984). Finally the ST regards managers as trustworthy agent thus does not need the BoD to act as monitoring mechanism (Donaldson & Davis, 1991).

2.3 Past Studies on CG and Firm Performance

Board diversity has strong and significant influence on performance of firm (Gul et al., 2016; Hassan & Marimuthu, 2016). Firms perform better when the board is well diversified (Garcia-Sanchez & Garcia-Meca, 2018; Terjesen et al., 2016). Lückerath-Rovers (2013) assert that board diversity can lead to maximum firm performance with its competitive advantage, initiating greater knowledge, creativity and innovation (Aslam et al., 2019; Hamdan, et al., 2017; Hasan Al-Naser, 2019; Salman & Laouisset, 2020).

However, Terjesen et al. (2016) claim that diversity in BoD can lead to conflicts. When the BoD is too diverse, it is hard to establish interpersonal connection within the board, leading to communication issues, conflicting interests and ideas thus inhibit effective use of skills, resources and knowledge that are expected of the members (Harjoto et al., 2018). When there is conflicting idea and firm's vision is not shared among the BoD, the members' attention and cohesiveness will deteriorate, implicating communication of objectives (Harjoto et al., 2018; Sheikh et al., 2013).

The liaison between certain CG attributes like Malay (ethnic) directors, board size, board independence, director remuneration, CEO duality, ownership concentration and ownership identity with the performance of firms have never been definite. Ownership concentration as documented by Sheikh et al. (2013) influences firm performance positively and is supported by Mishra and Kapil (2017) and Haron et al. (2020). Demsetz and Villalonga (2001) on the other hand report that ownership

structure does not seem to influence the performance of a firm hence, inconclusive results.

Family-owned firms according to Luo and Chung (2013) and Jong and Ho (2018) have certain degree of influence on the association between CEO duality and performances and appear to benefit from CEO duality. A contrasting result is depicted when Christensen et al. (2010) find firm performance being negatively affected by large board size and CEO duality. A study by Yammeesri and Herath (2010) witnesses CEO duality has a certain degree of influence on the appointment of independent directors. Yermack (1996), one of the most prominent studies on BOD attributes yields an inverse association between board size and performance of firm based on 452 sample U.S. firms from 1984 to 1991. He also reports more favourable firm financial ratios within smaller board size. However, Sheikh et al. (2013) and Mishra and Kapil (2017) found a positive association between board size and performance. As for remuneration and firm performance, attractive remuneration plan for the BoD mitigates agency conflicts and consequently improves firm performance (Fama & Jensen, 1983) supported by Jaafar et al. (2012), Ismail et al. (2014) and Ahad and Rahman (2018).

Board independence also records inconclusive result where Klein (2002) depicts an inverse relationship between independent board and performance of firm, supported by Farhan et al. (2017) for the United Arab Emirates (UAE) and Aslam et al. (2019) for Pakistan. Haron et al. (2020) however report a positive relationship among the Malaysian firms. Rodriguez-Fernandez et al. (2014) find insignificant influence of independent board as well as CEO duality on performance of firm. The inconclusiveness continues.

The scenario in Malaysia also follows the conflicting pattern. In a study covering the period of 1996–1999, Leng (2004) records board size influences the performance of 77 sample firms. Nonetheless, Ghazali (2010) reports insignificant relationship. Ponnu (2008) reports insignificant association between CG attributes and performance of firm post MCCG 2000 implementation. Nevertheless, the result is contended by Che Haat et al. (2008) where encouraging performance of 142 firms in Malaysia in the year of study (2002) were detected after the MCCG implementation. The MCCG also puts forward that BoD will have high interest to bring firm to its maximum performance if they are offered good remuneration package (Yoshikawa, 2018). Ahad and Rahman (2018) report good firm performance in Malaysia during 2013–2017 as a result of good remuneration for the BoD.

Puchniak and Lan (2017) discover that in Malaysia, there exists a culture where family-owned firms preserve good rapport with their close business allies. A special knitted association between board independence and family-owned firms acts as effective mediator to mitigate conflicts between the majority and minority shareholders. Independent director also functions as a trusted advisor to the firm, functions to source foreign capital and to reflect their adherence to international CG practices. Haniffa and Hudaib (2006) on the other hand posit that in emerging market like Malaysia, the selection of independent directors are not according to their expertise and experience rather often for securing contracts, networking and even for political aims to legitimise business activities. In other words, the selection is more towards

affiliation instead of expertise. Thus, a higher presence of Malay (ethnic) directors may also provide a selection of board needed for good counsel and oversight for the firm to move forward although it may just for contacts, networking and political related purposes.

Rahman and Haniffa (2005) find that firms without CEO duality out-perform firms with CEO duality. Nevertheless, Shawtari et al. and Haron et al. (2020) record otherwise during their study period. Using a different approach, Bhatt and Bhatt (2017) develop a CG index to analyse the link between CG mechanism and performance of firm and reveal a significant positive influence of CG on performance in Malaysia. Hooy and Ali (2017) document a lower firm performance with Malay CEO on the BoD comparative to the performance of firms with non-Malay CEO on the board.

3 The Corporate Governance Mechanisms and Hypotheses Development

Seven CG mechanisms are incorporated with hypotheses development according to the literature, appropriate theories and the MCCG (2017) requirement.

3.1 Malay (Ethnic) Director

The presence of Malay directors on board is defined by the ratio of Malay directors to the number of BoD. Agency theory (AT) suggests that when a board is less ethnically diverse, they tend to be less critical than a board with a diverse ethnic background (Gul et al., 2016) causing monitoring to be less effective hence lower performance, a negative relationship. Hooy and Ali (2017) record a lower firm performance in firms with higher Malay CEO on the BoD. There is also an argument that the presence of Malay directors on board is merely for the affiliation not the expertise and is one of the government's move¹ to create status quo between the Malay participation and the Chinese in the economy (Mohammad et al., 2016). Therefore in line with AT; H₁: A significant negative association is expected between the ratio of Malay (ethnic) directors on board and firm performance.

¹ The National Economic Policy (NEP) was formulated to mitigate the economic disparities among the different ethnics in Malaysia, especially the Malay ethnic and improve the ethnic Malay position and participation in the economy. One of the measures is the appointment of Malays as independent directors on board (Mohammad et al., 2016).

3.2 Board Size (BS)

Haniffa and Hudaib (2006) and Haron et al. (2020) claim that bigger BS adds more ideas in decision making thus enhances firm performance, as explained by AT and RDT. Sun et al. (2014) argued that bigger board offers more comprehensive and collective decision following resources from board members. Nevertheless, as argued by the ST, managers are responsible and can act on their own without being monitored or guided by the BoD. Moreover, bigger BS may face miscommunication among the board members, may also affect prompt and urgent decision making hence lower firm performance, therefore a negative relationship (Aslam et al., 2019; Garcia-Sanchez & Garcia-Meca, 2018; Kao et al., 2019; Yermack, 1996). Hence, based on the stewardship theory (ST); H_2 : A significant negative association is expected between board size and firm performance.

3.3 Board Independence (BI)

Independence generally means no circumstances or relationships that can influence the judgments of independent directors. In Malaysia, according to the Bursa Malaysia (the stock exchange) Listing Requirement, independent director is an outside director who is free from any businesses or other relationships which could interfere with the exercise of independent judgments and independent from the management (Mohammad et al., 2016).

AT proposes that an independent director can independently monitor and advice managers to act for shareholders' best interest (Fama & Jensen, 1983; Jensen & Meckling, 1976; Terjesen et al., 2016). The separation of roles (directors-managers) encourages boards to execute their duties more efficiently due to their independency hence maximum performance (Haron et al., 2020; Terjesen et al., 2016). The MCCG also acknowledges the advantage of having independent board and entails no less than half of the board members to be comprised of independent directors (MCCG, 2017). However, the ST argues that independent directors are not necessary and in fact costly. This is because managers are the best steward to navigate the firm to its best performance and not motivated by self-goals (Donaldson & Davis, 1991) hence a negative relationship (Bhagat & Bolton, 2008; Christensen et al., 2010; Shamsudin et al., 2018). Following the MCCG (2017) requirement and the AT; H₃: A significant positive relationship is expected between board independence and firm performance.

3.4 Board Remuneration

Fama and Jensen (1983) argue according to the AT, attractive remuneration package for the BoD mitigates agency problem for superior firm performance, hence a positive

association (Ahad & Rahman, 2018; Aslam et al., 2019; Ismail et al., 2014; Jaafar et al., 2012). Hassan and Theo (2003) and Jong and Ho (2018) conversely reveal that among family-owned firms, directors' remuneration does not seem to be a strong factor for a good firm performance owing to the conflicting interest between the majority and minority shareholders. Based on the AT; H_4 : A significant positive relationship can be expected between director remuneration and firm performance.

3.5 CEO Duality (CEOD)

CEO duality, a CEO who is also a chairman of the board, has direct impact on the CG of firms (Yameesri & Herath, 2010; Haron et al., 2020). The AT sees increase of agency problem and conflict of interest when the CEO holds the chairman position (Fama & Jensen, 1983; Haron et al., 2020). The MCCG (2017) also requires the positions of CEO and chairman and are held by different persons, seeing the conflict that might arise. Nevertheless, the ST claims that separation of roles could lead to conflicts between them (Donaldson & Davis, 1991) rather CEOD is supposed to reduce the bureaucracy in decision making. Ismail et al. (2014) add that CEOD would provide better incentives hence better firm performance. According to Saidat et al. (2019), CEOD works better in family-owned firms to make sure power concentration remains within the family, hence improves the performance of firm (Ibrahim & Samad, 2011; Klein, 2002; Saidat et al., 2019; Sanda et al., 2010). Following the MCCG (2017) requirement and the AT; H₅: A significant negative relationship is expected between CEO duality and performance of firm.

3.6 Ownership Concentration (OC)

Agency problem can be mitigated through OC and this may contribute to better firm performance, hence a positive association. Controlling shareholders are in a better monitoring position on managers and have massive influence in policy-making thus value maximization. Firms with highly concentrated ownership are greatly motivated to boost the performance of the firm (Haron et al., 2020; Jong & Ho, 2018; Kao et al., 2019; Reddy et al., 2010; Saidat et al., 2019; Sheikh et al., 2013). Nevertheless, there is an argument that when ownership is highly concentrated, controlling shareholders tend to entrench themselves instead of employing quality independent directors thus weakens monitoring effectiveness of BoD which may dampen performance. Abdullah and Ku Ismail (2016) find an inverse association between OC and performance of firm. Following the AT therefore; H_6 : A significant positive association can be expected between ownership concentration and performance of firm.

