

Indicators to Measure Smart Economy: An Indonesian Perspective

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ABSTRACT

The rate of urbanization or the proportion of population that lives in cities in the world increases every year, a city should adopt the concept of smart city that may increase the quality of life. Indonesia is undergoing a historic change and is beginning to enter the urban economic stage. Cities in Indonesia are growing faster than cities in other Asian countries, hence it is interesting to implement smart economy concept in Indonesia. Smart Economy concerns an open, transparent, varied economy that adds value to smart cities. Its characteristics include a variety of employment opportunities with labor market flexibility, diversification that promotes entrepreneurship and innovation as well as more productivity through local, regional and global linkages. This characteristic of the smart economy embodies a high level of competitiveness worldwide and also at the local level. This research explores the variables and indicators used to measure the smart economy derived from the literature and also the opinion of 18 respondents from quadruple helix backgrounds namely, business player, government, expert/researcher and civil society. The study finds 10 variables and 34 indicators to measure whether a city has implemented the concept of smart economy from an Indonesian perspective.

CCS Concepts

• Social and professional topic \rightarrow Professional topics \rightarrow Computing and business → Economic impact

Keywords

Smart city; Smart economy; Urban; Quality of life; Indonesia.

1. INTRODUCTION

A city is regarded as the highest form of economic and sociocultural achievement in human civilization, it is also considered as the location of non-primary economic activities [1]. These condition makes the urbanization become popular among citizens in most of countries in the world, hence we are now living

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in a global urban transition period. The rate of urbanization or the proportion of population living in cities is mostly high, even though the numbers are varying greatly for each region of the world.

Based on existing data, the world's urbanization rate in 2014 reached 81.5% in North America, 79.5% in Latin America, 73.4% in Europe, 70.8% in Oceania, 47.5% in Asia, and 40.0% in Africa [2]. With the positive growth of demographics in urban areas, the urbanization trend will continue to increase in some regions of the world. Among the three developing regions, the highest urban demographic growth rates are in Africa and Asia followed by Latin America.

Currently, Indonesia is undergoing a historic change and starts entering the urban economic stage. Cities in Indonesia grow at an average of 4.1% per year, this figure is faster than other Asian cities. By 2025, it is estimated that 68% of Indonesians are residents living in urban areas [3]. It is predicted that by 2050, Indonesia becomes one of the countries with the highest contribution to the increase of urban population after India, China and Nigeria to the increasing of population in urban area [2].

Cities are globally positioned to participate in identifying, adopting and implementing transformational solutions. Broadly speaking, technological developments alter the paradigm of how a city is developed, the inner city economy, how it interacts with its citizens, to municipal services related to health care, safety and waste management. One of the biggest challenges facing today is ensuring that experience and work for building smart cities can be shared across cities globally [4]. Challenges and mutual commitment to develop smart city also reached the Indonesian government.

Implementation of smart city is still a new thing, especially for cities in Indonesia. The concept of smart city talks about the concept of urban development that becomes a hot topic for experts around the world. Until now there is no absolute definition of smart city, there is no end point of the concept but a series of sustainable development processes where a city becomes more feasible to live in and ready to face the challenges of new life in the future. In addition, based on the existing literature survey, it is still unclear how the governance should manage the system and infrastructure to make the city spatial in such a way that can run smart economy in a city.

One of the interesting things about the city of Bandung is the condition of its economy, as the data obtained from Statistics of Bandung Municipality Bureau, it is known that Bandung economic growth rate from 2011 to 2016 is relatively stable. It

was noted that the economic growth rate in Bandung in 2011 was 7.91%, in 2012 8.53%, in 2013 7.84%, in 2014 7.72%, in 2015 7.64%, and last has been calculated there in 2016 that is 7.79%. Viewed from the development of non-oil exports in the city of Bandung, the export value for non-oil and gas industry from 2011 to 2016 is considered quite volatile. The average value of non-oil and gas exports from 2011-2016 can reach 45,891.84 in dollar. Viewed from the tourism sector, the city of Bandung is quite crowded by both domestic and foreign tourists, although the average comparison of domestic tourists visitors far greater than foreign tourists ranging from 30: 1. The average of foreign tourists who visit the city of Bandung in 2011-2016 reached 185,997 tourists, while domestic tourists can reach 5.55 million tourists, so as a whole total tourists both domestic and foreign tourists who visit the city each year reached 5,73 million tourists. From the employment perspective, from 2011 to 2015 the average open unemployment rate reached 9.5%, the percentage is obtained from the comparison between the number of unemployed divided by the number of labor force in Bandung [5].

