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A Study on The Relationship of Technical Leadership Skills and Managerial Skills with The Performance of Engineers

Mohd Tajuddin Ismail[1], Hafizan Mat Som[1] & Nor Aishah Hashim[1]
[1]University College of Yayasan Pahang

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ABSTRACT

The study will assist engineers in improving their performance by implementing two key skills, Technical Leadership and Managerial Skills, as a learning tool and a means of improving self-awareness, skills, and attitude. As a result, to achieve the study's goal, a descriptive study was used, in which questionnaires with four sections were delivered to 208 respondents. The findings suggest that Technical Leadership Skills and Managerial Skills have a substantial impact on the performance of engineers. As a result, it is recommended that organisational management evaluate the value of Technical Leadership and Managerial Skills among engineers for practice, particularly in the workplace. Companies looking to preserve a competitive advantage need engineers with the skills to lead diverse teams, combine technical brilliance with business acumen, and produce engineers with a thirst for lifelong learning. Companies that want to keep their competitive advantage need engineers who can manage a variety of teams, combine technical prowess with business sense, and develop engineers who have a passion for lifelong learning. This research also examines why technical leadership and managerial abilities must become a major factor in the performance of engineers and advancement. This presentation will give a review of the literature on the link between Technical Leadership Skills Managerial Skills and the performance of engineers. Finally, this study will make explicit recommendations regarding the relationship between Technical Leadership Skills Managerial Skills, and the Performance of Engineers. The following are two recommended best practices that, when combined, have a greater impact. The vital element in the advancement of the engineering profession is being relevant and connected in an era of global competition. Selecting the right engineers at the right moment with competent competence, trainability, and commitment to construction can help firms perform better and gain a competitive advantage. Second Managerial Skills are crucial for a variety of reasons. As managers or engineers, they must be able to lead and solve problems in a variety of scenarios, both simple and complex. Effective and efficient management necessitates managerial abilities. Engineer knowledge and ability to perform certain management tasks in a managerial capability are known as managerial skills.

Corresponding Author: Mohd Tajuddin Ismail, University College of Yayasan Pahang, Kampus Utama, Tanjung Lumpur, 26060 Kuantan, Pahang. Tel. +60-19-9000164. E-mail: tajuddini@tnb.com.my.

1. Introduction

1.1 Background of Study

The phenomenon of performance of engineers is a respected profession in Malaysia, but their salary rate does not reflect the real situation. It is understood that the salary rate of local engineers in Malaysia has not changed in the last 20 years. In 2019, Berita Harian (2019) reported that the salary of Malaysian engineers who have just graduated from university is less than RM2,500 a month, not as much as the community expected. According to the report by the Board of Engineers of Malaysia (2019), every year local universities produce about 10,000 engineering graduates, and the number increases every year and found that more than 5,000 engineering companies currently do not want to be involved in engineering development programs, including research & development (R&D). As a result, the country's industrial sector is not developing at the proper level, despite various efforts by the government to reach the level of a developed country. However, the industry in Malaysia did not see skills as a valuable value to be paid, causing the country's engineering field to still not rise to the level it should be. The industry feels that engineering graduates are not ready to do the work, but do not want to invest to provide the right training and experience. This situation causes the salary level of engineers in the country today to be stressful situation because the industry is not trying to improve the performance and skills of engineers.

Similarly, with Avid (2020), more than 90 percent of companies providing engineering services in the country do not trust the capabilities of local talent, thus causing many engineers and engineering graduates not to receive recognition and equivalent salaries. In addition, the situation puts the development of engineering in the country under pressure because the industry is currently more interested in foreign expertise and technology, especially from neighboring countries, compared to local energy. The science, technology, engineering, and mathematics (STEM) sectors of top organisations with great technical leadership skills are roughly 40% more lucrative than the rest, with operating margins between 30% and 50% higher than peers in the industry. The UK has a persistent problem with a lack of engineering talent, according to the Institute of Engineering and Technology (IET), the world's foremost technical engineering organisation. Their latest survey of skills reports an estimated shortage of 59,000 graduates in engineering, a deficit that continues to worsen.

According to Daley et al. (2020), the engineering workforce with proper Technical Leadership Skills and Managerial Skills is crucial for future growth in the industry as well as the economy. Recognizing the importance of Technical Leadership Skills is a part of a rising trend to standardise curriculum materials that promote the development of engineers who can meet the demands of the industry. Engineers' building projects have grown highly complicated, and only a perfect blend of managerial and technical knowledge and abilities can assess their business worth and risks, which can have a big impact on their economic repercussions. The construction industry has grown into a multibillion-dollar industry, and construction firms must continue to improve their capabilities to compete in this global market. It needs to concentrate on the information and abilities required for construction management. Engineers need a variety of skills to complete tasks and enhance their professional performance, including managerial, technical, legal, financial, information technology, and general skills. Managerial abilities are the most necessary for engineers who wish to attain their professional goals. Technical skills are ranked second, although IT and legal skills were found to be irrelevant. Managers of construction companies are required to enhance their knowledge and abilities because it is a dynamic sector in all economies (Lana Lovrencic Butkovic, 2018). Engineers and other technical personnel are increasingly filling Managerial Skills positions in numerous sectors. However, there is a huge difficulty at the time, which is that engineers were often deemed unsuccessful in Managerial Skills jobs because of their lack of managerial knowledge. Inadequate managerial skills education, such as administrative skills, interpersonal skills, personality, career orientation, and leadership abilities, during engineering study (Visser, Hercules, Naude, Louis, Schepers, & Johann, 2004). Successful managers tend to develop their careers over time (Visser et al., 2004). Engineers do not have a distinct career path that prepares them for managerial responsibilities. As a result, it's critical for novice engineers to prepare for Managerial Skills and learn development skills within their official education.