3.7 Ownership Identity (OI)

In emerging market, the most prominent OI is family-owned (Abdullah & Ku Ismail, 2016; Jong & Ho, 2018). Malaysia is ranked second after Indonesia in the region in term of ownership owned by family firms (Abdullah & Ku Ismail, 2016). Regarded as having serious institutional voids like weak regulatory frameworks, poor rule enforcing mechanisms and inefficient legal protection, firms in emerging market face serious problems like monitoring and information asymmetry which may inhibit better performance (Brenes et al., 2018; Khanna & Palepu, 2000). Nevertheless, Miller et al. (2009) claim that family-owned firms can fill the institutional voids and lessen information asymmetry problems by building good rapport with employees and other relevant parties for resources, skills, knowledge, information and also source of legal and financial assistance to gradually fill the voids, reduce agency conflicts and information asymmetry, hence better firm performance (Brenes et al., 2018; Khanna & Palepu, 2000). Following the AT therefore; H₇: A significant positive association is expected between ownership identity and performance of firm.

4 Data and Methodology

This study uses unbalanced panel data comprises of 743 non-financial firms listed on the Main Market of Bursa Malaysia from 2000 to 2015 (about 83% from total 892 firms listed as at December 2015), a 16 years study period. Data on CG of firms are collected manually from the firms' annual reports, downloaded from the stock exchange website. Data on control variables are sourced from the Datastream database.

A panel regression is performed to study the impact of CG attributes on performance of firms, controlling for firm factors (size, leverage, growth and age) (see, e.g., Hassan & Marimuthu, 2016; Hooy & Ali, 2017; Shamsudin et al., 2018; Harjoto et al., 2018) also the crisis (non-crisis) periods (see, e.g., Saghi-Zedek & Tarazi, 2015; Cordazzo et al., 2017). The estimation is based on the Generalized Method of Moments (GMM), an estimator that is commonly used due to the dynamic nature of firm performance and as well as to control for endogeneity problem (Abdallah et al., 2015; Aslam et al., 2019). For robustness check, this study performs three types of GMM i.e. GMM First Difference, GMM System–1 step and GMM System-2 step, and uses two definitions of performance (Return on Total Asset—ROA; Return on Total Equities—ROE). GMM estimators are performed using Stata software version 14. The panel regression is illustrated below:

$$Perf_{it} = \beta_0 Perf_{it(-1)} + \beta_1 BM_{it} + \beta_2 BS_{it} + \beta_3 BI_{it} + \beta_4 BR_{it} + \beta_5 CEOD_{it} + \beta_6 OC_{it} + \beta_7 OI_{it} + \sum Control_{it} + \varepsilon_{it}$$

where, $Perf_{it}$ (Firm Performance) is represented by ROA and ROE, BM_{it} (Malay Directors) BS_{it} (Board size), BI_{it} (Board Independence), BR_{it} (Board Remuneration), $CEOD_{it}$ (CEO Duality), OC_{it} (Ownership Concentration) and OI_{it} (Ownership Identity). *Control*_{it} (Control Variables) are Size, Leverage, Growth and Age, and Crisis (non-Crisis) periods, while ε_{it} is the error term. For the Crisis (non-Crisis) periods, following Saghi-Zedek and Tarazi (2015), the period of analysis (2000–2015) is divided into three: (prior to the crisis: 2000–2006), (during crisis: 2007–2008) and (post crisis: 2009–2015). Only during and post crisis periods (2 dummies) were included in the regression models while the period prior to the crisis was considered as the reference period (see, e.g. Cordazzo et al., 2017). Table 1 details the definitions and measurements of each variable.

Two diagnostic tests are conducted to confirm the efficiency of the GMM estimators. First, AR(2) test (*Ho*: no second order autocorrelation in the residuals) and second, Hansen test (*J*-statistic) (*Ho*: instrument variables representing $Perf_{it(-1)}$ are valid). The Hansen test is the most common diagnostic test in GMM estimation for assessment of the appropriateness of the model (Haron et al., 2020). Estimates of GMM are only efficient if *Ho* of AR(2) is not rejected and the instrument variables representing $Perf_{it(-1)}$ are valid (see, e.g., Aslam et al., 2019). The Variance Inflation Factor (VIF) is conducted to ascertain whether there is multicollinearity problem between independent variables in the study. VIF should <10 to avoid multicollinearity problem (Haron et al., 2020).

5 Analysis and Discussion

5.1 Descriptive Statistics

Table 2 details the variables' descriptive statistics. Firm performance (ROA and ROE) are volatile during the period of 2000–2015 based on its minimum and maximum values. Firms however record positive ROE and ROA, on average. Malay (ethnic) directors constitute on average about 35% of board member, ranging from zero to 100%. Gul et al. (2016) report that Malay directors occupied about 33.5% of board seats in their studies on Malaysian firms for the period 2005-2010. The minimum number of board size is 4 ($\log_{10} = 0.6021$) while the maximum is 17 ($\log_{10} = 1.2304$) with mean around 8 ($\log_{10} = 0.8656$), in line with Shamsudin et al. (2018). With regards to board independence (BI), independent board constitutes 42.79% of BOD on average, in compliance with the revised MCCG 2007 of one-third, however less than half as recommended in MCCG (2017). As for board remuneration (BR), firms paid on average RM2.622 million per year ($log_{10} = 6.1590$) to board members during the study period, ranging from a minimum of RM0.05 million ($\log_{10} = 4.6990$) to a maximum of RM127.462 million ($log_{10} = 8.1053$). Jong and Ho (2018) report remuneration of RM3.413 million, 126.768 million and RM0.05 million for mean, maximum and minimum, respectively on 279 family-owned listed Malaysian firms

Dependen	t variable firm performance	Measurement	References
ROA		Net Profit Total Aset	Hassan and Marimuthu (2016), Farhan et al. (2017), Shamsudin et al. (2018)
ROE		Net Profit Total Shareholders' Equities	Hassan and Marimuthu (2016)
Independe	ent variable CG variables	Measurement	References
BM	Malay (Ethnic) directors on BOD	No. of Malay Directors Total No. of Board Members Ethnic of the board member is stated in the annual report of the firm (board member profile section)	Hassan and Marimuthu (2016), Gul et al. (2016)
BS	Board size	Total No. of directors on board (in log_{10})	Bhagat and Bolton (2008), Farhan et al. (2017)
BI	Board independence	No.ofIndependent Board Member Total No.of Board Members	Bhagat and Bolton (2008), Farhan et al. (2017), Hooy and Ali (2017), Harjoto et al. (2018)
BR	Board remuneration	Total board remuneration (RM, in log_{10}). Board's total remuneration refers to cash remuneration for the year (stock options are excluded)	Jong and Ho (2018), Aslam et al. (2019)
CEOD	CEO duality	Dummy "1" = CEO and chairman of the same person, "0" = otherwise	Gul et al. (2016), Harjoto et al. (2018), Aslam et al. (2019)
OC	Ownership concentration	Shareholdings of 5% and above	Jong and Ho (2018), Kao et al. (2019)
OI	Ownership identity	Dummy "1" for family-owned firm if it meets the following criteria (i) executive directors have shareholding of at least 20% shares ownership (ii) the presence of family members on the BOD, and (iii) the family is the biggest shareholder; "0" = Otherwise	Abdullah et al. (2016), Jong and Ho (2018)

 Table 1
 Definitions and measurements of variables

(continued)

Dependent w	variable firm performance	Measurement	References
Control vari	iable	Measurement	References
SIZE	Firm size	Total asset of the firm (in \log_{10})	Hassan and Marimuthu (2016), Farhan et al. (2017), Harjoto et al. (2018), Shamsudin et al. (2018)
LEV	Firm leverage	Total Debt Total Asset	Bhagat and Bolton (2008), Hassan and Marimuthu (2016), Gul et al. (2016), Hooy and Ali (2017)
GROW	Firm growth	MarketValue(Equities) BookValue(Equities)	Hooy and Ali (2017), Haron et al. (2020)
AGE	Age of firm	No. of years since the firm is incorporated (in log_{10})	Hassan and Marimuthu (2016), Hooy and Ali (2017), Haron et al. (2020)
Year effect	Crisis (non-crisis) years	2 Dummies are incorporated in the model (during the crisis: 2007–2008) and (post crisis: 2009–2015)	Saghi-Zedek and Tarazi (2015), Cordazzo et al. (2017)

Table 1 (continued)

(2010 to 2014). CEOD, on average only 22.3% of the firms is served by the same person. Ownership concentration (OC) shows average of 47.7%, with 80% and zero percent maximum and minimum, respectively. On average, about 62% of the sample is dominated by family-owned firms, supporting evidence on family-owned firm domination in Malaysia as documented in past studies.

5.2 Diagnostic Tests

Table 3 reports the diagnostic tests on multicollinearity between independent variables and the efficiency of GMM estimators employed in this study. Based on the reported VIF, no multicollinearity problem is detected since the VIF for each variable is less than 10 with mean VIF of only 1.24 for each model (ROA, ROE). As for the GMM estimators (GMM-First Difference, GMM-System-One-step, GMM-System-Two-step), all models (ROA, ROE) are found to be efficient by fulfilling the diagnostic tests, which are the AR(2) test and Hansen test. Following this, the estimates originated from the GMM estimators are efficient and robust (Aslam et al., 2019; Haron, 2016).