In line with the vision of Bandung to become a smart city, a directional planning to realize the vision of Bandung to become a smart city is required. Meanwhile, based on some information and literature relating to the dimensions of the smart economy in smart cities, there are still no fixed variables and indicators used in the application of the smart economy concept in smart cities in the city of Bandung. Therefore, it is interesting to do research to get the variables and indicators related to the dimensions of smart economy in the implementation of smart city concept based on quadruple helix perspective. Then, its readiness for the dimensions of the smart economy in Bandung can be measured.

2. RESEARCH OBJECTIVES AND QUESTIONS

Smart Economy concerns an open, transparent, varied economy that adds value to smart cities. The Smart Economy will facilitate an efficient and effective business environment that promotes and encourages innovation regardless of outcome. It will also ensure a stable labor market with the resources and the ability to adapt and make changes if necessary. The Smart economy guarantees the success and economic growth of a city, as well as the livelihoods of its citizens [6]. Unfortunately based on literature review conducted in this research, until now there is still no standard related indicators that can be used to measure the application of smart economy in smart city especially for Indonesia, which fit the Indonesian characteristics. Since the social and economic background of Indonesia is different enough from another country, a model or indicators that fit in a country might not be able to be directly implemented well in another country like Indonesia [7]. Therefore, the objectives of this research are to find out the variables and indicators which fit to be used for measuring smart economy in Indonesia. In line with the research objectives, the research questions of this study are as follows: a) Based on the literature result, what are the variables and indicators to measure smart economy in Bandung Indonesia? b) Based on interview and focus group discussion result, what are the variables and indicators to measure smart economy in Bandung Indonesia?

3. RESEARCH METHODOLOGY

This study uses qualitative research methods. In order to achieve research objectives and answer research questions, this study uses two steps in to identify the variables and indicators for smart economy. The first step is literature review to collect the baseline variables and indicators, then second step is using focus group discussion and in-depth interview to confirm the variables and indicators founded from literature review from Indonesia perspective. During the first step, this research use articles from journal and conference proceedings as the primary literature that available online in the internet also by using campus facility in Telkom University. Besides, this research also uses books, articles, report, encyclopedias and dictionary as secondary literature. The literature review process is done by reading all the things associated with smart city and also the smart economy as the object of research, comparing one by one literature with other literatures, finding the similarities, to the difference in various perspective of the literatures, also from a short discussion and finally summarize it as a broad picture of the smart economy in smart city.

This research is also an explorative research which is a type of research that try to capture unclear problem, explorative research result relies on formal approaches through qualitative interview or qualitative observation [8]. Since it uses the literature as the baseline for the variables and indicators for measuring smart economy, it uses face-to-face in-depth interview and focus group discussion (FGD) to gather the qualitative data. Also the method that is used in this research is semi-structured interview and tend to be an open-ended discussion in the end.

This research uses convenience and purposive sampling technique approach. The respondent was selected based on some criteria [9]. Respondents are people who have knowledge of smart city concept and are aware of city and smart city development. Respondents in this research must at least have an equivalent academic background of master or equivalent experience and are relevant to the focus of the smart city area discussed, actively engaged in the focus of smart city areas such as conducting active scientific research related to the implementation of smart city, actively involving in policy making, involving directly or indirectly in projects related to the area of smart city implementation. For those criteria, this research divided the respondents into four groups based on quadruple helix concept. Quadruple helix is a concept of innovation that comes from 4 perspectives as government, business players, expert/researcher and civil-society. The list of respondent characteristics is shown in Table 1.

Table 1. List of respondents

| Category | Organization, Institutions or Jobs of Respondents | Number |
|---|---|--------|
| Government | Bandung City Government in the field of economy, Planning, Research and Development. Department of Communications and Informatics. | 5 |
| Business Players | Startup Practitioner, Banking | 4 |
| Researchers / Observers / Experts | Lecturer of Telkom University (School of Computing, School of Economic and Business), Expert from BPS | 5 |
| Civil-society | IT Manager, IT Governance, System Analyst, IT Professional | 4 |
| Total | | 18 |

The collected textual data has been processed and analyzed through 6 steps in accordance with what has been described by Creswell [10] related to qualitative data analysis. The first starts from preparing the data for analysis, reading the entire material until typing the observed data. Next is to perform preprocessing data, by coding or categorizing data that has been collected into several categories, in this study the data categorization is based on the variables found in the review literature which connect to all the themes / descriptions related to the object under study, this is a form of data processing to become more understandable, until finally interpreting the meaning of the theme / description that led to the conclusion.