1.2 Problem Statement

Due to developments in technology and disruptive technology in the electricity industry. As large-scale integration of renewable energy, improved energy management, and efficiency, and the mining of unconventional fossil fuels reinvent the energy sector, global energy systems are undergoing a process of destruction. Tenaga Nasional Berhad (TNB) is in a period of rapid transition and worldwide competition. Renewable Energy (RE) is important for Tenaga Nasional Berhad (TNB) as it is a potential new source of growth in a changing energy market. By 2030, over 60% of new capacity globally will be in Renewable Energy (RE). Tenaga Nasional Berhad (TNB) needs to build capabilities to enable it to seek regional or

global Renewable Energy (RE) opportunities. However, Renewable Energy (RE) electricity is subject to weather intermittency factors. Controllable systems then must provide short-term flexibility when the supply of weather-dependent wind and solar capacity is not available. As a result, Tenaga Nasional Berhad (TNB) requires its engineers to possess abilities and experience in new digital transformations that can be highlighted. Engineers must possess technical leadership and management skills to increase their performance.

Most engineers in Tenaga Nasional Berhad (TNB) focus on the technical part instead of the managerial part, maybe factors from the environment, workplace, and requirements of management. In addition, this study focuses on capabilities in Technical Leadership Skills, Managerial Skills, and Performance of Engineers in terms of capabilities for problem finding and solving. Regression analysis found that the ability to discover and solve the problems Performance of Engineers has a beneficial relationship with Technical Leadership Skills and Managerial Skills. To identify and solve those problems, basic Technical Leadership Skills are Managerial Skills are important, which will contribute to the promotion of process developments that concentrate on solving problems within companies. Similarly, the largest supplier of electric power in Malaysia i.e., TNB like other leading utility companies is facing the same problem where changes need to be made to less experienced engineers to face the current business challenges. Problems faced, the lack of engineers in the middle and upper management, the engineers in Tenaga Nasional Berhad (TNB), need to improve their Technical Leadership Skills. Thus, Technical Leadership Skills and Managerial Skill has become a key factor, which will contribute to the promotion of process developments that concentrate on solving problems within companies. To ensure the long-term viability of businesses and improve their performance, the functions and duties of 21st-century engineers are needed to continually change today, and the key skills and competencies that organisations demand from modern engineers need to be understood. It is now required that engineers will have broad interdisciplinary expertise within an organisation, covering numerous areas in the organisation.

Significantly, most project engineers thought that unethical behaviour can be a substantial contributor to poor project quality (Nasaruddin, Nur Ain Ngah, Rahman & Ismail Abdul, 2016). Over the years, engineering education has developed, and an increasing need for the development of Technical Leadership Skills among professional bodies such as the Institute of Engineering and Technology (IET), and engineering students. It clearly outlined the lack of skills among recent engineering graduates, such as Technical Leadership Skills, Managerial Skills, and communication skills. In addition, Technical Leadership Skills are a process that needs more time to achieve strengths (Macintyre & Phyllis Ed, 2016).

To avoid potential hazards connected with each project, project managers and engineers must have unique skills in the form of diversified technological and economic experience. Risk management strategies used during the design phase have an impact on project efficiency. Different intelligent managerial skills are valued in various businesses because now the environment and technical skills are no longer enough. Customer acceptance is one of the success elements that influence the project's success, and without it, the project would not be able to be completed successfully. Managerial Skills are crucial in this situation. (Kyle & Beyer, 2020). Because project performance is the most contentious aspect of project management, little is known about the impact and success of Managerial Skills. Even though there is a wide range of project management books and training approaches accessible, consistent project success remains elusive (Assem, 2018). Internal and external information sharing can be facilitated by improved Managerial Skills, which can then improve subordinates' problem-solving abilities. As a result, Managerial Skills have an impact on problem-solving abilities (Carmeli, Gelbard, and Reiter-Palmon, 2013). According to the theorising of Jeffrey Pfeffer (2010), most organisational results are unaffected by Managerial Skills. Rather, the situation needs to be properly examined. He also contends that circumstances beyond the control of engineers have a greater impact on business outcomes than Managerial Skills activities.