Variable	Mean	Median	Maximum	Minimum	Std. Dev
Performanc	re				
ROA	0.0326	0.0343	0.5475	-0.5020	0.0856
ROE	0.0043	0.0069	0.2682	-0.7024	0.0275
Corporate g	governance				
BM	0.3499	0.2857	1.0000	0.0000	0.2610
BS	0.8656	0.8451	1.2304	0.6021	0.1111
BI	0.4279	0.4000	0.9000	0.0909	0.1298
BR	6.1505	6.1463	8.1054	4.6990	0.4363
CEOD	0.2239	0.0000	1.0000	0.0000	0.4168
OC	0.4774	0.4986	0.7993	0.0000	0.1928
OI	0.6196	1.0000	1.0000	0.0000	0.4996
Control var	riables				
Size	5.5500	5.4607	8.0686	3.9542	0.6122
Lev	0.2072	0.1822	0.8838	0.0000	0.1748
Growth	1.1179	0.8164	9.8943	0.0661	1.0168
Age	1.3207	1.3617	2.0414	0.0000	0.3287

 Table 2
 Descriptive statistics of variables

Notes ROA (Return on Asset), *ROE* (Return on Equities), *BM* (Malay Ethnic Directors), *BS* (Board Size), *BI* (Board Independence), *BR* (Board Remuneration), *CEOD* (CEO Duality), *OC* (Ownership Concentration), *OI* (Ownership Identity), Control variables (*Size, Lev* Leverage, Growth and Age)

5.3 Panel Regression Results

Table 3 reports that all the CG variables significantly contribute to the good performance of Malaysian firms during the study period. Malay (ethnic) director appears to relate positively with performance (ROA), in contrast to a negative relationship expected as in H_1 . The finding confirms the positive influence of ethnicity on firm performance (Hassan & Marimuthu, 2016), however differs to Hooy and Ali (2017) who record a lower firm performance in firms with higher Malay CEO on the BoD. Nevertheless, there is also argument that the presence of Malay (ethnic) directors on board is not for the expertise but merely for the affiliation thus, better business contracts and contacts can be acquired and can also legitimise business activities, hence better performance. This notion might also explain the positive relationship (Haniffa & Hudaib, 2006).

Board size negatively relates to firm performance (ROA, ROE), supporting H_2 . This finding supports Donaldson and Davis (1991), Yermack (1996), Garcia-Sanchez and Garcia-Meca (2018) and the stewardship theory claiming that smaller board is efficient enough to enhance firm performance. This finding supports that it is more effective to run a firm with a reasonable size of board but too large a board creates miscommunication among the board members and may also disrupt prompt and

GMM	GMM-First difference	nce	GMM-system (One-step robust)		GMM-system (Two-step robust)		VIF	
Variable	ROA	ROE	ROA	ROE	ROA	ROE	ROA	ROE
Constant	1	1	0.1813	-0.129	0.0565	-0.0925	Ι	1
			(1.32)	(-0.60)	(0.65)	(-0.85)		
ROA (-1)	0.0164***	1	0.0228	1	1	1	1	1
	(4.4373)		(1.03)					
ROE (-1)	1	0.2393***	I	0.2544***	1	0.2047***	1	1
		(9.5108)		(00)		(4.26)		
BODMly	0.3796***	0.0399	0.0808**	0.0019	0.0559**	0.0203	1.18	1.18
	(8.1052)	(0.4203)	(2.28)	(0.03)	(2.16)	(0.61)		
BODSz	-0.0675***	-0.1910***	-0.0848***	-0.0220	-0.0626^{**}	-0.0141	1.34	1.34
	(-4.7139)	(-4.1944)	(-2.81)	(-0.38)	(-2.59)	(-0.33)		
BODInd	-0.1082***	-0.1275***	-0.0779**	-0.1298*	-0.0671^{**}	-0.0422	1.25	1.25
	(-4.6072)	(-3.1492)	(-2.21)	(-1.77)	(-2.49)	(-0.91)		
BODRem	0.0640***	0.0832***	0.0637***	0.0771**	0.0453***	0.0750***	1.57	1.57
	(6.0840)	(3.6300)	(3.06)	(2.46)	(2.67)	(2.70)		
CEOD	0.1671***	0.2028***	0.0332	0.0832^{**}	0.0319^{**}	0.0555^{*}	1.02	1.02
	(5.2116)	(3.3204)	(1.56)	(2.29)	(2.05)	(1.77)		
OwnCon	0.2691^{***}	0.1231^{***}	0.0914^{**}	0.1673^{**}	0.0560^{*}	0.1170^{**}	1.10	1.10
	(4.0482)	(4.2017)	(2.52)	(2.25)	(1.92)	(2.08)		
OwnID	0.0507***	0.0234	0.0388^{***}	0.0496^{**}	0.0351^{***}	0.0519^{**}	1.21	1.21
	(3.0909)	(0.4562)	(2.63)	(1.98)	(3.22)	(2.19)		

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GMM	GMM-First difference	е	GMM-system		GMM-system		VIF	
			(One-step robust)		(Two-step robust)			
Variable	ROA	ROE	ROA	ROE	ROA	ROE	ROA	ROE
Control variables								
Size	-0.0040	-0.0515^{***}	-0.0560^{*}	-0.0910^{*}	-0.0305	-0.0770*	1.70	1.71
	(-0.2918)	(-3.5786)	(-1.79)	(-1.78)	(-1.11)	(-1.73)		
Leverage	-0.1627***	-0.2628***	-0.1408***	0.4421**	-0.1248***	-0.2997	1.04	1.04
	(-4.0564)	(-3.3949)	(-3.34)	(2.05)	(-2.85)	(-1.28)		
Growth	0.0167***	0.0158***	0.0207*	0.1141***	0.0195***	0.1029***	1.01	1.01
	(3.4231)	(3.3002)	(1.87)	(3.75)	(3.21)	(3.31)		
Age	-0.0372***	0.0519	-0.0459	0.0108	-0.0349	-0.0369	1.12	1.13
)	(-3.2298)	(1.3676)	(-1.48)	(0.23)	(-1.30)	(96.0-)		
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	D1 = 1.22	D1 = 1.22
							D2 = 1.40	D2 = 1.40
Mean VIF	I	Ι	I	I	I	I	1.24	1.24
Dynamic	First-difference	First-difference	1	1	I	1	1	1
GMM-difference	-2.3593^{**}	-10.1909^{***}	I	I	I	Į	I	I
AR(1)	-0.4510	-0.3801	I	I	I	Į	I	I
AR(2)	106.1061	93.7910						
J-statistic								
Dynamic	1	I	One-step robust	One-step robust	Two-step robust	Two-step robust	1	1
GMM-system	1	1	-2.150^{**}	-10.120^{***}	-2.070^{**}	-10.140^{***}	I	1
AR(1)	I	I	1.500	1.590	1.630	1.430	I	I
AR(2)	I	I	123.280	31.400	123.280	12.050	I	I
Hansen test	1	1	130	47	130	27	I	I
No. of instruments	7684	1	728	726	728	726	I	I
No. of groups		I	8440	8219	8440	8245	I	I
Observations		7226						I

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urgent decision making hence, lower firm performance (Haniffa & Hudaib, 2006; Kao et al., 2019).

Board independence has a negative relationship as depicted in this study (ROA, ROE), H_3 , agreeing with the ST which regards managers as trustworthy, the best navigator for the firm and are not susceptible to misconduct leading to pursuing self-interest thus does not need independent directors especially for monitoring purposes (Bhagat & Bolton, 2008; Christensen et al., 2010; Donaldson & Davis, 1991). Board remuneration shows a positive association with performance (ROA, ROE), supporting H_4 , in line with Jaafar et al. (2012), Ismail et al. (2014) and Ahad and Rahman (2018). BoD in Malaysia is highly driven to strive for good performance when they are offered good remuneration package as explained by the AT (Ismail et al., 2014; Jaafar et al., 2012; Yoshikawa, 2018).

CEO duality positively associated with performance (ROA, ROE), not supporting H_5 , agreeing with the concentrated power of CEO in making important decisions to maximize performance of firm, as explained by the ST. Different people sitting as the chairman and the CEO might have contrasting interest thus might create conflict of interest which is not healthy for the firm. Moreover, majority of Malaysian firms are family-owned and Saidat et al. (2019) document that CEO duality works better in family-owned firms to safeguard power concentration within the family. Interestingly, it is worth to note that, this positive association between CEO duality and performance somehow compliments the negative association found in board independence. Concentration of power is much preferred to having independent directors as to avoid power dilution and CEO duality acts as perfect monitoring mechanism as well as good navigator for the firm towards value maximization.

Firm performance is positively affected by ownership concentration (ROA, ROE), H_6 is thus supported. AT explains that agency problems can be mitigated by having concentrated ownership thus can improve firm performance. Highly concentrated ownership firms, such as the firms in Malaysia which are mostly family-owned are greatly motivated to boost the performance of the firm (Reddy et al., 2010; Saidat et al., 2019; Sheikh et al., 2013). Ownership identity has a positive relationship as depicted (ROA, ROE). Family-ownership significantly contributes to firm performance, supporting H_7 . Malaysian firms, being family-owned, choose to use their advantage as controlling shareholder to fill the institutional voids discussed earlier and lessen information asymmetry problems. Agency problem is mitigated by building good rapport with employees and other relevant parties for resources, skills, knowledge, information and also source of legal and financial assistance (Brenes et al., 2018; Khanna & Palepu, 2000) which later translated to a better firm performance.

Leverage and age of firm record negative association with performance while growth, a positive association. Firm level factors do play important roles in the performance of firms as evidenced in the literature. There is however no evidence on the influence of firm size on performance. Table 4 summarizes the findings.

Explanatory variable	Hypotheses (Expected sign)	Hypotheses (supported/not supported)	Theory supporting findings
BM	H ₁ : -	Not supported	Agency theory (AT)
BS	H ₂ : -	Supported	Stewardship theory (ST)
BI	H ₃ : +	Not supported	Stewardship theory (ST)
BR	H4: +	Supported	Agency theory (AT)
CEOD	H ₅ : –	Not supported	Stewardship theory (ST)
OC	H ₆ : +	Supported	Agency theory (AT)
OI	H ₇ : +	Supported	Agency theory (AT)

Table 4 Summary of findings

Notes BM (Malay Ethnic Directors), *BS* (Board Size), *BI* (Board Independence), *BR* (Board Remuneration), *CEOD* (CEO Duality), *OC* (Ownership Concentration), *OI* (Ownership Identity)

6 Conclusion

GMM estimators are utilized to examine 743 listed firms in Malaysia from 2000 to 2015 (16 years). The relationships between CG attributes (the presence of Malay directors on board, board size, board independence, board remuneration, CEO duality, ownership concentration and ownership identity) and firm performance are established, controlling for (size, leverage, growth and age of firms, and crisis/non-crisis periods). Endogeneity concern is addressed by using the GMM which is a reliable method following the literature.