4. SMART ECONOMY: LITERATURE REVIEW

4.1 Smart Economy Definition

Currently there is no absolute definition of smart city as stated by The Department for Business Innovation & Skill of the United Kingdom Government. The department states that "There is no absolute definition of a smart city, no end point, but rather a process, or series of steps, by which cities become more "livable" and resilient and, hence, able to respond quicker to new challenges ". One of the concepts of smart city that is quite often cited is the concept identified by [11] and further developed by [12] who transformed it into Smart City Wheel. Reference [11] identifies six key elements that characterize a smart city: smart people, smart economy, smart environment, smart governance, smart living and smart mobility. In 2012 [12] developed a smart city wheel by combining aspects and findings of smart city studies that have been studied previously, the built framework allows readers to easily understand what kind of city is classified into smart city. Criteria to different indicators define the six elements that facilitate differences between cities.

Smart Economy concerns an open, transparent, varied economy that adds value to smart cities. Its characteristics include a variety of employment opportunities with labor market flexibility, diversification that promotes entrepreneurship and innovation as well as more productivity through local, regional and global linkages. This characteristic of the smart economy embodies a high level of competitiveness worldwide and also at the local level, and is well connected to the global economy. The Smart Economy will facilitate an efficient and effective business environment that promotes and encourages innovation regardless of outcome. It will also ensure a stable labor market with the resources and the ability to adapt and make changes if necessary. The Smart economy guarantees the success and economic growth of a city, as well as the livelihoods of its citizens [6]. Thus, this should be the focus of every Government to think ahead, innovatively and with global reach with regard to economic policy to remain attractive and competitive in the global economy.

4.2 Smart Economy Variables and Indicators

From a variety of literature and research that have been done previously, this finds emerging various variables and indicators. Previous studies used different terms related to factors affecting the smart economy. There is a direct mention of the indicators that affect the smart economy, and there are also grouped some indicators in a variable. This research uses the point of view that smart economy is a dimension of smart city influenced by several variables. Each variable consists of several indicators. Table 2 presents the findings of several variables from previous studies. As shown in Table 2, Giffinger describes that smart economy has 6 factors consisting of Innovative Spirit, Entrepreneurship, Economic Image & Trademarks, Productivity, Flexibility of Labor Market, International Embeddedness which is consist of 12 indicators, while those 6 factors mentioned again by Batty et al in 2012 with additional of ability to transform as variables [13].

Table 2. Smart economy variables in smart city from literature

| Reference Variables | Rudolf Giffinger (2007) | Batty, et al (2012) | Vinod Kumar (2012) | Kok-Lim Alvin Yau (2014) | ISO 37120 (2014) | Kondepudi (2015) | Paida Mhangara (2017) | Global Power City Index(2017) |
|--------------------------------|-------------------------|---------------------|--------------------|--------------------------|------------------|------------------|-----------------------|-------------------------------|
| Entrepreneurship | \checkmark | ~ | \checkmark | \checkmark | \checkmark | \checkmark | \checkmark | \checkmark |
| Productivity | \checkmark | \checkmark | \checkmark | \checkmark | \checkmark | \checkmark | \checkmark | \checkmark |
| Flexibility of Labor Market | \checkmark | ~ | \checkmark | | \checkmark | | \checkmark | \checkmark |
| Innovative spirit | \checkmark | \checkmark | \checkmark | | \checkmark | \checkmark | \checkmark | |
| International Embeddedness | \checkmark | ~ | \checkmark | \checkmark | | \checkmark | \checkmark | |
| Ability to Transform | | ~ | \checkmark | | | | \checkmark | |
| Economic Image & Trademarks | ~ | ~ | ~ | | | | | |
| Tourism | | | \checkmark | | | | | |
| Poverty | | | | | \checkmark | | | |
| Opportunity | | | | | | \checkmark | | |
| E-Business | | | | | | \checkmark | | |

