CHAPTER I

INTRODUCTION

I.1 Background

Every company requires a number of good and regular human resources with appropriate capacities and abilities so that the company can run well, develop and survive in carrying out its business or activities. One of the most crucial things in a company is developing an optimal human resources scheme, so that the company can run effectively and efficiently and has reliable and competitive capabilities in accordance with the business it runs.

Human resource development can be carried out through human resource management by paying attention to the workload of each personnel so as to obtain an optimal workload that can increase productivity and work quality and minimize the impact of stress, physical and mental fatigue and other negative impacts. Workload is a task or work demand imposed on employees which must be completed within a predetermined time period at a company (Ahmad et al., 2019). Adjusting employee workload in a company has a very important role in determining the level of effectiveness and efficiency of employee work. Employees with excessive levels of workload tend to have difficulty carrying it out (overload), while employees with workload levels that are too low (underload) will also make the company's efficiency level worse, because they are deemed unable to maximize employee functions properly (Wicaksono & Min Fadlillah, 2021). So it is necessary to measure workload so that the level of effectiveness and efficiency of the company and employees remains stable and does not burden both parties.

Several problems that are often faced by several companies, especially construction engineering consulting services companies, which have an impact on the workload of their employees include: employees being given double or multitasking tasks and responsibilities, employees being placed in inappropriate positions. According to their main expertise due to the lack of available personnel, the working period is related to the length of the contract/project so that a lot of work must be done outside normal working hours, as well as the lack of replacement personnel. Work

team/project team either due to limited existing personnel or consideration of project costs or other things so that a lot of double work has to be done.

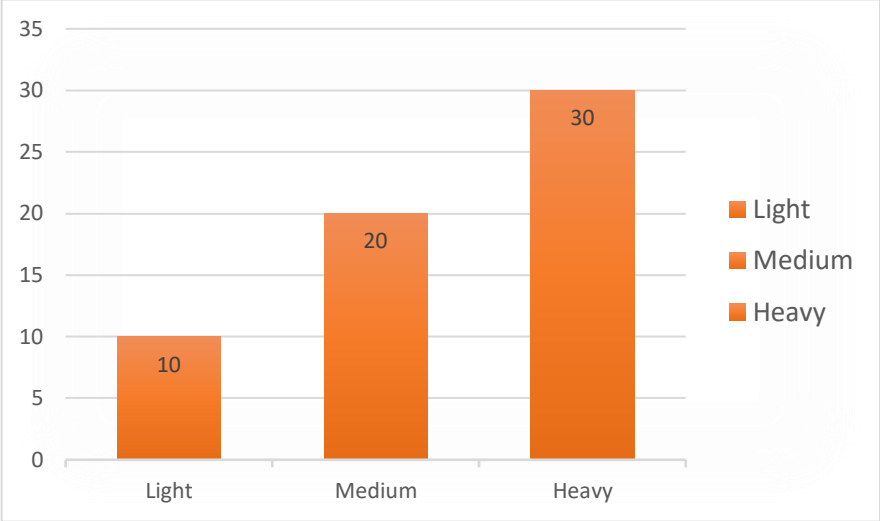

Figure I. 1 Correlation graph between physical workload and work fatigue
Sources: Tri aet al 2021

Figure I.1 illustrates the correlation between physical workload and work fatigue among employees. The x-axis represents the levels of physical workload (Light, Medium, Heavy), and the y-axis indicates the degree of work fatigue experienced. Employees experiencing light physical workload report the lowest levels of work fatigue, as their tasks likely require minimal physical exertion. As the physical workload increases to a medium level, there is a noticeable rise in reported work fatigue, indicating that more physically demanding tasks cause greater fatigue. The highest levels of work fatigue are reported by employees subjected to heavy physical workload, suggesting that intense physical demands significantly impact employee well-being and productivity. This correlation underscores the importance of managing physical workload to maintain optimal employee performance and health. Companies must consider ergonomic practices and workload management strategies to mitigate the adverse effects of heavy physical workloads.