Many academics feel a leader’s abilities can have a major impact on employee attitudes, as well as boost employee happiness and commitment. Management skills instruments for leadership skills in management are studied. Managers or engineers are necessary to have management skills to achieve an organisation's vision and objective. They are required as a component or aspect of managerial efficiency and effectiveness. Managers and engineers today would be unable to succeed if they had fundamental management abilities. The result is each manager and engineer should have a thorough understanding of their workplace. As a result, the performance of managers and engineers is determined by managing abilities (Amera et al., 2020). Based on Kheirdmand, Lotfi & Etebarian (2012), there are four qualities that an effective manager or engineer must have. Human skills, technical skills, cognitive skills, and political skills Managers and engineers must have Managerial Skills to give the appropriate context for the work they conduct. Management is a team endeavour and working with people necessitates a high level of managerial expertise and leadership abilities. People must be interacted with, motivated, influenced, and communicated with for a manager to be effective. The success of an organisation is inextricably linked to the individuals who work

there. As a result, today's most difficult task for managers is to effectively manage people (Visser et al. 2004). In conclusion, numerous investigations have investigated the connection between Technical Leadership skills and Managerial Skills. Few studies have examined "A Study on Relationship of Technical Leadership Skills and Managerial Skills with the Performance of Engineers".

1.3 Research Objectives

This study's objectives are divided into two categories: general objectives and specific objectives.

i. The general objective – is to examine the relationship between knowledge of Technical Leadership Skills, Managerial Skills, and the Performance of Engineers in Tenaga Nasional Berhad (TNB).

ii. The specific objectives – are to determine whether there is a significant relationship between Technical Leadership Skills and Performance of an Engineer and Managerial skills and the Performance of an Engineer.

1.4 Research Questions

Critical issues affecting the relationship between Technical Leadership Skills, Managerial Skills, and the Performance of engineers have been raised. The following research questions are posed to address the issues raised:

i. Is there a significant relationship between Technical Leadership Skills and the Performance of an engineer?

ii. Is there a significant relationship Between Managerial Skills and the Performance of an engineer?

1.5 Scope of Study

The relationship is at the focus of this study between Technical Leadership Skills, Managerial Skills, and the Performance of Engineers in Tenaga Nasional Berhad Malaysia (TNB). Thus, the evaluation of the Engineer in Tenaga Nasional Berhad (TNB) has been limited to the following aspects i.e., Technical Leadership Skills, Managerial Skills, and Performance of the Engineer. The electricity sector in Malaysia includes the generation, transmission, distribution, and sale of electricity throughout the country. Tenaga Nasional Berhad is Malaysia's largest utility company in Asia with the widest operations in middle eastern countries such as Kuwait, Turkey, and Saudi Arabia, and Asia such as Pakistan, India, Indonesia, and the United Kingdom. This research focuses on Project Engineers in Tenaga Nasional Berhad (TNB), Distribution Network (DN). It is presumed that Tenaga Nasional Berhad (TNB), Distribution Network (DN), given the frequency analysis. Managerial Skills include teamwork, technical leadership skills, entrepreneurship, conflict management, negotiation, project management, time management, adaptability, decision-making, planning, and communication skills. Project engineers are the key informants. The choice of the Distribution Network (DN) Division makes the sample homogeneous.

Therefore, the implementation of the project requires engineers who can perform a vital role in ensuring the smooth implementation of the processes. Basically, during project execution, the qualities of Technical Leadership Skills and Managerial Skills affect project performance and the performance of engineers either positively or negatively. Besides that, this study focused more on the impact of Technical Leadership Skills and Managerial Skills on affecting the Performance of an Engineer in Tenaga Nasional Berhad (TNB), which are more closely related to the project engineers rather than top management. The purpose of this analysis will be also to quantify those responsible for plan implementation, not the top management who devised it. The focus of this study would thus be well supported by gathering information from the project engineer.

1.6 Significance of Study

The significance of this research is important to uncover how Technical Leadership Skills and Managerial Skills influence engineers' performance in attaining the company's vision and goal. In addition, the findings attempted to be comprehended in a more desirable and superior manner. "A Study on Relationship of Technical Leadership Skills and Managerial Skills with the Performance of Engineers" for the survival of the organisation. This study is also supported by adding previous theories on the relationship between Technical Leadership Skills and Managerial Skills, both of which have positively impacted Engineer Performance. From a management or Human Resources perspective, the study's findings would have provided further information and understanding that could have aided in terms of appropriate commitment and accurate execution. This contingency theory would be supported by demonstrating that superior engineering performance was not dependent on a single factor, but rather on a good set or two of factors or variables.

The engineers in the engineering industry need an ability to interpersonally communicate and a willingness to make tough decisions that can affect other people. This research study will analyse the theoretical and practical aspects of the relationship between Technical Leadership Skills and Managerial Skills with the

Performance of Engineers required during the transition process from engineer to manager and top management. The results of this research would be practically important to the engineers. From the findings, engineers will learn in this age of globalisation or the 21st Century about Technical Leadership Skills and Managerial Skills.