Kumar describes smart economy as building block of smart city second largest after smart people, according to a smart city in applying smart economy need some attributes. He explained in the application of smart economy that smart city must: 1) Understand its economic DNA; 2) Driven by innovation and supported by universities focusing on cutting-edge research, not just for science, industry, and business, but also for cultural, architectural, planning, development and the like; 3) Highly appreciate creativity and welcome new ideas; 4) Enlightened entrepreneurial leadership; 5) Offer its citizens in a variety of economic opportunities; 6) Knowing that all economies work at the local level; 7) Ready to face the challenges posed and opportunities of economic globalization; 8) Smart city-related experiments, supporting, and promoting a shared economy; 9) Think locally, acts regionally, and compete globally; 10) Make strategic investments in its strategic assets; 11) Develop and support strong national brands; 12) Insist on balancing economic development and sustainable economic development; 13) Smart city becomes a destination to be visited by the community (tourism); 14) Smart cities compete nationally with selected and significant factors; 15) Utilize most of its assets when finding solutions to problems; 16)

Superior in productivity; 17) Has high labor market flexibility; 18) Welcomes the human resources that increase their wealth; 19) Smart city residents seek sustainable natural resource management and understand that in the absence of this, the economy will not function indefinitely. Reference [14] only mentions 3 variables about smart economy. Karayannis based on ISO 37120 says poverty is one of the factors in smart economy, reference [15] also mentioned e-business and opportunity. While referring to the ranking of cities in the world, namely the global power city index, if categorized from 13 economy indicators used they mostly lead to 3 variables in the smart economy.

In Table 2, it appears that the variables from number 1 to 7 are frequently mentioned variables and cross each other in previous studies. Variable number 1-11 is mentioned only once in some literatures. We examine some of these variables, such as poverty should stand up to be a variable and the term is changed to welfare, and also the opportunity and e-business should not stand alone as a variable, but at the indicator level. Also tourism is linked to the city's economic image as well as the trademark, so we try to propose models that show the relationship between variables and indicators to measure the intelligent economy as shown in Table 3. Table 3 is then confirmed to the respondents.

| Table 3. Smart economy in | dicators and | concept f | irom |
|---------------------------|--------------|-----------|------|
| litera | ture | | |

| Variables : Concept | Indicators | |
|--|--|--|
| Innovative spirit : The spirit of innovation that finds newer | R&D expenditure in % of GDP | |
| approaches to economic activity. Innovation is stimulated through competition collaboration and | Employment rate in knowledge-intensive sectors | |
| grouping of economic units and activities [16]. | Number of new patents per 100,000 population per year | |
| Entrepreneurship : The entrepreneurial spirit, associated with entrepreneurship resulting from individual business (regardless of family wealth and | Self-employment rate | |
| inheritance) and fostered through a positive business climate, enhances capacities, institutional strengthening, and openness to unexpected opportunities [1]. | New business registered per year | |
| International Embeddedness : International integration, this refers to the extent to which | Companies with headquarter in the city quoted on national stock market | |
| economic activities are limited by non-economic institutions within | Air transport of passengers | |
| the international sphere [17]. | Air transport of freight | |
| Productivity : The productivity | GDP regional per employed person | |
| also employment [1]. | GDP regional growth rate | |
| Flexibility of Labor Market: | Labor force participation rate | |
| The flexibility of the labor market that includes the | Total vacancy available | |
| acceptance of labor from outside and without conflict, also avoids the economic losses of the city | Proportion in part-time employment | |

| due to periodic labor unrest [16]. | Existence of labor market regulation |
|--|--|
| Poverty : Poverty is defined as | Percentage of city poverty |
| those who are unable to provide | Unemployment rate |
| water, food, shelter and basic needs for themselves for 12 | Percentage of ownership of residential land |
| monuis [10]. | Gini Ratio |
| Economic Image Tourism & Trademarks: Image of the | Importance as decision- making center |
| economy & also trademarks that exist or originated in the city [11]. This refers more to how a | Number of foreign and domestic tourists |
| city is viewed from outside entities. | Number of national brands coming from the city |
| Ability to Transform: A smart economy shows the ability to | Number of active internet users |
| transform a city into a smart city | Number of NGOs |
| [1]. | Number of Digital start-up |

5. SMART ECONOMY CRITERIA: BASED ON INTERVIEW AND FGD RESULT

In order to obtain variable that appropriate with the condition in Indonesia, this study use semi-structured interview with openended approach and FGD. The process has been carried out in 4 categories such as government, business player, expert / researcher and civil society. The results are presented as shown in Figure 1.