It is revealed that a high presence (ratio) of Malay directors on board positively influence performance of firm. This may be the results of being guided and also being observant on certain set of customary beliefs and values in the society and the directors are expected to behave accordingly with full integrity thus lesser monitoring is required. It is also worth to note that there is a possibility that the presence of Malay directors on board is because of the affiliation attached to them and not because of their expertise. This notion implies that the Malay directors can bring in better business contracts and contacts and can legitimise business opportunities, hence improve the performance of firm (Haniffa & Hudaib, 2006). Firms in Malaysia regard attractive remuneration policy as effective booster to strive for maximum performance and an effective way to mitigate agency issues that may exist, implying the influence of agency theory.

Nevertheless, despite the new conduct required of firms in the newly revised MCCG (2017) for independent directors to encompass of at least half of the board, Malaysian firms do not see board independence as a factor in their CG structure, an influence of stewardship theory. Perhaps firms in Malaysia do regard managers as trustworthy and the best navigator towards optimum performance thus independent

directors are not necessary. This also manifests the characteristic of family-owned firms where they believe they can function at their best without the interference from independent directors. Family-owned firms in Malaysia do exercise their power as controlling shareholders when CEO duality is preferred. Despite the requirement of the MCCG (2017) for all public listed firms on the independent directors, family-owned listed firms in Malaysia do not seem to fully adhere to the requirement. Rather preferred to practice CEO duality. They agree with the concentrated power of CEO in making important decisions to maximize performance of firm.

This study reports that 62% of the sample firms are family-owned, confirming what has been claimed in the literature that ownership structure in the emerging market like Malaysia is highly concentrated with family-owned firm being the most dominant ownership identity. Being family owned they prefer to practice power concentration by having the same person holding the CEO and chairman position on the board. They believe in smaller board size as they do not intend to employ outside professionals on the BoD for they may fear of power dilution within the firm. They seem to have strong faith on their manager to navigate the firm towards value maximization without having the tendency to act at their own personal interest. The findings from this study confirm and justify the past literature concerning family-owned firm characteristics. Generally in Malaysia, family-owned firms function within a smaller board size, with minimum number of independent directors and practice CEO duality in their CG structure in their attempt to maximise firm performance. For this, the AT and the ST can best explain the CG landscape in Malaysia.

This study offers policy implications. The high presence of Malay directors on board is evidenced to have a role in striving for better firm performance especially within societies with diverse ethnic, culture and race. Even though there is argument that the Malay (ethnic) directors may be attractive to be appointed due to their affiliation rather than expertise, the existence of Malay directors has been evidenced to improve firm performance. Policy makers should be more sensitive towards the nature and characteristics of family-owned firm, being the prevailing ownership identity in Malaysia as well to ensure the effectiveness of the MCCG in assisting sound CG structure. Responsible players should take into account the impact of these CG attributes on the performance of firm especially in Malaysia where diversity is very evident, be it in ethnic, religion and culture.

The current study however has some limitations. Despite the challenges faced by researchers on data collection as CG board attributes has to be collected manually, the dataset utilized in this study is quite comprehensive. However, there are other important CG board attributes like gender, politically connection, qualifications, age and so forth. Future research perhaps can incorporate these attributes in their CG research thus enrich the literature even further. In addition to that, the argument that the presence of the Malay (ethnic) directors is merely for the affiliation rather than the expertise should be investigated further. The legitimacy of the roles and functions of the Malay directors on BOD should be examined and scrutinized further.

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Impact of Derivatives on Firm Value: Evidence on Shariah and Non-Shariah Compliant Firms



Zaminor Zamzamir Zamzamin, Razali Haron, Anwar Hasan Abdullah Othman, and Zatul Karamah Ahmad Baharul Ulum

Abstract This study examines the influence of financial derivatives on the value of Shariah (ShC) and non-Shariah (non-ShC) compliant firms in Malaysia and compares the influence of derivatives on value between the two categories of firms. To achieve its objective, System-GMM estimator is employed on a panel data from 2000–2017. This study finds financial derivatives contribute positively to the value of ShC but negatively to the non-ShC compliant firms. Following this, the study concludes that ShC firms performed better than its counterpart in risk management using derivatives. The findings enhance the current literature on the risk management of firms in the Islamic capital market and provide further insights on hedging activities.

Keywords Risk management \cdot Derivatives \cdot Hedging \cdot Firm value \cdot Shariah compliant firms

1 Introduction

Risk management practices undertaken by firms are meant for risk reduction. Understanding the utmost critical risks fronting the firms enables stakeholders specifically managers to carry out the necessary measures to mitigate the adverse consequence of risks on firm value. Recently, a massive growth in derivatives usage is reported among firms around the world (Antonio et al., 2020; Bartram, 2019). The global financial crisis in 2008 has made risk management using financial derivatives a most researched topic among academic researchers (Bilal Khan et al., 2021; Linda, 2018; Nassar, 2018; Wahab et al., 2020; Zeidan & Rodrigues, 2013). The collapse of some established financial institutions for instance Merrill Lynch, Lehman Brothers, and

Z. Zamzamir Zamzamin · R. Haron (🖂) · A. H. A. Othman

IIUM Institute of Islamic Banking and Finance, International Islamic University Malaysia, Kuala Lumpur, Malaysia

e-mail: hrazali@iium.edu.my

Z. K. A. B. Ulum Faculty of Management and Information Technology, Universiti Sultan Azlan Shah, Kuala Kangsar, Perak, Malaysia

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National City Bank elevated many issues about the risk management effectiveness using derivatives in financial institutions. Risk management failures on the institutions lead to their collapse as reported during the 2008 financial crisis, and this includes the collapse of Brazilian firms due to the risk management fiasco (Antonio et al., 2020) and the huge losses in derivatives incurred by 12 countries caused by the inadequate risk management strategies (Bartram, 2019).

Following the collapse of some firms, especially due to scandals with huge derivatives-related losses, the improvement of reporting information on derivatives activities has become imperative (Antonio et al., 2020; Bae et al., 2018). In Malaysia, the awareness of derivatives among firms is low and most managers do not really understand the function of derivatives for risk management especially during the crisis periods (Ameer et al., 2011). Managers are reluctant to use derivatives because of its complexity (Ameer et al., 2011; Seok et al., 2020; Wahab et al., 2020). Ameer et al. (2011) stated that the practice of derivatives among firms in Malaysia is less extensive compared to those in the developed countries. Lau (2016) also reported that merely 26.8% of Malaysian firms have derivative contracts in their operations while the majority of firms have no exposure at all.

The financial crisis in Asia (1997/1998) has molded the scope of derivatives use in Malaysia. After the 2008 global financial crisis, the Securities Commission (SC) of Malaysia required public listed firms to release information concerning derivatives usage in their annual reports, with the aim to restore investors' confidence. The SC makes it compulsory for listed firms to follow the International Financial Reporting Standard (IFRS) for their reporting standard plus disclosing it through their listing requirement. This standard requires listed firms to disclose information on investment and derivatives in their annual reports. The practice is consistent with the International Accounting Standard (IAS 7), which entails listed companies to report their intention on derivatives hedging. Despite the requirement set by the regulator on the information disclosure, the study by Abdullah and Ismail (2017) however found that only 29.6% (48 firms) of the Malaysian listed firms chose to provide information on their derivatives positions while the rest of the firms failed to do so.

Concerning the risk exposure, many firms face varieties of risk and every firm has a different technique and approach to manage those risks, and one of the techniques of managing risk is using derivatives. Some firms however do not use derivatives at all to manage risk (Lau, 2016), and Ameer (2009) recorded that 298 listed firms in Malaysia do not engage in any form of derivatives instruments. Ameer et al. (2011) stated derivatives usage among Malaysian listed firms is at the minimum against firms in the developed market. This is further confirmed by Lau (2016) who reported about 73% (498 non-financial listed firms) in Malaysia have zero exposure in derivatives between 2002 and 2012.

Islamic capital market (ICM) has been growing at a remarkable growth over the years and becoming important component of the global financial system (Wahab et al., 2020). Shariah-compliant firms (ShC) as component of ICM therefore need to engage with sophisticated risk management tools to withstand the challenges facing the firms. Mitchell (2010) highlighted the failure in risk management as the main factor contributing to the 2008/2009 financial crisis. Nafis and Shadique (2016) and

Wahab et al. (2020) argued that in contrast to the conventional system, Islamic finance relatively is in a better position to face economic decline.

The purpose of the current study therefore is to examine the influence of financial derivatives on the firm value of Shariah (ShC) and non-Shariah compliant (non-ShC) in Malaysia. This study will then compare the influence of derivatives on the value of these two categories of firms. In this regard, derivatives will act as an instrument to be used for hedging purposes especially during the crisis period, and will ultimately result in optimum performance of the firm (Alareeni & Hamdan, 2020; Alazemi & Alazemi, 2021; Ali et al., 2018; Bae et al., 2018; Hamdan et al., 2017).

This study differs from the previous studies on a few aspects. First, unlike the previous studies on Malaysia, which only focus on listed firms in general, the sample of this study includes ShC as well as non-ShC firms and compares the risk management aspects between the two categories of firms. Following the lack of studies on risk management via derivatives on ShC firms, this study therefore contributes in filling the gap in the prevailing literature. Second, this study capitalizes on an extensive firm dataset involving 18 years of study period (2000–2017) to investigate the influence of risk management on firm performance, covering the crisis and non-crisis periods. Third, the current study employs various measurements of firm value for robustness check on the findings of the study coupled with utilizing the appropriate methodology that addresses the issue of endogeneity in panel data.

2 Literature Review

The revolution of derivative instruments has developed and grown at a spectacular pace during the 1980s and 1990s. These derivative instruments consist of forward, swaps, futures and options. Due to the rapid development in derivatives, many firms have actively participated in derivatives markets. Following the revolution, Allen and Santomero (1998) reported that the diversity of derivatives have been intensified extensively. Allen and Santomero referred hedging as a process of risk management undertaken by firms to transfer risk and eventually affect firm value positively.