The finding of this research will be valuable because of a lack of previous research in the "A Study on Relationship of Technical Leadership Skills and Managerial Skills with the Performance of Engineers" context. In addition, this study also supports previous theories. This study has many theoretical meanings or inputs. This is because when theories are proposed or developed, those theories must be tested to ensure reliability, acceptance, and generalisation. More are tested, will be better, strengthened, trusted, credible, and more generally accepted. This paper aims to examine the knowledge-sharing process of engineers at project sites in Tenaga Nasional Berhad (TNB). This is produced by a study of information-sharing activities and determinants of Technical Leadership Skills and Managerial Skills with the Performance of Engineers in work efficiency. The Impact of Technical Leadership Skills and Managerial Skills towards the Performance of Engineers. There are two major viewpoints i.e., Technical Leadership Skills and Managerial Skills do make a difference, and Technical Leadership Skills and Managerial Skills do not make a difference (DuBrin, 2010).

2. Literature Review

2.1 Performance of Engineers Concept

Performance has been used extensively in research into Managerial Skills. There is no agreement, however, as to which parameters are the best measure of company success (Bayyvarapu, 2006). Performance measurement is very complicated, stressful, difficult, demanding, necessary, abused, and misused. The organisation's success depends on the organisation's intent. Since success may not be objectively defined, performance is the organisation's ability to compete with the goal of the future. Even the assessment of success already made by the organisation, however, still has a contradiction in that organisation. In this scenario, the data on the component is used to assess potential results. The achievement of success is not a guarantee that the target will be reached again in the future (Michel J. Lebas, 1995).

An engineer is a person whom he has:

i. Awareness,
ii. Usage of mathematical structures,
iii. Physical,
iv. Science of engineering,
v. The values and techniques of engineering research and design

The researchers argue that scientists and mathematicians typically do not need to collaborate with engineers. To deal with the issues themselves, they have ample expertise. An engineering student would be able to understand the big social issues of his day by sample knowledge of the humanities and social sciences. The success of the whole team is dependent on the Performance of the Engineer and the whole team loses if he becomes too autonomous. The engineer who attempts to do a job by himself would be frustrated in most job conditions today. Thus, the Performance of Engineers is believed to have a connection with the Technical Leadership Skills and Managerial Skills of the project engineers and project managers.

2.2 Technical Leadership Skills Concept

Technical Leadership Skills are a fundamental element of the human condition. Wherever society exists, Technical Leadership Skills also exist. Any definition of Technical Leadership Skills must account for its universal nature. Technical Leadership Skills seem to be linked to what it means to be human (Valeria et. al., 2020). In an Industry Revolution (IR) 4.0 organization, engineers are needed to have in-depth skills in technical knowledge and an understanding of science. For each Industry Revolution (IR) 4.0, R. Kelly, (2018) demonstrates measures to describe Management (IR).

i. Charismatic Technical Leadership Skills are linked to how a leader behaves by behaviour and personal attributes and mobilises an organisation.
ii. Represented as the directive's Technical Leadership Skills, the engineers adopt a top-down approach. Relational Technical Leadership Skills are characterised by relational Technical Leadership Skills, which consider the theories of transformative Technical Leadership Skills to stimulate followers' autonomy and cooperation for new ideas.
iii. The more carried out and accepted transactional Technical Leadership Skills through the accomplishments of the ambitions of followers.

Technical Leadership Skills for Industry Revolution (IR) 4.0 is defined as digital Technical Leadership Skills. R. Ashkenas and B. Manville, (2018), identified six Technical Leadership Skills after conducting interviews with successful project managers and project engineers from large corporations, start-ups, and non-profit organisations to learn about their perspectives on what it takes to be a leader such as:

i. creating a vision to focus on and challenge the team
ii. transforming the vision into a clear strategy for what actions to take and which not to take
iii. assembling, developing, and rewarding a fantastic team
iv. concentrating on measurable outcomes
v. fostering innovation and learning to sustain the team or organisation
vi. developing these leadership skills requires ongoing practice and real-world experience, rather than just reading books or attending courses or seminars.

To ensure emphasis, versatility, and efficiency, effective and reliable transformative Technical Leadership Skills are required and to maximise the country's capital, transformational Technical Leadership Skills are a common phenomenon and an urgent necessity. Although more of it happens at the top than at the bottom of an organisation, Visser et al. (2004) note that in first-level managers and informal leaders, it has also been found by many workers. Proper Technical Leadership Skills are facilitated with outer inspiration that can enhance work execution, work advancement, and occupation fulfillment and subsequently prompt the accomplishment of both individual and hierarchical goals. In addition, Technical Leadership Skills is a standout amongst the most watched and slightest comprehended marvels on earth (Awan and Mahmood, 2010).