Figure 1. Smart economy variables based on interview and FGD result

The results from Figure 1 explain that the majority of respondents tend to agree with each variable that has been obtained from the literature. Therefore, those variables should be used in Indonesia. Moreover, when discussions with respondents there are new variables that emerged namely Sustainability, but it hasn't been confirmed yet clearly, this will be done in the next step of research. Based on the interview with 18 respondents also helped by 3 observers to label the sentiment per respondent (with the aim to improve the precision of labeling quality), this research also examines the indicators from literature and some emerging indicators from discussion that can be confirmed by most of respondent, the result is presented in Table 4.

| Table 4. Confirmation result based on literature and some |
|---|
| emerging indicators |

| Variables Indicators | Tendency | | | | |
|--|----------|-------|--|--|--|
| variables - mulcators | Disagree | Agree | | | |
| Innovative Spirit | | | | | |
| R&D expenditure in % of GDP | 7,9% | 69,8% | | | |
| Employment rate in knowledge-intensive | 6,3% | 61,9% | | | |
| sectors | | | | | |
| Number of new patents per year | 11,1% | 63,5% | | | |
| Entreprenuership | | | | | |
| Self-Employment rate | 6,3% | 77,8% | | | |
| New business registered per year | 6,3% | 71,4% | | | |
| International Embeddedness | | | | | |
| Companies with Headquarter in the city | 25,4% | 36,5% | | | |
| quoted on national stock market | | | | | |
| Air transport of passengers (Persons) | 9,5% | 66,7% | | | |
| Air transport of freight (Tons) | 11,1% | 61,9% | | | |
| Productivity | | | | | |
| GDP Per Employed Person | 0,0% | 69,8% | | | |
| GDP Per Capita | 0,0% | 69,8% | | | |
| GDP regional growth rate | 0,0% | 66,7% | | | |
| Flexibility of Labour Market | | | | | |
| Labor force participation rate | 4,8% | 60,3% | | | |
| Total vacancy available | 4,8% | 63,5% | | | |
| Proportion in part-time employment | 12,7% | 54,0% | | | |
| Poverty / Welfare | | | | | |
| Poverty Rate | 7,9% | 65,1% | | | |
| Unemployment Rate | 9,5% | 65,1% | | | |
| Percentage of ownership of residential | 14,3% | 58,7% | | | |
| land | | | | | |
| Gini Ratio | 7,9% | 60,3% | | | |
| Economic Image, Tourism & | | | | | |
| Trademark | | | | | |
| Importance as decision-making center | 14,3% | 55,6% | | | |
| Total Tourists Annually | 6,3% | 76,2% | | | |
| Number of national brands coming from | 7,9% | 66,7% | | | |
| the city | | | | | |
| Ability to Transform | r | | | | |
| Number of active internet users | 4,8% | 66,7% | | | |
| Number of NGOs | 19,0% | 42,9% | | | |
| Number of Community | 11,1% | 47,6% | | | |
| Number of Digital Start-up | 1,6% | 47,6% | | | |

Based on respondent's tendency in Table 4, we decided not to use or modify the indicator which is marked by dark color. This is based on the threshold we use, i.e. 60% tend to agree (sets A) or tend to disagree below 2% (sets B), so Table 4 with no dark mark shows as A U B. However, there are still some interesting indicators that emerge along with the data retrieval process. We try to modify and add some indicators also variables based on confirmation and additional from respondent. We mark the emerging indicators based on reason from respondent that is make sense. The results of emerging indicators and variables are presented as shown in Table 5.