Prior to the introduction of hedging theory, scholars basically depend on the classical Modigliani and Miller (MM) framework. This traditional framework indicated that the financial policy decisions only impact firm value and how the value is allocated among the claim holders (Modigliani & Miller, 1963). However there are arguments among the scholars on the framework developed by MM particularly on the risk management strategies adopted by the firms. Some researchers recommend that hedging using derivatives is a strategy to increase firm value. In this regard, Froot and Scharfstein (1993) and Smith and Stulz (1985) argued that underinvestment costs, expected cost of bankruptcy risk, tax incentives, asymmetric information and managerial compensation could add to firm value via hedging. Moreover, according to Smith and Stulz (1985), hedging strategy stresses on the function of contraction cost and imperfection in capital market. Due to this argument, Smith and Stulz (1985) proposed that hedging is proven useful during market imperfection. Similarly, Froot

and Scharfstein (1993) also claimed that when external financing costs correlate with capital market imperfection, hedging is necessary.

From the Islamic perspective, hedging is a method of precaution or minimizing loss from the risk that persistently exists in the financial market. Many Quranic verses offer guidelines and suggest men to have risk protection in their life. At the same time there is a section in the Quran that discusses the financial context of risk management implying that managing risk is significantly important, as mentioned in (12:47–48):

Yusuf conveyed, "You will plant for seven years consecutively; and what you harvest leave in its spikes, except a little from which you will eat. Then after that seven difficult (years), which will consume what, you save for them, except a little from which you will store. Then will come after that a year in which the people will be given rain and in which they will press (olive and grapes)".

According to Ibn Kathir (1988), Prophet Yusuf translated the dream of the King based on the verse. Subsequent to the seven years of prosperity in Egypt, the Kingdom will encounter a dry season lasting for seven years, and to address the forthcoming disaster, the Prophet recommended the King to make a proper plan in managing the country's economy. This involves the preparation of planting more crops and to store as much as possible to face the long lasting dry season. Following the effective strategy, the people were able to survive during the difficult period of seven years Based on this *surah*, it is evidenced that managing risk is essential for risk if not well managed, can bring destruction.

Risk management has becoming more crucial especially during the financial crisis. Non-financial firms normally managed their business risk through financial derivatives (Ayturk et al., 2016). Previous studies focused on and investigated the various types of market risk using the qualitative or quantitative techniques on non-financial firms. Linsley and Shrives (2005) reported that there is a significant relationship between risk disclosure and size for firms in the U.K. They highlighted that the risk disclosure can be improved through cost reduction in firms' capital. Beretta and Bozzolan (2004) found significant relationship between risk disclosure and firm size of Italian firms. Tanha and Dempsey (2017) also found that financial risk influenced firms to hedge. Chalmers (2001) argued that the selection of industries matters in the study of derivatives hedging because various industries might have higher (lower) positions in derivatives for risk management. In this regards, a few studies have examined the hedging positions practiced by firms in the Asian countries. For examples, Hu and Wang (2005) investigated the derivatives use in Hong Kong while Chalmers (2001), Chalmers and Godfrey (2000) and Nguyen and Faff (2010) studied the effect of hedging on firms in Australia. Most of the researchers investigated the impact of hedging on the performance of firm, and Allayannis and Weston (2001) reported that firm value is significantly improved after firm taking hedging positions using foreign currency derivatives. Firm value is exposed to currency risk and firms managed to protect its value through hedging.

Bartram (2019) further established a positive impact of derivatives usage on firm value and risk by examining the non-financial firms in 47 countries and confirmed the value relevance of hedging. Faseruk and Mishra (2008) also stated that firm value increased when financial and operational hedging is combined based on sample firms

in Canada. They concluded that, with the increase in exchange rate risk, non-financial firms in the country managed the risk through hedging via financial derivatives.

Furthermore, Adam and Fernando (2006) indicated that many firms could hedge their commodity prices, provide consistent pricing and avoid unnecessary losses when they use derivatives. Jin and Jorion (2006) concluded that hedging contributes to higher firm value despite the presence of instability and volatility in commodity prices. Moreover Mackay and Moeller (2007) also found that managing risk via derivatives could increase value of firm and later concluded that firms gained the reward from hedging because hedging creates value. They reported firm value increased by 2% through hedging. Berkman and Bradbury (1996) also found that the use of derivatives contributes considerably to higher firm performance.

Bhagawan and Lukose (2017) found that firms tend to use derivatives to hedge due to currency exposure. Allayannis and Weston (2001) reported a similar strategy where the engagement in derivatives (foreign currency) contributes significantly to value of firm. Besides, Panaretou (2013) examined the consequence of hedging using derivatives by large firms in the UK and found that only currency hedging proved to significantly contribute to firm value. However there is weak evidence on the interest rate derivatives to support the value relevance on firm value. Chong et al. (2014) also found that derivatives usage minimizes firm risk en route value maximization.

Ayturk et al. (2016) however reported the majority of financial derivatives (currency and interest rates) engagement did not influence the value of firms in the Turkish market. Likewise, Jin and Jorion (2006) recorded that hedging fails to contribute to higher value for firms in the oil and gas sector. However, hedging reduced firm stock price volatility despite the volatility in oil and gas prices. Furthermore according to Magee (2013) there is no correlation between currency derivatives position and firm value. Similarly, Belghitar et al. (2013) also found that currency derivatives did not influence firm value in French non-financial firms. Besides that Bae et al. (2017) stated that currency derivatives failed to contribute to higher performance of firm. Bae and Kim (2016) reported that the heavy exposure in hedging (foreign currency) by Korean firms led to lower risk, nevertheless, it did not contribute to the value of firm. Furthermore, Phan et al. (2014) found currency hedging contributes negatively to firm value, mainly due to the inaccurate forecast in future volatility of foreign currencies. Meanwhile Gay et al. (2011) found that derivatives are negatively significant to firm value, in support of Nelson et al. (2005) on non-financial firms in the U.S. Besides that, Gounopoulos et al. (2013) found currency derivatives negatively associated with the value of the firm due to foreign exchange volatility during the financial crisis 2007/2008. Following such varied empirical findings of derivatives usage among the firms, this study hypothesizes the following on the non-financial firms in Malaysia:

 H_{1a} : A significant relationship (positive) is expected between hedging and value of ShC firms.

 H_{1b} : A significant relationship (positive) is expected between hedging and value of non-ShC firms.

3 Research Methodology

3.1 Sample Firms

The current study includes non-financial firms (Shariah and non-Shariah compliant) that engaged in derivatives for risk management throughout the period of 2000–2017. The sample covers 946 listed firms (main market) of Bursa Malaysia (Bursa). Subsequent to the filtering process, there are 200 firms engaged in derivatives during the period with 59 firms (ShC) and the remaining 141 firms (non-ShC). To determine firms that engaged in derivatives during the period, we manually search the derivatives information in the annual reports of firms, downloaded from the website of Bursa. Keywords are used in searching for the information related to derivatives in the footnotes of annual reports. The keywords representing derivatives usage include derivatives, forward contract, forward foreign exchange, forward foreign currency, futures contract, cross-currency swap, swap contract, hedging, financial risk and financial instrument.

The sectors of the firms include industrial products, consumer products, plantation, construction, technology, properties, utilities, and trading and services. Referring to Ramli and Haron (2017), for the inclusion of ShC firms into the sample, the firms have to (1) be consistently be ShC every year from 2000 to 2017 based on the Securities Commission (SC) ShC yearly listing. This differs to the selection of ShC status according to only particular year (cut-off), say for instance, only based on November 2017 (as per ShC listing of the SC). Ramli and Haron (2017) argued that the consistency in ShC listing over the years signifies the real ShC status of the firms.

3.2 Dependent and Explanatory Variables

Hedging is proxied by derivatives engagement during the period, which acts as the explanatory variable with control variables included in the regression models. Based on past literature, Tobin's Q represents firm value (dependent variable), defined as equity (at market value) plus total liabilities (at book value) over total assets (at book value).

Financial derivatives is based on the derivatives contracts (notional value) over total assets, with expected influence on firm value (Allayannis & Weston, 2001; Ayturk et al., 2016; Bae et al., 2018; Bartram et al., 2011; Magee, 2013; Seok et al., 2020).

3.3 Control Variables

Firm control variables are incorporated in the regression following past studies (managerial ownership, size, risk, leverage, access to financial market, growth, industry effect, industry diversification and year effect). Ameer (2009) stated that manager's decision can influence firm value and managers tend to engage in hedging to maximize shareholders' value (Lievenbrück & Schmid, 2014). Managerial ownership is measured according to the total shareholding owned by the directors of the firm over total shares outstanding (Ameer, 2009).

Large firms use more derivatives than small firms (Ayturk et al., 2016; Lau, 2016). Following this, size is based on total assets (natural logarithm) (Allayannis et al., 2011; Ayturk et al., 2016; Lau, 2016; Magee, 2013). Firm risk also influences firm value. Bae et al. (2017) reported foreign currency derivatives reduces firm risk and increases firm value of Korean firms. Risk is measured according to standard deviation of daily stock returns (average) and then annualized (Bae et al., 2017). The ability to access to financial market affects firm value as these types of firm are less likely to face capital constraints. If a firm that uses derivatives refrain a project because they are unable to gain financing, their firm value remains low due to the preceding positive NPV projects (Seok et al., 2020). Firm access to financial market is based on dividend payment. Firm that pays dividend in the present year equals "1" and "0", if otherwise (Lau, 2016; Seok, 2020).

Firm value is known to influence leverage (capital structure). Leverage is represented by long-term debt over total shareholder's equity (Bae et al., 2017; Bartram et al., 2011; Lau, 2016; Seok et al., 2020). This study also includes firm growth as growth influences firm value, represented by capital expenditure over sales (Ayturk et al., 2016; Lau, 2016; Seok et al., 2020). This study also controls for industry effect and industry diversification. Decision to engage in derivatives by a firm is also influenced by the industry they belong to (Allayannis & Ofek, 2001; Lau, 2016). To control for industry effect, this study first constructs the industry adjusted Q, and then computes the log difference between the weight-adjusted industry Q and multisegment for each firm (Allayannis & Weston, 2001; Ayturk et al., 2016; Seok et al., 2020). Industrial diversification similarly influences firm value. Highly diversified industries have a higher value compared to low diversified industries (Bae et al., 2017; Bartram et al., 2011; Seok et al., 2020). This study uses the Herfindahl-Hirshman Index (HHI) to control the effect of industrial diversification (Lang & Stulz, 1994; Seok et al., 2020). HHI is measured based on the sum of the squared values of sales (per segment) over total sales. To control for year effect, dummy variable is incorporated for crisis years (2007/2008) equals "1", while the non-crisis years equals "0" (Bahri et al., 2018; Zeidan & Rodrigues, 2013).