2.3 Managerial Skills Concept

R. L. Katz (1955) was the earliest to address the issue of determining the talents required for successful managerial performance. Technical, human, and conceptual talents, he said, are the skills of an excellent manager and engineer. Peterson and Fleet (2004) revised Katz's paper, modifying several elements and identifying seven other talents in addition to Katz's three. Managerial skills are characteristics or abilities that an engineer should have to perform specific tasks in an organisation (Robert Katz, 2020). The importance of promoting kaizen activities to improve engineering Managerial skills such as leadership skills and coaching skills is a managerial and policy consequence of these results. To have a deeper understanding of consumers and vendors and achieve process changes in addition to technical skills. In other words, to develop the performance of engineers in terms of Managerial Skills for example management ability, Technical Leadership Skills, and coaching skills. In addition to technical skills, to have a better understanding of customers and suppliers and achieve process improvement (Ueki et al.2020). E. Wallace (2016) emphasises several roles that need to be made for engineers in the organisation name, such as socialising the organisation's ineffective transitions for engineers, the role of education in transitions, and the role of motivational models in transitions. Literature and research are insufficient on comprehension of the views of newly transformed engineers, combined with a lack of understanding of managerial skills in work practices from the viewpoints of the performance of engineers.

Three components are responsible for the success of the transition of engineers into management i.e., knowledge management, managerial skills, and attitude management. For successful management, in-depth knowledge of administrative principles and elements is required (Visser et al. 2004). Daley et al. (2020) integrate the skills between Technical Leadership Skills and Managerial Skills. Due to pressure from accreditation bodies such as "The Institute of Engineering and Technology" (IET), universities are beginning to embed Technical Leadership Skills and managerial skills, with each accreditation increasing the importance of Technical Leadership Skills development.

2.4 Underpinning Theories

The research framework in this study is established on three skills which included Resource-Based Theory, Leadership Skills Theory, and Managerial Skills Theory.

2.4.1 Theories of performance - resource-based view (RBV)

The term "performance" is also used interchangeably with words like "do," "accomplish," and "work." They say that individuals do their jobs properly to fulfill the organisation's goal and that performance can be measured. It's more about the skill and willingness to learn (Simon Shepherd, 2016).al resources. The definition of performance is human interaction behaviour in various settings. However, when multiple concepts are combined in one location, it is referred to as a performance. When the concept of performance was related to academia, in the new practice, performance was shaped by its engagement with struggles over

economic and social limitations. They will work hard to get and reach the goal, and only the most successful individuals will achieve the desired level of performance. The primary sources of long-term competitive advantage for sustained superior performance are organisational resources that are valuable, scarce, impractically imitable, and impractically substitutable (Barney, 1991).

According to Bourne, Melnyk, and Bititci (2018), performance measurement is critical and always linked to the organisation's objective. The purpose of the performance is to ensure that they remain focused on the company's goals. However, by utilising the Performance Measurement and Management system, academic performance can be measured (PM&MS). The top-down process of the organisation's strategic direction, people or team dynamics, and interpersonal contact are all included in this system. The philosophy of performance assessment is already evolving today, allowing organisations to adapt to new settings while maintaining the status quo. Based on Nitsch and Hackfort (2016), performance theory is an aspect of human life that has a goal in numerous actions. The scientific fields ranging from philosophy to biochemistry identify the element in human life. Performance in psychology is divided into two categories: fundamental and applied psychology, which includes educational, vocational, and athletic psychology. Furthermore, educational psychology determines intellect and concentration. Teamwork skills, conflict resolution skills, and leadership abilities are examples of occupational psychology. Finally, there's sports psychology, which includes mental toughness and self-assurance.

2.4.2 Theories of technical leadership skills

According to Richard L. Daft Leadership Skills, theories can be categorised into many basic approaches. There are several types of leadership theories as below:

Great Man Theories

i. Pre-bureaucratic organisation and Administrative.
ii. The theory is the effort toward explorations for common traits of leadership as before legacy.

Trait Theories

i. Pre-bureaucratic organisation and administrative principles.
ii. Born leaders have physical and personality characteristics that distinguish them from non-leaders.

Behaviour Theories

i. Vertical hierarchy, bureaucracy, Functional management
ii. The theory acknowledges the significance of previous leadership skills which means the new leader cannot make their own decision until they get confirmation from the previous leader.

A leader normally has the socio-emotional support and task toward relationship behaviour required by the follower's functions and objectives (Ahmad Khan, Bhat & Hussanie, 2017). The leadership theory is the skills that people were born with abilities to be a leader. They explain how and why people become a leader. The theories often focus on the people that are born to be a leader in nature, however, experience and situation also play a critical role to be a leader. In addition, the leadership theory focuses on the quality differences between leaders and followers such as situational factors and skill levels (Kendra Cherry, 2019).

Meanwhile, in Herzberg's theory, Herzberg's idea could be a good fit for this research. Herzberg's theory looks at what motivates (satisfies) and de-motivates (dissatisfies) people from a different angle. The antithesis of contentment, according to Herzberg's idea, is no satisfaction. Rajiv, Dubinsky, and Anderson (2003) employed self-determination theory in the context of three different types of employee motivation as impacted by leadership styles. Rajiv et al. discovered how employees regarded their administrator's leadership styles influenced their motivation to work. As an employee, it was worth treating them fairly and equally. Having a good leader also influences the employee's sense of satisfaction. The top management should make wise decisions in selecting and appointing someone to the function of supervising (Bakotic & Babic, 2013). Finally, process leadership theory is the leadership with a process from bottom to upper. Sometimes the leader is starting from servant leadership. This leadership theory can be emerging every year based on the organisational promotion.