Based on the data obtained physical complaints commonly reported by construction workers. The x-axis lists various types of physical complaints, including back pain, aches, dizziness, and fatigue, while the y-axis indicates the percentage of workers reporting these complaints. The graph clearly indicates that a significant portion of

construction workers experience physical complaints, likely due to the heavy physical workload they endure. According to Law of the Republic of Indonesia Number 2 of 2017 concerning Construction Services, construction work has special characteristics such as work locations in open spaces that are influenced by the weather, short work periods, and untrained workers. Based on these characteristics, construction work has many potential dangers that can trigger work accidents (Sihombing et al, 2014). Various factors can trigger fatigue in the workplace, one of which is workload. High workload can cause excessive energy consumption, thereby triggering overstress. On the other hand, a workload that is too low can cause understress or feelings of boredom and boredom (Tarwaka, 2014). Maharja's (2015) research shows that there is a strong relationship between physical workload and work fatigue, where the higher the physical workload, the higher the level of fatigue experienced by workers. This is supported by research by Wulandari et al (2016) which found that construction workers on mechanical workshop infrastructure projects who had moderate and heavy physical workloads experienced higher work fatigue compared to those who had light workloads. The workload ratio will have a negative impact on the employees who carry it out. Negative impacts that usually arise include excessive workload which will result in physical and mental fatigue which can affect the emotional level of employees so that they are easily emotional and sometimes have an impact on physical conditions such as falling ill which will ultimately have an impact on physical and mental health employee has a further impact on work and product productivity (Irawati and Carrolina, 2017). The results will affect the company's performance and performance as a whole. A workload that is too low or too little will result in the organizational structure becoming fat, sluggish, and work productivity being reduced, which will have an impact on the quantity of products produced, thus impacting the sustainability of the company, where there will be a decrease in workload. Imbalance of costs and productivity as well as lack of respect for tasks, lack of focus in carrying out tasks, and lack of development of skills and expertise in these employees. Considering the two aspects above, companies need to design an effective and efficient human resource management pattern in accordance with the business sector they are involved in so that there is an increase in the capacity

and quality of their employees in creating reliable employees in supporting the company's business sector. Run in order to be able to compete, develop and be sustainable amidst intense competition with other companies operating in similar business fields such as the construction engineering consulting services business sector run by PT. Tricomindo Cipta Mandiri where this research was conducted. Tricomindo has its head office at Jalan Kota Baru No. 27 Bandung City with operational offices at Jalan Salam No. 47 Bandung City and has a main branch operational office in Jakarta on Jalan Tebet Timur Dalam VI E No. 10 South Jakarta as well as several project operational offices according to the project area managed. The number of human resources working at Tricomindo varies with the current number of active human resources being 50 people, additions and reductions in personnel will depend on job changes obtained each year the Company operates. Founded in 2001 in Bandung City - West Java and has been running for more than 22 years in the construction engineering consulting services business. The Business Entity Certificate owned is in accordance with the new regulations in KLBI 2020, namely Code 71102 Sub-Classification RK001 and RK004. Supported by reliable human resources with professional certificates in accordance with the business field carried out by the Company.

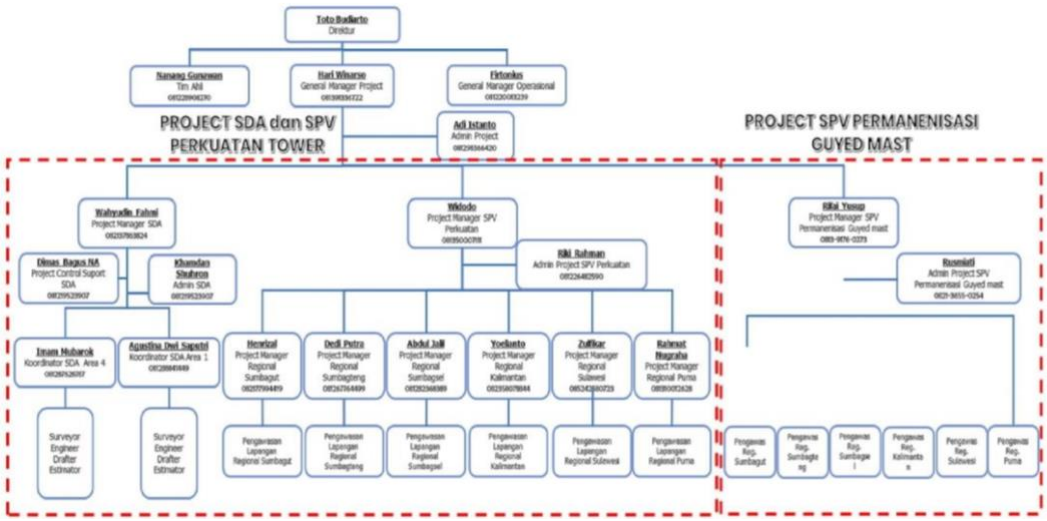

Figure I. 2 PT Tricomindo Cipta Mandiri Organizational Structure.