3.4 Empirical Model

This study examines the impact of hedging on value of firm (ShC and non-ShC) in Malaysia. A panel regression model is employed, written as the following:

$$Q_{it} = \beta_0 Q_{it-1} + \beta_1 F C_{it} + \beta_2 M O_{it} + \beta_3 SIZE_{it} + \beta_4 RISK_{it} + \beta_5 LEV_{it} + \beta_6 ACCES_{it} + \beta_7 GROW_{it} + \beta_8 INDEFF_{it} + \beta_9 INDDIV_{it} + \beta_{10} DUMYEAR_t + u_{it}$$
(1)

where Q_{it} is the firm value measurement (Tobin's Q). To capture the persistence in firm value, the lagged value (Q_{it-1}) is included as the independent variable. For robustness check, firm value is also measured based on (Return on Asset–ROA; Return on Equity-ROE). The explanatory variable is FC_{it} (foreign currency derivatives). Control variables: MO_{it} is the managerial ownership, $SIZE_{it}$ is firm size, $RISK_{it}$ is firm risk, LEV_{it} is firm leverage, $ACCES_{it}$ is firm access to financial market, $GROWTH_{it}$ is firm growth, $INDEFF_{it}$ represents industry effects, $INDDIV_{it}$ is industry diversification and $DUMYEAR_t$ refers to year dummy (crisis or non-crisis year). This study employs System-GMM, a dynamic model to control for endogeneity with leverage and size treated as endogenous variables (Ayturk et al., 2016; Magee, 2013), while other variables are exogenous. Equation 1 is applied to both categories of firms.

This study employs the System-GMM (two-step) (Arellano & Bover, 1995; Blundell & Bond, 1998). The System-GMM offers an improvement over the GMM (First Difference) especially when the regressors are persistent. System-GMM is also reported to be better than GMM (First Difference) due to being less bias and more accurate. Other than addressing the endogeneity issue, System-GMM is also capable of incorporating time-invariant variable, such as dummy year. Hansen Test is performed to check the validity of the instruments and to ascertain whether the instruments are exogenous. Additionally, the validity of the model can be further verified based on the AR(1) and AR(2) tests for the existence of serial correlation in the residuals. Blundell and Bond (1998) stated that the null of AR(1) should be rejected while the null of AR(2) should not be rejected for the model to be robust.

4 **Results and Discussion**

4.1 Descriptive Statistics and Correlation Matrix

Table 1 shows the differences in mean between ShC and non-ShC firms (2000–2017). Based on the two-sample *t*-test, there is significant evidence to conclude the difference

Variables	ShC		Non-ShC		Difference	
	Mean	SD	Mean	SD	Mean	t-statistic
Dependent variable						
Firm value	1.15898	1.10673	1.09677	1.41970	0.0622^{*}	
Explanatory variable						
Foreign currency derivatives	13.8156	2.50217	13.5783	3.00408	0.1013	2.38
Control variables						
Ownership	0.01713	0.01948	0.01517	0.16248	0.0019***	-1.21
Firm size	14.1097	1.80343	14.2780	2.13067	0.1683	-0.51
Firm risk	0.29897	0.15723	0.32438	0.17484	0.1240	-2.17
Leverage	0.25382	0.28236	0.57518	1.73319	0.3213	-2.14
Firm access to financial market	0.825	0.38049	0.72362	0.44743	0.3775	2.35
Firm growth	0.08751	0.16491	0.11493	0.43867	0.0264***	-5.7
Industry effect	2.65999	0.69135	2.72476	0.88192	0.0647*	-1.37
Industrial diversification	0.11593	0.09573	0.14041	0.11722	0.0012***	-0.41

 Table 1
 Summary of descriptive statistic—Shariah (ShC) and non-Shariah compliant (non-ShC) firms

Note *, *** Represent significance at p < 0.1, p < 0.01

in mean of firm value between the two groups of firms (p < 0.1). The mean firm value of ShC is higher (1.15898) than non-ShC (1.09677). A mean of foreign currency derivatives is 13.8156 (ShC), which is not significantly different from 13.5783 (non-ShC). This suggests both groups of firms used almost the same value of derivatives for hedging, on average. Other variables such as managerial ownership, firm growth, industry effect and industry diversification also show significant different between the groups. Tables 2 and 3 present the correlation matrix between independent variables with no concern on multicollinearity in the dataset due to the low correlation.

4.2 Regression Results

Table 4 exhibits the influence of hedging on firm value. Currency derivatives significantly contribute to higher firm value (Q) of ShC (p < 0.01), H_{1a} therefore is supported, providing evidence on the effective hedging adopted by the ShC firms, therefore increasing firm value, in support of Bartram et al. (2011), Lau (2016), Tanha and Dempsey (2017) and Seok et al. (2020). Conversely, the result shows currency derivatives significantly contribute to lower value of non–ShC firms. H_{1b} therefore is not supported. The negative influence could be due to several reasons, among others, the inefficient hedging using foreign currency derivatives by the firms (Bae & Kim,

	Derivatives	Derivatives Ownership Size	Size	Risk	Leverage	Leverage Access to financial Firm growth Industry effect Industry market diversific	Firm growth	Industry effect	Industry diversification
Derivatives	1.000								
Ownership	-0.3691^{**}	1.000							
Size	0.6277**	-0.4192^{**}	1.000						
Risk	-0.3716^{**}	-0.3716^{**} 0.2240 **	-0.5458^{**}	1.000					
Leverage	0.3884^{**}	-0.2172^{**} 0.4864 ^{**}	0.4864^{**}	-0.1873^{**} 1.000	1.000				
Access to financial 0.1285*** market	0.1285**	-0.1240** 0.2603**	0.2603^{**}	-0.5065** 0.0470	0.0470	1.000			
Firm growth	0.1568**	-0.1277^{**}	-0.1277^{**} 0.1362 ^{**}	-0.0691	0.1443^{**}	-0.0982	1.000		
Industry effect	-0.1943^{**}	-0.1943^{**} 0.4129 ^{**}		-0.3342^{**} 0.3532 **	0.0102	-0.2149^{**}	-0.0936	1.000	
Industry Diversification	0.2915**	-0.0579 0.2859**	0.2859^{**}	-0.1440** 0.2974** 0.1362**	0.2974**	0.1362**	0.1305**	0.1073^{**}	1.000
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Table 2Correlation coefficients (ShC firms)

Note **Represents significance at level p < 0.05

			(9)						
	Derivatives	Derivatives Ownership Size	Size	Risk	Leverage	Leverage Access to financial market	Investment growth	Investment Industry effect Industry growth diversific	Industry diversification
	1 000)		
Derivatives	1.000								
Ownership	-0.0868^{**}	1.000							
Size	0.5731^{**}	-0.1549^{**}	1.000						
Risk	-0.2835^{**}	0.1082^{**}	-0.4353^{**}	1.000					
Leverage	0.2509^{**}	-0.0887^{**}	0.1943^{**}	-0.0976^{**}	1.000				
Access to	0.1306^{**}	-0.1675^{**}	0.2880^{**}	-0.4834^{**}	-0.0183	1.000			
financial market									
Firm growth	0.1507^{**}	-0.0710^{**}	0.1082^{**}	-0.0465^{**}	0.0239	0.0186	1.000		
Industry effect	-0.1246^{**}	0.3548^{**}	-0.1854^{**}	0.1618^{**}	-0.0463	-0.2921^{**}	-0.1216^{**} 1.000	1.000	
Industry diversification	0.0262	0.0356	0.0659**	-0.0311	-0.0015	0.0574	-0.0084 0.0015	0.0015	1.000
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 Table 3
 Correlation coefficients (non-ShC firms)

Note ^{**}Represents significance p < 0.05

	1	
Variables	(ShC)	(Non-ShC)
Q (-1)	0.597*** (6.95)	0.311**** (9.68)
Explanatory varia	ble	
Foreign currency derivatives	0.0553*** (3.38)	-0.0285** (-2.39)
Control variables		
Ownership	-5.005*** (-3.38)	-4.770*** (-2.32)
Firm size	-0.206**** (-3.57)	-0.00912 (-0.25)
Firm risk	0.576** (2.18)	0.0102 (0.06)
Firm leverage	-0.171** (-2.19)	0.270*** (10.66)
Firm access to financial market	0.163 (1.38)	0.0696 (0.55)
Firm growth	2.380*** (5.41)	-0.122*** (-2.73)
Industry effect	-0.206**** (-2.70)	-0.217**** (-5.67)
Industrial diversification	0.951* (1.74)	2.064** (2.04)
Year dummy	Yes	Yes
No of observations	193	416
AR(1)	0.050	0.020
AR(2)	0.554	0.262
Hansen test	0.506	0.159

Notes^{*}, ***, ****Significance at p < 0.1, p < 0.05, p < 0.01; z-statistics are in parenthesis

2016; Nelson et al., 2005) and the many constraints involving the foreign exchange risk management (Bae & Kim, 2016; Seok, 2020). Several control variables are found to significantly influence firm value, such as managerial ownership, firm size, risk, leverage, growth, industry effect and industry diversification.

Table 4 also confirms the validity of instrument (Hansen Test) and the absence of serial correlation in the residuals (AR(2) test) for both regression models, hence fulfils the standard to validate the GMM estimations.

Referring to the empirical result, first, there is positive influence of hedging (currency derivatives) on the value of ShC firms. This supports the argument that ShC firms are more resilient in risk management compared to their counterpart (Mitchell, 2010; Nafis & Shadique, 2016). Furthermore, during the financial crisis, Islamic finance is more resilient to face economic uncertainties compared to conventional finance (Nafis & Shadique, 2016; Wahab et al., 2020). This notion is strengthened further by the difference in firm value between the two groups of firms. As reported in the descriptive statistics, Q of ShC (mean = 1.15898) is significantly higher than non-ShC firms (mean = 1.09677). Second, this study provides evidence that financial derivatives usage fails to protect the value of non-ShC firms. Instead, engagement in

Table 4 Impact ofderivatives on firm value

derivatives causes reduction in firm value. Possible explanation to this is, non-ShC firms involved in different type of businesses (investment) activities compared to the ShC, hence the related risks and the influence of risk management strategies on firm value (Abu Bakar & Ali, 2014; Wahab et al., 2020).