2.4.3 Theories of managerial skills

Schultz (1961) presents his theory of managerial skills in an article titled "Investment in Human Capital." Schultz contends that expertise and capacity are both types of human capital that result from the deliberate investment. Acquiring knowledge and skills is linked to acquiring productive assets. Earnings disparities are related to the importance of access to education and health care. He believes that investing in human capital increases human productivity, resulting in a good return on investment. According to Becker et al. (1964), management abilities are analogous to physical production for example machines and factories.

Human capital is a mode of production that generates additional output in exchange for additional investment. Human capital, such as land, labour, or fixed capital, is interchangeable but not transferable. The Human Capital Theory by arguing that, while human capital is generally applied to workers, there is no reason why it should not also be applied to entrepreneurs. Entrepreneurs with higher general and specific knowledge are also expected to perform better. Managerial skills would lead to greater success than lower levels of general and specific human resources. This is referred to as human entrepreneurial capital. Entrepreneurial human capital refers to a person's entrepreneurial knowledge, skills, and experiences. Entrepreneurial human capital is essential for the growth of entrepreneurship (Bruderl, Preisendorfer & Rolf, 1992).

2.5 Technical Leadership Skills and Performance of Engineers

The Independent variable (IV1) in this study is Technical Leadership Skills and the dependent variable (DV) is the Performance of Engineers. According to INCOSE's Vision 2025, one of the seven critical areas of Systems Engineering 'Competency' required for outcome delivery is the development of Systems Thinking and Technical Leadership. "Education and training of engineers, as well as the infusion of systems thinking across a broad range of the engineering and management workforce, will fulfill the increased demand for engineers with the essential technical and leadership competencies," according to Vision 2025. To handle the rising difficulty and variety of upcoming systems, the engineer's tasks and competencies will broaden. The technical leadership role of an engineer in a project will be well established as critical to the project's success. These requirements necessitate the rapid development of the art and science of technical leadership. In response to this demand, INCOSE established the INCOSE Institute for Technical Leadership (Patrick Godfrey, 2016).

Engineering as a profession draws on a wide range of interdisciplinary knowledge, and universities should take a more holistic approach to teach and learning when preparing twenty-first-century engineers, focusing on both technical and soft skills, as well as incorporating leadership into engineering curricula. However, there is no clear definition of engineering leadership. In the field of science, technology, engineering, and mathematics (STEM), one of the most sought-after abilities is leadership (Joshua Daley & Bidyut Baruah, 2020). Technical Leadership Skills for engineers are more difficult than in most other sectors because an additional dimension of Technical Leadership Skills and governance is required, in the conventional skills needed to engineers succeed (John V. Farr, 2020).

2.6 Managerial Skills and Performance

In this study, the independent variable (IV2) is Managerial skills, and the dependent variable (DV) is the Performance of Engineers. According to Nittala (2019), most engineers, regardless of their desired career path, move into some form of Managerial Skills function throughout the first 3-5 years of their careers. In addition, a survey of professional engineers in the United Kingdom discovered that more than three-quarters of those polled worked in jobs that included a considerable or main administrative component. With the addition of administrative parts to the task, work demands, and expectations increase when engineers move into such positions. In fact, according to the findings of one empirical investigation, the engineering managerial function entails juggling far more duties, tasks, and priorities than more typical technical roles. The current engineering education system is partly to blame for many of the issues faced by engineers migrating into engineering management roles. According to J. Trevelyan (2014), engineering education has failed to prepare the next generation of engineers, notably by focusing on producing engineers who are technically proficient but lack social skills. Engineers' fundamental talents are key resources for the company's achievement as they have an enormous impact on strategic decisions and implementation. Engineers' capacity to comprehend and explain a company's economic performance potential is thus dependent on the integration of their professional talents (Tangwo & Asah Francis, 2012).

Managerial Skills efforts can be targeted toward a certain market segment in any of these two techniques. Tangwo and Asah Francis (2012), go on to say that managers and engineers should make use of their managerial abilities, works and services, consumers, and so on, particularly their marketing abilities. Skills as a means of distinguishing their products and services from competitors, as well as market-oriented organisations' competitive edge in terms of the speed and efficiency with which they respond to opportunities and threats. The level of competition in the industry in which a company works will have an impact on its performance. Bosma et al. (2004), on the other hand, discovered that an engineer's leadership skills are not the sole determinant of performance. They also discovered a negligible association between managers' managerial abilities and engineers' performance, as well as a substantial positive relationship between employee skills and engineers' performance.