The following are active employees who work at PT Tricomindo Cipta Mandiri and there are 2 main units, namely the supervision division and the planning division,

and is limited to nine job positions. The Head Office includes roles such as Director, Manager of Operational, Manager of Planning, Manager of Finance, Finance Staff, Manager of Admin & General Affairs, Driver, Security Guard, and Office Boy (OB). In total, there are 11 employees in the Head Office. The Project Unit comprises positions such as Project Manager, Team Leader, Engineer, Project Admin, Coordinator, and Field Supervisor. This unit has a significantly larger workforce with 39 employees. The total number of active employees in the company is 50.

Table I. 1 Number of Employees at PT Tricomindo Cipta Mandiri

Year	**Unit**	**Position**	**Number**
2023	Head Office	Director	1
		Mgr. Operational	1
		Mgr. Planning	1
		Mgr. Finance	1
		Finance Staff	1
		Mgr. Adm & Umum	1
		Driver	1
		Security Guard	1
		OB	1
	Project	*Project Manager*	1
		Team Leader	3
		Engineer	7
		Project Admin	6
		Coordinator	8
		Field Supervisor	16
Total Number			50

The focus on the Project Unit at PT Tricomindo Cipta Mandiri is critical because this unit is the core driver of the company's business operations. All the work within the company is intricately related to the projects managed by this unit. The Project Unit is responsible for executing and overseeing various construction and engineering projects, which are the primary revenue-generating activities for the company.

Optimization is the main thing needed in running a construction project, where the efficient and effective use of existing resources in the project organization in order to obtain controlled results in terms of quality, cost and project time.

For the above, we take an example of a project that has been carried out by PT Tricomindo Cipta Mandiri as an engineering consultant, namely survey and analysis work and as plan drawing (SDA telecommunication tower).

This project is targeted to produce the following products:

1. Existing capacity of the telecommunication tower related to the strength of the existing tower structure compared to the load acting on the tower (dead load and live load as well as wind and earthquake).
2. The ability of the existing tower to accept additional new workloads (devices that are planned to be installed) and if it needs reinforcement so that it is able to bear the existing and planned loads.
3. The firmness of the tower referring to the applicable standards on steel construction tower buildings and
4. The twist and sway ratio refers to the applicable standards for steel construction tower buildings.
5. As Plan Drawing complete with material list and technical specification per site.

Project Overview:

1. Number of sites is 100 sites (telecommunication towers)
2. Service Level Agreement 50 Calendar Days after Purchasing Order or Kick off Meeting is done
3. The work locations are spread in the Sumatra Area in 3 regions, namely North Sumatra, Central Sumatra and West Sumatra.

Project Team Plan:

1. 1 Project Manager as SDA Team Leader
2. 4 Survey Team assuming team production capacity is 1 site / 1 team / day
3. 4 Drafters assuming drafter production capacity is 1 site / drafter / day
4. 4 Engineers assuming production capacity is 4 sites/engineer/day
5. 1 Project Admin and or 1 Project Finance (usually duplicated by 1 personnel)

The evaluation of the project implementation above from the Company's management is that the project is running quite well with some notes that must be taken to improve the optimization, efficiency and effectiveness of the project with consideration of the control of cost, time and quality factors, the notes are as follows:

The additional cost of mobilization & demobilisation of the survey team from South Sumatra to North Sumatra due to one of the surveyors who fell ill after 2 weeks in the field, the initial assumption was due to work fatigue.

The additional cost of mobilizing the survey team from Sumbagteng to Sumbagsel after 3 weeks of the team in the field, this mobilization is because the team that was mobilized to Sumbagut after returning to Sumbagsel (duration 1 week) allegedly the results of the work were less thorough and focused so it was necessary to re-survey to ensure the accuracy of the data.

Additional re-survey costs for 4 telecommunication tower sites because the initial survey results were not accurate and clear, the initial assumption was due to the lack of focus of the survey team which may have been caused by fatigue, stress or other things.

There were 12 locations where the team did not go to the site on the same day, the main obstacle was the 8-hour road trip between sites. All of these notes are still based on estimates in accordance with the work experience that has been undertaken by the Company's Management, but empirically or scientifically there is no method used to measure these assumptions.

Given that the majority of the workforce is allocated to the Project Unit, it is evident that this unit plays a vital role in ensuring the success of PT Tricomindo Cipta Mandiri. Roles within this unit, such as Project Managers, Engineers, Team Leaders, and Field Supervisors, are crucial for the timely and efficient completion of projects. These positions are responsible for managing the project's lifecycle, from planning and design to execution and completion, ensuring that the projects meet the required quality standards, timelines, and budget constraints.