| T-LL 6 | F | 1 | |
|---------|------------|------------|-------------|
| Table 5 | . Emerging | indicators | occurrence |
| | | | o courrence |

| Variable | Indicators | Occur (%) |
|-------------------|--|--------------|
| Innovative Spirit | Intellectual property rights instead of patents | 3,17 |
| | The importance of e-commerce | 1,59 |
| | Dissemination of education | 1,59 |

| | Government programs related to | 1.59 |
|-----------------|---|------|
| | innovation | 1,00 |
| | The labor of college graduates | 1,59 |
| | Number of innovations | 1,59 |
| | Amount of intellectual property rights | 1,59 |
| | Facilities to innovate | 1,59 |
| | Presentation of creative economy | 1,59 |
| | Contribution of the creative economy in of GDP | 1,59 |
| | Positive credit channeling for | 6,35 |
| | Regulation | 1 59 |
| Fntrenreneurshi | Ease of establishing a business | 1 59 |
| n | Informal-employment rate | 1,59 |
| F | Growth of SME | 1,59 |
| | Distribution of credit capital | 1,59 |
| | Ease of obtaining business loans | 1,59 |
| | Number of international | 6,35 |
| International | Regulation | 6 35 |
| Embeddedness | Number of international | 0,00 |
| Linbeaucanoos | transactions | 3,17 |
| | International transaction volume | 3.17 |
| | Human development index | 4,76 |
| | Primary Industry | 4,76 |
| Productivity | Regional minimum wage | 1,59 |
| - | Gross Fixed Capital Formation | 1,59 |
| | Percentage of GFCF to GDP | 1,59 |
| | Regulation | 7,94 |
| | Number of people commuting | 7,94 |
| | Number of foreign workers | 4,76 |
| Flevibility of | Unemployment rate | 3,17 |
| Labor Market | The number of workers from outside the city | 3,17 |
| | Rate Labor Conflict | 3,17 |
| | Convenience of Foreign Workers | 1,59 |
| | Number of labor unions | 1,59 |
| | Human Development Index | 4,76 |
| Poverty/Welfare | Index of happiness | 4,76 |
| i overty/wenare | Spending per capita | 1,59 |
| | Floor area per capita | 1,59 |
| Economic Image | Number of tourist destinations | 4,76 |
| Tourism & | City Brand | 3,17 |
| Trademark | Inflation Stability | 3,17 |
| | Number of Franchises | 1,59 |
| | Historical Value Primary Industry | 1,59 |
| | City Achievement | 6.25 |
| Ability to | Economia Infractructure | 0,35 |
| Transform | Percentage of internet usage in | 3.17 |
| | Supportive regulations | 3,17 |
| | Education | 1 59 |
| | Number of internet providers | 1,57 |
| | Citizon-government initiatives | 1,59 |
| Sustainability | Contribution of ICT category to | 1,59 |
| | Benewahle (non-ronowahle | |
| | resources | 3,17 |
| | Integrated Infrastructure | 1,59 |
| | Potential distribution of local products | 1,59 |
| | • • | |

| The amount of corporate budget for Environmental Impact | 1,59 |
|--|------|
| Analysis | |

Initially we tried to propose Economic Image and Trademarks merged with Tourism, but at the time of FGD process took place many indicators that emerged that can strengthen Tourism to become one of its own variable. Although at first we tried to propose Economic Image and Trademarks combined with Tourism, but during the FGD process there were many indicators that emerged which could strengthen tourism to become a separate variable. So many suggestions for a new indicator that can be used to measure variables exist, it is certainly not possible to use all of these suggestions to be used as new indicators in the proposed model. We mark with dark colors in Table 5, which indicators are quite plausible and data can be obtained for measurement, to be proposed as new models. Selection of these indicators is based on a high percentage of occurrences and confirmed to the respondents. One interesting thing, although the primary industry indicator is discussed in 2 different variables namely Productivity and Ability to Transform, but when confirmed and discussed again this indicator more suitable grouped on Economic Image and Trademarks variable.

6. CONCLUSION 6.1 Proposed Model

Refers to literature review process, there are 8 variables that can be used to measure smart economy. Meanwhile based on interview and FGD result, there is a new variable that should be added as one of smart economy variables namely sustainability.

Therefore, this research proposed a model to measure a smart economy in Indonesia which is presented as Figure 2. The next process should be done by writers are by revalidate again to the respondent based on all emerging variables and indicators in interview and FGD process. Then, test the variables and items as a measurement tool for measuring smart economy concept through a pilot test. After revalidate the measurement, it can be used as a reference to collect some data based on the city that is want to be measured and also can be used as comparison to best practice condition. We decided to separate the tourism as one independent variable along with its indicators and change the term of one of the variables, i.e. poverty is changed to welfare, because it is already talking about smart economy, it should not be discussed again about poverty, although the indicators used are still things that refer to poverty.