2.7 Research Framework

The proposed framework is underpinned by the Resource-Based Theories (RBT) and/or Resource-Based Views (RBV) which explain how Technical Leadership Skills and Managerial skills affect the Performance of an Engineer. Combining the company resources in the forms of Technical Leadership Skills, Managerial Skills, and the Performance of Engineers may enhance company capabilities and effectiveness which may be the key to gaining a competitive advantage.

Hypothesis 1 and Hypothesis 2 are the two hypotheses in this study.

H1: There is a significant relationship between Technical Leadership Skills and the Performance of Engineers.

H2: There is a significant relationship between Managerial Skills and the performance of Engineers.

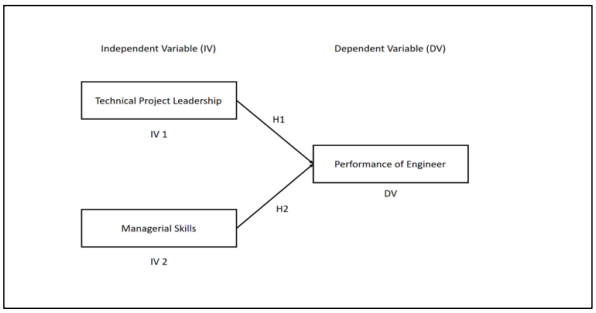

Figure 1. *Research Framework*

3. Method

The methodology, strategy, and techniques applied in this study describe the philosophy of research, the nature of the research, the population of this study, the sample size, and the techniques of sampling adopted.

3.1 Research Design

The study of engineers' Technical Leadership Skills and Managerial Skills is fresh, demanding, and exciting. It is important to distinguish between the quantitative and qualitative nature of the research process when deciding on the research methodology to be pursued. This study is applying quantitative data that will be collected using a postal questionnaire survey. The quantitative research process applies to this research. The research will take place at Tenaga Nasional Berhad (TNB) and will be case specific to project engineers. Whether the study is exploratory, descriptive, or causal, the sort of research design that will be used is determined by the purpose and nature of the investigation. The three types of research designs are exploratory research design, descriptive research design, and causal research design.

The descriptive research design is used to describe phenomena. Its goal is to collect quantitative or qualitative data that describes the subjects under investigation. It is now necessary to collect quantitative or qualitative data. A descriptive research design is appropriate when a researcher wants to investigate relationships between variables to describe a population or situation. Because they depict the relationships that exist between variables, these studies are correlational in nature. There are two types of descriptive research: cross-sectional and longitudinal. Cross-sectional data is collected in one location for a study; longitudinal data is collected in several locations (Sekaran & Bougie, 2016; Kumar et al., 2013). Causation studies are conducted by researchers to determine whether one variable cause another to change. The goal of a causal study is to identify the elements that contribute to the problem. It is used to determine whether two variables have a cause-and-effect relationship in which one influences the other (Kumar et al., 2013; Sekaran & Bougie, 2016).

3.2 Research Gap

Some academics believe that education for Managerial Skills and Technical Leadership Skills should be purely intrapersonal. Others believe it is a unique phenomenon that should be established independently of other abilities. However, such a stance will disregard the suggestions of opposing academics and many in the industry that Managerial Skills are inherently related to skills such as Technical Leadership Skills, business insight, entrepreneurship, innovation, and ethics (Daley et al. 2020). Thus, this study is analysing "A Study on Relationship of Technical Leadership Skills and Managerial Skills with the Performance of Engineers".

3.3 Population and Sampling

The population is the number of people who live in a city, a region, or a country. The term is frequently used to describe populations that are more fleeting and transitory. Daytime populations are high in central business districts in towns (Peterson et. al., 2017; Laughlin et al. 2015; McKenzie et al. 2013; Konrad Bhaduri 2008).

The population is the entire group of people or things that the researcher wishes to study. A sample can be identified as a subset of the population. The necessity for a study sample is required for the following reasons. To begin with, it is rarely practicable to study the complete research population. Second, samples are collected to generalise the study's findings (Kumar et al., 2013; Sekaran & Bougie, 2013; Kumar et al., 2013).

The necessity for a study sample is critical for the reasons listed below. To begin with, it is not always feasible to research the entire study population. Second, samples are collected to generalise the study findings. A sample is a subset of a population or the entire universe. Nonetheless, many people consider solely persons when calculating population. A few people may not always suggest a population. It could also refer to the total quantity of objects or cases that are the subject of our investigation (Etikan & Ilker 2016; Walliman, 2011; Tailor & G. R. ED 2005). Sampling is a type of sequential decision-making algorithm that requires the maintenance of a posterior distribution over a model (Zhang, Ruiyi Wen, Zheng Chen, Changyou Carin, Lawrence, 2018).

Probability sampling is distinguished by the fact that each unit in the population has a known, nonzero chance of being included in the sample. It is stated more explicitly that each participant has an equal chance of being chosen from the population. Each element in the population has a known nonzero chance of being selected using a random selection procedure in probability sampling (Etikan & Ilker, 2016). Every element in the population has a chance of being selected in probability sampling, whereas every element in the population has no chance of being selected in non-probability sampling. However, the type of sampling design to use is determined by factors such as the desired level of generalizability, the time and other resources required, and the purpose of the study (Sekaran & Bougie, 2013). Therefore, Convenience Sampling (CS) and Purposive Sampling (PS) random sampling techniques, Technical Leadership Skills, and Managerial Skills will be used in this study.