By focusing on the Project Unit, PT Tricomindo Cipta Mandiri can better understand and address the challenges related to workload management within this crucial unit. This focus allows the company to enhance productivity, improve employee satisfaction, and ensure the successful delivery of projects, which in turn, strengthens the overall performance and sustainability of the company. In this research is all 50 employees of PT Tricomindo Cipta Mandiri, with a focus on 37 people who became the research sample.

Based on a questionnaire given to several employees of PT Tricomindo Cipta Mandiri for pre-research needs regarding the workload experienced by employees. The answers obtained from several employees of PT Tricomindo Cipta Mandiri, totaling 10 people out of a total of 36 people, prove that the workload they experience is unstable so it is necessary to analyze the workload received by these employees. The results of the questionnaire can be seen in the pie chart below:

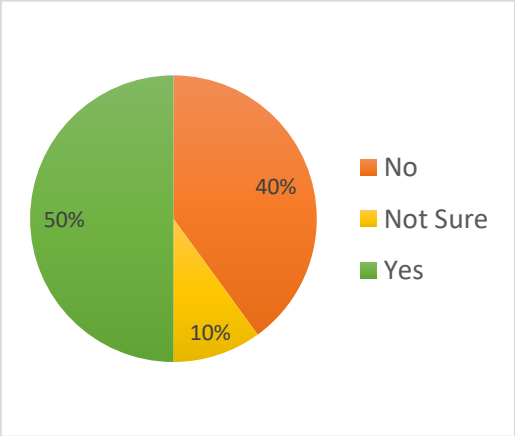

Figure I. 3 Questionnare Diagram Increased Workload

Based on Figure I.3, half (50%) felt their workload had increased in the past few months. Meanwhile, 40% did not notice an increase in workload, and 10% were unsure about it. This shows a mixed view among employees regarding the change in workload.

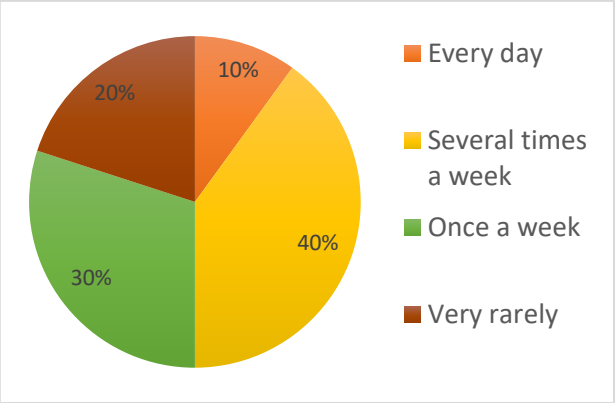

Figure I. 4 Questionnare Diagram Felt Workload

Based on Figure I. 4 the 10 respondents, 40% felt their workload exceeded their capacity several times a week. As many as 30% experienced it every day, while 20% rarely felt it, and 10% only experienced it once a week. There were no respondents who never felt their workload exceeded their capacity.

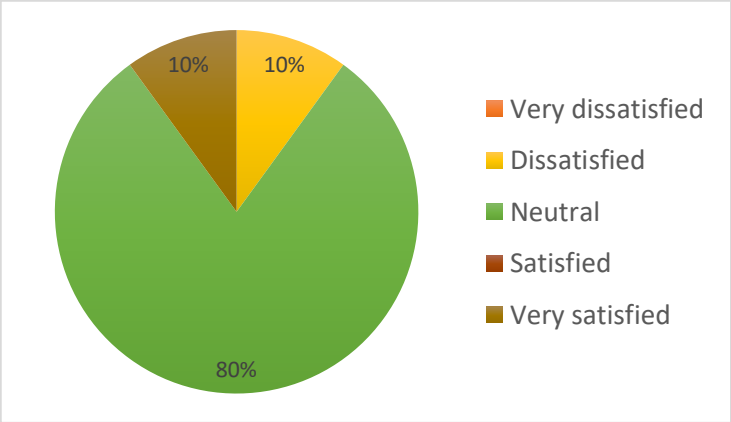

Figure I. 5 Questionnare Diagram Satisfied Increased Workload

Based on Figure I. 5 The majority of the 10 respondents (80%) felt dissatisfied with the balance between their workload in the company and their personal life. In addition, 10% were neutral, and another 10% were very dissatisfied. No one felt satisfied or very satisfied with this balance.