6.2 Limitation and Managerial Implication

Although we have tried to suggest indicators and variables that can apply generally. However, the scope of research data is limited in the city of Bandung. The evidence found in Bandung may not be applicable in other cities. Testing in other cities based on the findings of this study is highly recommended.

Variables and indicators in the proposed Smart Economy model are can be used to be one of the solutions and also the benchmarks related to economic problems in a city that apply the concept of smart city, and can be used to help realize the economic welfare in society, and realize sustainable urban development. Regardless of the proposed model, the indicators mentioned in Table 5 but not proposed in the model can still be studied further to be used as a benchmark for smart economy.



Figure 2. Proposed model to measure smart economy in Indonesia

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8. References

- [1] Kumar, T. V. and Dahiya, B. 2017. Smart Economy in Smart Cities, in *Smart Economy in Smart Cities*, New Delhi, Springer, 3-79.
- [2] McCarney, P. 2017. Foreword II The Power of Sharing, in *Smart Economy in Smart City*, New Delhi, Springer, p. vii.
- [3] Statistics of Bandung Municipality Bureau, 2016. "Laju Pertumbuhan Ekonomi Kota Bandung," Statistics of Bandung Municipality Bureau (Badan Pusat Statistik -BPS), Bandung.
- [4] United Nations. 2014. World Urbanization Prospects, Department of Economic and Social Affairs, New York.
- [5] Worldbank, Indonesia Urban Story, 14 Juni 2016. [Online]. Available: http://www.worldbank.org/in/news/feature/2016/06/14/indo nesia-urban-story. [Accessed 03 Oktober 2017].

- [6] Govada, S. S., Spruijt W., and Rodgers, T. 2017. Smart City Concept and Framework, *Smart Economy in Smart Cities*, no. Advances in 21st Century Human Settlements, 187-198.
- [7] Indrawati, S. Murugesan and Raman, M. 2010. A New Conceptual Model of Mobile Multimedia Service (MMS) and 3G Network Adoption in Indonesia, *International Journal of Information Science and Management (IJISM).*
- [8] Indrawati, Metode Penelitian Kualitatif Manajemen dan Bisnis Konvergensi Teknologi Informasi dan Komunikasi di Kota Pintar, Bandung: Refika Aditama, 2018.
- [9] Indrawati, Metode Penelitian Manajemen dan Bisnis Konvergensi Teknologi Komunikasi dan Informasi, Bandung: Refika Aditama, 2015.
- [10] Creswell, J. W. 2014. Research Design; Qualitative, Quantitative, and Mixed Methods Approaches 4th Edition, Los Angles: Sage.
- [11] Giffinger, R. 2011. European Smart Cities: the need for a place related Understanding, in *Creating Smart Cities*.
- [12] Cohen, B. 2012. What Exactly is a Smart City?, 19 September 2012. [Online]. Available: http://www.fastcoexist.com/1680538/what-exactly-is-asmart-city.
- [13] Batty, M., Axhausen, K., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., Ouzounis G., and Portugali, Y.

2012. Smart cities of the future, *The European Physical Journal Special Topics*, pp. 481-518.

- [14] Kondepudi S. and Kondepudi, R. 2015. What Constitutes a Smart City?, in Handbook of Research on Social, Economic, and Environmental Sustainability in the Development of Smart Cities, IGI Global, 1-25.
- [15] Yau, K.-L. A., Lau, S. L., Chua, H. N., Ling, M. H., Iranmanesh, V., and Kwan, S. C. C. 2016. Greater Kuala Lumpur as a Smart City: A Case Study on Technology Opportunities, in 8th International Conference on Knowledge and Smart Technology (KST), Chiangmai, Thailand, 2016.
- [16] Mhangara, P., Mudau, N., Mboup, G., and Mwaniki, D. 2017. Transforming the City of Cape Town from an Apartheid City to an Inclusive Smart City, in Smart Economy in Smart Cities, Advances in 21st Century Human Settlements, Calicut, Kerala India, Springer, 951-983.
- [17] Granovetter, M. 1985. Economic action and social structure: The Probelem of Embeddedness, *American Journal of Sociology*, 91, 3, 481-510.
- [18] Karayannis, G. 2014. Dissecting ISO 37120: Economic indicators in the new smart city standard, 01 Agustus 2014. [Online]. Available: http://smartcitiescouncil.com/article/dissecting-iso-37120economic-indicators-new-smart-city-standard.