4.3 Robustness Test

A robustness test is performed with alternative measurements (ROA and ROE), reported in Table 5. Hedging contributes significantly to the value of ShC firms (ROE) (p < 0.01), consistent with Q. However ROA reports a significant negative (p < 0.01). As for the non-ShC firms, hedging caused value reduction for both ROA and ROE (p < 0.01), further validated the result on Q.

5 Conclusion, Limitation and Future Research

This study investigates the influence of derivatives (foreign currency) usage on the performance of firms in Malaysia. This study suggests that ShC firms performed better than its counterpart in risk management, via hedging using financial derivatives. The current study also differs from previous studies in Malaysia that discuss risk management of firms in general. With this comparison between the firms, the study fills the gap in the existing literature by offering new insight on the role played by risk management practice via hedging on firm value in Malaysia. Hedging does not necessarily benefit firm (Seok et al., 2020) as demonstrated, instead the efficiency of hedging also matters for firms to benefit from the risk management strategies. Results are robust to the various definitions of value of firm (Tobin's Q, ROA, ROE).

The current study is not without limitation. The sample ShC firms engaged in derivatives is only limited to 59, comparatively smaller sample against the 141 non-ShC firms coupled with most of the firms are not engaged in derivatives for hedging. Due to this constraint, it may cause limitation on generalization of the results and representation of the whole population. Nonetheless, the different impact of hedging on firm value between the two groups of firms from the Malaysian context provides important contribution. This context of analysis can be expanded to other capital markets that offer both ShC and non-ShC investments.

Variables	ROA		ROE	
	ShC	Non-ShC	ShC	Non-ShC
Firm value (-1)	0.230^{***} (13.48)	0.247** (2.2)	0.281^{***} (9.73)	0.155^{***} (3.16)
Explanatory variable				
Foreign currency derivatives	-0.00363^{***} (-2.74)	-0.00486^{***} (-3.25)	0.0108^{***} (3.22)	-0.0166^{**} (-3.21)
Control variables				
Ownership	-1.964^{***} (-3.52)	-0.254(-0.94)	-0.123 (-0.23)	-1.418^{**} (-2.08)
Firm size	-0.0182^{***} (-5.33)	0.0118^{**} (1.97)	-0.0193(-1.33)	-0.0232** (-1.97)
Firm risk	-0.0254(-0.75)	0.0564^{*} (1.76)	0.00161 (0.02)	0.0233 (0.60)
Firm leverage	-0.00511 (-0.43)	-0.000803(-0.66)	0.0342 (0.69)	0.00221 (0.26)
Firm access to financial market	0.130^{***} (5.38)	0.108 (1.49)	0.101^{***} (2.77)	0.216 (1.32)
Firm growth	0.0295 (0.48)	0.0379 (1.42)	-0.554^{***} (-4.48)	0.0685** (2.24)
Industry effect	$0.0119^{*}(1.93)$	-0.00174(-0.32)	-0.0305 (-1.45)	0.0175 (1.28
Industrial diversification	-0.0389 (-0.48)	0.181 (1.58)	-0.465^{***} (-3.05)	0.115 (0.40)
Year dummy	Yes	Yes	Yes	Yes
No of observations	197	418	200	417
AR (1)	0.099	0.047	0.030	0.238
AR (2)	0.105	0.632	0.494	0.482
Hansen Test	0.408	0.748	0.945	0.212

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The Impact of Artificial Intelligence (AI) in the Oil and Gas Industry



Abdulhadi Jaara, Allam Hamdan, and Sabri Mushtaha

Abstract Artificial Intelligence (AI) has become one of the most popular technologies and technological tools. The capabilities and use cases of AI have only increased, both in scope and complexity over the past few years. What initially started as a simple idea in the 1950s has now grown into perhaps the most influential twenty-first century technologies. In the industrial sector, the use of AI has become more and more common and even popular, given the unique problems the sector faces. In this paper, the potential of applying AI in the oil and gas sector is explicated. This is as a consequence of the significant impact that AI is bound to have on advancing the oil and gas sector moving into the future. It was established that the adoption of AI will provide credible solutions to the most pressing challenges faced by the sector.

Keywords Oil and gas sector · Artificial intelligence · Technologies · Solutions

1 Introduction

To determine the importance of artificial intelligence and its effect on the oil and gas sector, it is imperative to comprehend what artificial intelligence (AI) is, especially in the modern-day context. AI is not necessarily new, and many of the ideas that are being currently implemented have been around for some time. The history of AI as it is known today can be traced back a few decades ago. Humans had fantasized about the presence and possibilities that could be achieved by the use of intelligent machines for a long time. The stories of machines taking over and philosophical and ethical debates regarding the issue had dominated writing and science fiction over the

A. Jaara

A. Hamdan (⊠) Ahlia University, Manama, Bahrain e-mail: allamh3@hotmail.com

S. Mushtaha Faculty of Administrative and Economics Sciences, Al-Ouds Open University, Gaza, Palestine

College of Business and Finance, MBA, Manama, Bahrain

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years. AI was not developed by one single inventor or person. Instead, it was the result of the combination of several different cultures and strands of thought. Nonetheless, when it comes to the development of AI, there are several individuals that should be mentioned. One of the most significant contributors to the development of AI was Alan Touring. Touring was a British polymath who explored artificial intelligence mathematically in 1950 (Anyoha 2017). According to the researcher, humans used available information and reasoning to make decisions and solve problems they faced every day. Thus, Touring wondered whether machines could do the same thing. The given question became the basis of the concept paper the scholar published in the same year (Anyoha 2017). This was the beginning of the fascination that the world of research and development had with AI.

The development of AI during that era was curtailed by several factors. The first obstacle was the nature of operations of computers. In the 1940s and 1950s, computers were different from the ones that are used today (Anyoha 2017). In most cases, they could only perform target duties, but could not store the relevant information. Hence, some critical records could be lost because of such inefficiencies. Another major impediment to the development and growth of AI was the fact that computers and technologies they ran on, including hardware, were very expensive. Only the largest and most financially endowed institutions could afford to experiment with and invest into new technological ventures. The burden of proof for such a thing to work was very high (Anyoha 2017). This could serve as the explanation of the fact that AI could not have been developed by a single person but was the result of joint efforts of many individuals. After the initial paper publication by Touring, what followed was the proof of concept that was later initialized in 1955 through a program designed by Alan Newell, Herbert Simon and Cliff Shaw called the Logic Theorist (Anyoha 2017). The Logic Theorist was eventually presented at a conference in Dartmouth in 1956 (Anyoha 2017). It was at this conference that the name artificial intelligence was officially coined. The Logic Theorist was important to the development of AI as it was one of the first AI programs that was able to copy the problem-solving behaviour of humans, mentioned by Alan Touring in his concept paper (Augusto 2021, p. 30). Today, it is the foundational work that was done by pioneers such as the mentioned above that forms the basis of AI.

The oil and gas industry forms the cornerstone of the world economy. Ever since the industrial revolution, energy and its generation have been the focus of attention. Despite recent developments, things have largely remained the same. The levels of energy consumption have considerably gone up over the past few decades (Stevens 2018, p. 2). Even after the pandemic, the sector is still expected to grow. In most cases, the energy in question has always been the one obtained using fossil fuels. Yet, oil and gas are utilized for the manufacturing and facilitation of the production of various goods and services. Therefore, oil shocks and fluctuations in oil prices have a widespread economic impact. For instance, oil shocks in the 1970s and the 1980s influenced the GDP growth in the OECD countries. Considering the fact that oil and gas are almost always traded internationally, the importance of oil and gas, both economically and geopolitically, becomes even more significant (Stevens 2018, p. 4). The effects are more than macroeconomic though. There are lower-level impacts of

the operations of the oil and gas sector, including the influence on the commodity prices and even poverty levels. In fact, oil and gas have been described as the fuel of the world.

In spite of the rapid development of the oil and gas sector, there is still a problem with quantifying or rather explaining clearly the real impact of AI on it. Currently, AI is regarded as the most important general-purpose technology in the world, influencing industries faster and more significantly than ever before. Earlier, AI and its tools were reserved for the companies whose processes or products were heavily influenced by and involved the use of technologies. At the moment, the impact of AI can be observed in the industries such as the oil and gas sector. The adoption of AI in the oil and gas sector, however, must be contextual. Even though companies in the oil and gas sector are much faster in making use of new technologies, they do not change their business models accordingly. The implication here is that the use of AI will almost always focus on improvements in efficiency (Koroteev & Tekic 2021, p. 1). The oil and gas sector is also incredibly complex and diverse. Even the biggest economies in larger oil producing regions are still grappling with the effective application of AI. However, the oil and gas sector remains an anchor for growth across many oil-producing countries. Given the sheer promise of AI and the possibilities that it opens up for the oil and gas sector, it is important that any changes and improvements in efficiency are backed by proper research and development. The given study will therefore present research-based conclusions regarding the extent to which AI tools can be used impactfully in the oil and gas sector.

The study's aim is to explore the impact of AI on the oil and gas sector. It is expected that the research will contribute to literature by further exploring the opportunities for the upgrade of the oil and gas sector utilising AI. In addition, the study will present a more in-depth analysis of the impact of AI on the changes of the business or operational model in the oil and gas sector.

2 Literature Review

2.1 Brief Review of the Research Problem and Related Issues

Today, as technologies are advancing and becoming cheaper and more accessible, the development and use of AI tools has become more commonplace (Anderson & Raine 2018). AI is now an important part of lives and livelihoods. For instance, programs like Siri, used in iPhones, enable internet searches and make the use of phones easier. There are self-driving autonomous cars on the streets, with many AI robots in operation (Adams 2017). Furthermore, endless AI applications are becoming more and more sophisticated (Kaushal & Nolan 2015). Given that the major intention of developing AI was problem-solving, it is little wonder that AI tools have been used to deal with some of the biggest issue the world is facing nowadays. Some of the smartest uses of AI have been observed in the field of service delivery where AI tools

have been utilized to assist people with disabilities. Additionally, AI tools have been widely utilized in the human resources field to leverage the true power of objectivity of technology. AI automates and streamlines routine tasks related to the hiring process, removing the influence of bias and optimizing individual performance. AI has also been used in the marketing and medical fields to assist with early detection of some of the most dangerous diseases (Forbes 2021). The effectiveness with which AI solves some of the routine and micro-level problems makes it easier to imagine the world in which AI could be utilized to deal with some of the most serious issues.