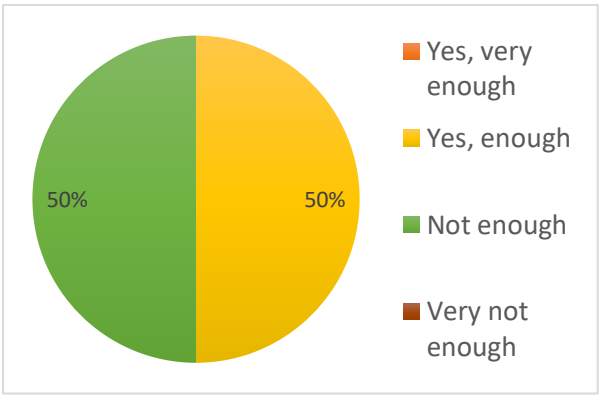

Figure I. 6 Questionnare Diagram Resource Company

Based on Figure I. 6 the 10 respondents, 50% felt that their company did not provide enough resources or tools to help them handle their workload effectively, while the other 50% believed that their company provided enough resources or tools. No one felt that their company provided very enough or very insufficient resources or tools.

The conclusion of the survey results shows that most employees feel their workload has increased in recent months, with almost half of them feeling the pressure of a workload that exceeds capacity several times a week. The main factors contributing to this workload are an excessive number of projects and the need for excessive multitasking. As a result, most employees experience stress several times a week or even every day.

Additionally, the majority of employees are dissatisfied with the balance between their workload and personal life, indicating a significant imbalance. Lastly, there is a difference of opinion on whether the company provides enough resources or tools to handle the workload, with half of employees feeling the company does not provide enough support in this regard. Overall, the results of this survey indicate that there are significant problems related to workload management and work-life balance in companies that need to be addressed immediately. This conclusion points to the need for improved communication within teams and increased support from management to help employees manage their workload more effectively. Based on the data collected above, an analysis was carried out using a fishbone diagram at PT Tricomindo Cipta Mandiri, it was discovered that several main factors influenced employee workload as follows:

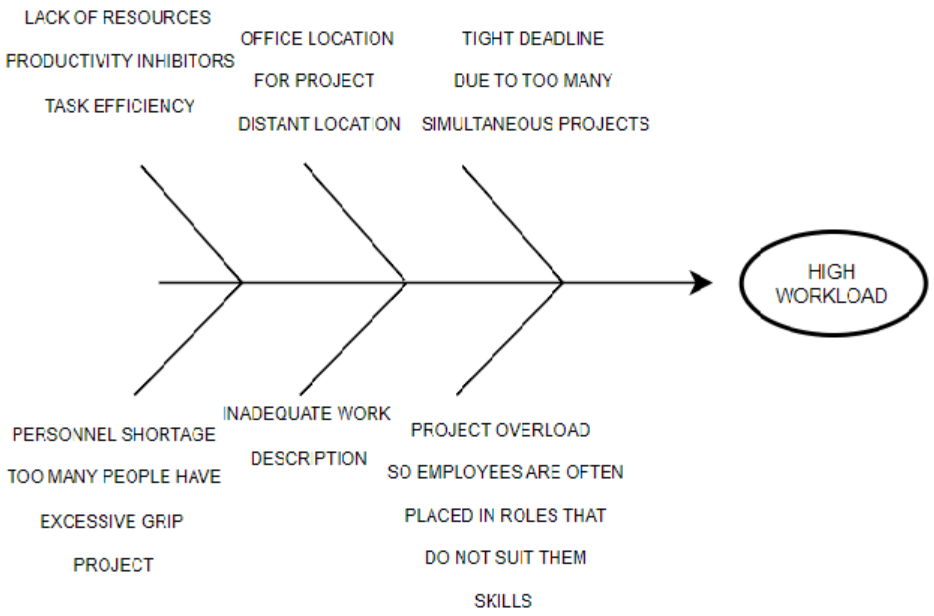

Figure I. 7 Fishbone Diagram

The fishbone diagram identified several key factors contributing to the high workload at PT Tricomindo Cipta Mandiri. One issue was the lack of essential tools and equipment, especially at remote project sites. This lack of resources hampered task efficiency and reduced productivity. In addition, software constraints, such as limited licenses and slow performance, increased frustration among employees. For example, technicians faced delays due to the limited availability of officially licensed software and the condition of their laptops, which led to boredom while waiting for processes such as steel frame analysis to be completed.

Another important factor also indispensable as a reference for improvement and recommendations from this research conducted is lack of personnel, which is a significant issue that results in employees being burdened with additional tasks and responsibilities. This shortage leads to physical and mental fatigue, increased employee turnover, and a higher risk of errors. Employees are often required to multitask, handling project management, field supervision, and administration simultaneously, which reduces efficiency. In addition, employees are often placed in roles that do not match their expertise, leading to inefficiencies and additional adaptation time, which ultimately reduces productivity.

The nature of the work involves long travel times, as many employees have to work away from their homes or main office locations, which causes fatigue and

negatively impacts their work-life balance and productivity. The separation of office locations and project sites adds to the logistical challenges and complexities of managing tasks in different locations, further increasing the workload for employees. Tight project deadlines put immense pressure on employees to complete tasks quickly, resulting in longer working hours, increased stress, and higher workloads. In addition, companies undertake a number of projects simultaneously, resulting in limited resources and personnel available. This over-commitment leads to excessive tasks and responsibilities, causing stress and high workload among employees. High workload negatively impacts employees' work-life balance, causing chronic fatigue, decreased productivity and increased risk of errors. Physical complaints such as back pain, aches, dizziness and fatigue are common among employees, highlighting the need for better workload management and communication within the company. Views on management support vary among employees, indicating the need for improvements in workload management and communication. By this research, PT Tricomindo Cipta Mandiri measures and evaluates workloads to identify the level of workload experienced by employees and make necessary adjustments. This method helps the company understand the workload experienced by employees and allows it to make necessary adjustments. By optimizing resource allocation, implementikg advanced project management, enhacging internal communication, utilizing outsourcing for non-core activities, providing targeted training programs, flexible work arrangements, implementing flexible work arrangements, designing ergonomic workspaces, improving ergonomics at work, and establishing clear prioritization guidelines. Understanding and addressing the root causes of high workload, as illustrated in the fishbone diagram, is essential for PT Tricomindo Cipta Mandiri. By focusing on these factors, the company can develop targeted strategies to reduce workload, improve employee satisfaction, and ensure the successful delivery of projects.

I.2 Formulation of the problem

The author wants to conduct further research regarding workload analysis to obtain scientific results from the initial hypothesis, namely that employees at PT,

Tricomindo Cipta Mandiri receive a relatively large workload related to the work they do.

1) What are the workload conditions at PT Tricomindo Cipta Mandiri?
2) What are the factors that contribute most to the relatively large workload associated with the work performed by employees at PT Tricomindo Cipta Mandiri?

I.3 Final Assignment Goal

The aim of this research is divided into several points, which can be explained as follows:

1. Knowing the results of workload analysis obtained by employees at PT Tricomindo Cipta Mandiri
2. Understand the analysis of the factors that most contribute to the relatively large workload associated with the work performed by employees at PT Tricomindo Cipta Mandiri.

I.4 Benefits of Final Assignment

The benefits to be achieved in this research are as follows:

1. Better understand the use of the NASA – TLX method in analyzing the workload of construction engineering consultant employees
2. Provide scientific information to the Company regarding the workload received by employees, scientific here because research standards, data collection and analysis are carried out scientifically according to the methods used,
3. Can be used as a reference source for companies in improving work management systems to improve employee and company performance.
4. This research provides scientific references that assist companies in improving the effectiveness and efficiency of project team management. This supports the optimization of resources, quality of work, time, and operational costs, resulting in maximum project performance.

I.5 Systematic Research

The systematics of this research were prepared to provide a general description of the research carried out as follows:

CHAPTER I . Introduction

At this stage the researcher will determine what data needs to be collected in accordance with the objectives, limitations and analysis methods as well as the objectives to be achieved.

CHAPTER II. Method Of Collecting Data

At this stage the researcher will determine and compile the data collection method that will be carried out in accordance with the research method used, namely NASA - TLX

CHAPTER III. Data Collection Process

At this stage the researcher will carry out the process of collecting field data by conducting questionnaires and interviews with research targets according to the data they want to obtain in order to determine the analytical method used according to the predetermined problem boundaries.

CHAPTER IV. Analysis and Design

At this stage the researcher will analyze the data collected using predetermined methods and design a management scheme that can increase the competency and productivity of the research object by reducing the optimal workload.

CHAPTER V. Verification and Validation

At this stage the researcher will verify and validate the data, analysis results and recommended improvement proposal schemes based on the results of this research.