Given the importance and the challenges that the oil and gas industry is experiencing, it is opined that it is one of the sectors where the use of artificial intelligence could possibly have the biggest impact. Due to the continued utilization of fossil fuels, the oil and gas industry has important primary and secondary benefits. It not only influences such important sectors as transportation and production, but also has secondary level impacts on commodity prices. Further, the industry also faces issues and threats that are inherent in and around the industry itself. First, because of the fact that the oil and gas sector is associated with intensive investment of resources, it is important to make sound financial decisions especially with regards to the upstream activities of the company (Zhu & Singh 2016, p. 1). Other potential issues that could be resolved through the use of AI include the problem of illicit financial flows to which the oil and gas sector is susceptible as oil trade activities are perhaps the most significant source of domestic resource mobilization for developing countries that produce oil (Porter & Anderson 2021, p. 2). Probably, the biggest threat the industry has encountered to date is that of environmental sustainability. The oil and gas sector has been at the centre of the debates related to emissions and greenhouse gasses. As a result, it has been identified as one of the biggest contributors to global climate change (Beck et al. 2020). Other geopolitical and social global challenges have also affected the oil and gas sector, leading to price issues and general industry instability.

2.2 Summary of the History of the Problem within Relevant Context and Background.

Several researchers have looked into the influence of AI and the possibilities it offers to the oil and gas industry. In particular, Korotev and Tekic looked into the impact of AI on the upstream segment of the oil and gas industry. The given focus was deliberate given that this is the part that requires extensive financial input the oil and gas value chain, and therefore the single part that is characterized by the highest number of challenges and risks. The researchers explored the possibilities of AI as a technology system of tools and applied them to the oil and gas sector. Further, the study also focused on some non-technical issues such as those that relate to the human resource aspect and impacts of AI on them in the oil and gas sector. According to Korotev and Tekic the upstream segment of the oil and gas sector, comprising the field development and production, would benefit most from the use of AI as opposed

to the midstream segment, involving transportation, and the downstream segment, focusing on refinery.

Gupta and Shah (2021, p. 1) also carried out a study exploring the influence of AI on the oil and gas sector. The approach taken by Gupta and Shah (2021) was broader than the one used by Korotev and Tekic as the researchers looked into the issue from the perspective of the larger energy sector. Similar to Korotev and Tekic, Gupta and Shah (2021) considered both technical and non-technical aspects that impact the implementation of AI in the oil and gas industry and the adoption of machine learning technologies. Unlike Korotev and Tekic, the researchers analysed the implications for all the three segments of the oil and gas value chain, comprising the upstream, midstream, and downstream operations. Their conclusions were therefore more comprehensive than those of other researchers. Moreover, the researchers diagrammed the patterns related to the use of the AI-based instruments and determined their impact on de-gambling measures in the field (Gupta & Shah 2021, p. 2). Generally, AI is continuously perceived necessary for the sector.

While many researchers have generally explicated the utilization of AI in the oil and gas sector, Li et al. (2021, p. 937) examined the possibilities of the AI utilization in the sector's development. As is the case with Gupta and Shah (2021) and Korotev and Tekic, the researchers highlighted the fact that AI became the focus of research in all spheres. The increasing use of AI-based work points to its potential in almost all industries (Li et al. 2021, p. 937). The research focused on the upstream segment of the oil and gas industry, in particular, on the utilization of AI in oilfield development. As it stands, oilfield development is associated with numerous issues. It is a process that involves a huge volume of data and unpredictable emergencies (Li et al. 2021, p. 937). The implication is that without any resource integration or automatic management, it would be impossible to achieve good results. In fact, the likelihood of unexpected outcomes would be very high, leading to the increased need for material and financial resources (Li et al. 2021, p. 937). This finding explains why the sector has gone digital, and why there has been a gradual push towards the use of AI. Additionally, the study revealed that the use of AI in oilfield development is essential with regards to the informatization of oilfield development and is therefore the future trend in the area (Li et al. 2021, p. 937). Based on the investigation, the researchers concluded that some uses of AI in oilfield development included prediction of oilfield production dynamic, optimization plans development, the identification of any fractures, as well as the advanced recovery of oil. In all these, the outcome is that there are reduced losses or rather wastage.

Due to the growing importance of AI in almost all industries, it is somewhat surprising that it is not characterized by bigger presence in the oil and gas sector. This is what Magill (2021) points out drawing attention to the fact that the oil and gas sector is now slowly turning to AI to solve some of its most serious problems. At the moment, the oil and gas industry is facing bigger challenges than it has ever encountered in its more than 260-year history (Magill 2021). In order to deal with the problems, the industry is turning towards the use of AI, which is a relatively new area. COVID-19 and its resultant effects offer both challenges and opportunities for the oil and gas sector (Barbosa et al. 2020). According to Magill (2021), even though

the oil and gas industry is beginning to emerge from the challenges posed by the COVID-19 pandemic, it has been confronted by a new set of issues.

The single biggest threat is that of global warming and climate change, and the fact that the oil and gas industry is seen as a key culprit responsible for the problem. Some of the key players in the transportation market, including GM, have recently announced plans to offer only electric vehicles by 2035, signalling the shift from the use of fossil fuels in the near future (Magill 2021). This will result in huge changes in demand that will no doubt affect the market profoundly. Politically, almost all countries have been putting forward green agendas and committing to solving the issue of global climate change. All of these initiatives are likely to impact the oil and gas sector and its operations (Magill 2021). Therefore, the companies in the oil and gas sector have been adopting AI and machine learning technologies to improve their value chains from top to bottom (Magill 2021). Some of the possibilities of the use of AI in the industry include the opportunities to track and reduce emissions.

2.3 Shortcomings and Gaps in the Literature

The review of literature has demonstrated that there is no shortage of research into the possibilities of the use of AI in the oil and gas industry (Koroteev & Tekic 2021, p. 1). However, there are important gaps in literature in this field of study. To begin with, almost all studies speculate about the application of AI in the oil and gas industry, not looking into the concrete initiatives that have already been implemented. Therefore, one of the biggest gaps in literature is related to the lack of research into the challenges and drawbacks in the oil and gas industry that prevent the utilization of AI. In most cases, the problems associated with AI implementation in the oil and gas sector are not the industry specific problems, but the challenges generally associated with AI. Some of the issues include the lack of professionals that the industry will require should it implement AI, the importance of data in the process and the need for collaboration. Ultimately, AI solutions to the problems faced by the oil and gas industry will depend on human intelligence. There is need for AI solutions to be specific to the company in terms of its operations. The solutions have to be developed with the oil and gas industry in mind and made to match the business activities and the data that every particular company has (Rahmanifard & Plaksina 2019, p. 2295). Additionally, AI tools need sufficient data to be trained and be able to properly function in the ideal operational mode. Smarter algorithms might help to get better results from different datasets when the size is relatively limited. However, the solution cannot be developed if the data is poor. Consequently, one of the challenges going forward, which has not been addressed by existing research, is the fact that access to large and quality data could be a critical facilitator or barrier to the successful application of AI in the oil and gas industry.

Notably, most studies that investigate the advantages of the AI use in the industry tend to focus on the technical aspects of the technologies and outcomes of their application. There is not enough research related to the benefits of the adoption and implementation of AI in the oil and gas industry in the context of the resolution of real-life problems. Such research is necessary considering the challenges that have been identified in the oil and gas sector, necessitating the use of AI in the first place. For instance, AI-based solutions have not been tied strongly enough to such problems as environmental impact of the oil and gas sector and economic value of the AI implementation (Herweijer et al. 2020, p. 6).

2.4 Sustainability of the Oil and Gas Sector

Oil and gas exploration has come under intense scrutiny over the years as the sector leads in terms of environmental pollution (Gross 2020). As the world is working towards clean energy production, the contribution of the oil and gas sector to environmental pollution through the use of fossil fuels and resultant emissions of greenhouse gases has been a huge point of contention. Over time, the industry has been encouraged to do more in terms of its participation in climate change mitigation efforts (IEA 2020). The effects of greenhouse gases and oil spills on the environment are dire, and the continued use of fossil fuels will endanger people's survival due to global warming. It is also important to note that the issues of sustainability as relating to the oil and gas sector go beyond the emissions produced by the oil and gas sector and its customers. There are also direct environmental sustainability effects associated with the structure and operations of the industry. For instance, there have been oil spills in offshore drilling and extraction sites such as the spill in the Gulf of Mexico in 2010, whose effects are likely to be felt for years to come (EDF 2018). Oil spills such as those that happened in the Gulf of Mexico not only affect the ecosystems in these regions, but also impact human lives (Eklund et al. 2019, p. 391). Moreover, they cost incredibly huge amounts of money for the companies involved, considering the expenses for settlements and clean-up operations.

As per researchers and scientists, environmental conservation and sustainability and the use of fossil fuels do not have to be mutually exclusive. Scholars agree that environmental conservation is a priority, but due to the increasing need for energy especially in developing countries, a proposal to adopt technologies that minimize carbon emissions has been made (Bos & Gupta 2019, p. 1). Carbon emissions can therefore be reduced through technologies such as Carbon Capture and Storage (CCS). These technologies are built based on the recognition that environmental sustainability is required even as people seek for the renewable energy sources for the future.

Another issue connected with the sustainability concept is the fear that the world will run out of fossil fuels in this century. With regard to the oil and gas sector, this realization has resulted in in the country diversifying its economic activities to avoid over dependence on oil alone. The need to move to renewable sources of energy will also lead to the reduction of demand for petrol fuels starting from 2040.

3 Conclusion

The AI theory has been used as the theoretical approach and conceptual model in the given research. The artificial intelligence theory refers to the computational approach utilized to develop intelligent software systems that can be used to solve complex problems through the adoption of working systems of the human mind (Gupta & Tham 2018, p. 187). The major aim of this theoretical approach involves assisting to achieve artificial general intelligence (AGI). The general idea is creating a system or computer powerful enough to resolve problems in exactly the same way a human being does it. At the same time, the operations of AI are expected to be very different from what the human mind does. As it stands, people can only perform tasks in certain limited and specific areas referred to as weak AI (Winfield 2018, p. 1). Computing power, however, provides the right environment and tools for the growth and flourishing of such instruments as AI, artificial neural networks and machine learning, which use large amounts of data to train machines in decision-making through the support of vector machines.

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