The population and the unit of analysis of this study consist of engineers in the electricity utility company in Malaysia, namely Tenaga Nasional Berhad (TNB). This study will focus on the project engineers in Distribution Network (DN) at Tenaga Nasional Berhad (TNB). Distribution Network (DN) is the largest organisation of engineers carrying out projects with an estimated 200 engineers. Previously, DN has introduced 6 mega projects to provide the best service to customers as well as "Rakyat". One of the projects involved is the Distribution Automation (DA) project. The DA project is one of the initiatives of Tenaga Nasional Berhad (TNB) company to provide services to customers in terms of restoration time during outages or breakdowns. It is estimated that more than 30 engineers will be involved in the project. Thus, this study will focus on engineers in DN and DA as a pilot study. As a result, the sample size for this study will be calculated. Based on the population and sample size table, the ideal sample size for a population of 210 is 136 with a 95% confidence level and .05 errors (Krejcie and Morgan, 1970).

3.4 Instruments and Measurements

Operationalization, defined as a hierarchy, examines cohesive groups within the developer network and categorises developers as the core if they cannot be assigned to a single cohesive developer group but are linked to multiple groups, implying that these developers are partially responsible for the coordination of these cohesive developer communities (Frank & Ferdinand, 2017). The measuring of study variables is what the operationalization of variables is all about. Through operationalization, research variables are reduced to constructs that can be observed and assessed. The variables considered in this study are operationalized in this section (Bougie & Sekaran, 2013).

Two considerations have been considered to confirm that the instruments acquire the data required from the respondents. First, there was the basic design of the questionnaires, and then there were the procedures for administering the surveys (Hair, Money, Page & Samuel, 2007). The questionnaire inquired about Technical Leadership Skills, Managerial Skills, and Engineer Performance to assess an engineer's skills. 1 = extremely unsatisfactory, 2 = unsatisfactory, 3 = neither, 4 = satisfactory, and 5 = extremely satisfactory, according to the survey respondents. Visser et al., 2004; Ueki et al., 2019).

There is a variety of measuring devices available, each with its own set of benefits and drawbacks. The Multifactor Leadership Skills Questionnaire (MLQ), created by Visser et al. (2004) and Bass & Avolio, was used to assess leadership abilities (1995). The MLQ will be used to assess a wide spectrum of leadership abilities, from laissez-faire to idealised influence, in this study. Based on prior research, the MLQ will be used to convey the significance of each construct of the Full Range Model, as well as Managerial abilities and Engineer Performance.

Table 1. *Proposed Questionnaires*

Variables	Items	Scales	Sources
Leadership Skills i. Technical Leadership Skills behaviour ii. self-explanatory	12	Likert Scale 1-4	MLQ (Multi-Factor Leadership Questionnaires) i. Visser, Hercules,Naude, Louis,Schepers, Johann 2004 ii. Bass & Avolia 1995).
Managerial skills	11	Likert Scale 1-4	i. Lana Lovrencic Butkovic,(2018) ii. John V. Farr, (2020).
Performance	7	Likert Scale 1-4	i. Ueki, Yasushi, Guaita Martínez, & José Manuel, (2019) ii. Tseng, S-M., & Huang, J-S. (2011)

The questionnaires will include elements based on important key points for Technical Leadership Skills. In addition to technical skills, conceptual skills, human or interpersonal skills, and communication skills, the researcher will include Managerial Skills in the questions.

3.5 Validity and Reliability

To examine the effectiveness of the research instrument of the questionnaire/survey by applying validity and reliability tests. To improve researchers' survey validity test skills and knowledge, various types of validity will be discussed. As mentioned, the questionnaire has four key validity tests i.e., face validity, material validity, construct validity, and criterion validity (Taherdoost & Hamed, 2020). Before the survey questionnaire can be used, its validity and reliability must be established, to examine and increase the results or findings' accuracy and credibility (Saunders et al. 2000).

3.5.1 Validity

To ensure that the measurement scale accurately measures, the validity tests have been tested in this study (Davis & Cosenza, 1998; Hair et al., 2007). The total accuracy or veracity of a study is referred to as validity. It is defined as an instrument's ability to measure the construct it was designed to assess (Gall & Borg, 1989; Pallant, 2007). Due to the presence of certain circumstances, the measurement employed in the survey may become invalid, preventing it from expressing what it was designed for. As a result, a validity test is required to ensure that the study's instruments measure what they are supposed to measure (Borden & Abbot, 2011). External and internal validity testing is also possible.

Construct validity is concerned with both theoretical and statistical components of the evaluation. The theoretical aspect includes the natural part, which necessitates the concept's justification. Evidence from previous and current studies that the construct variables can be found (Davis & Cosenza, 1998). The variables in this study derived from the literature about Technical Leadership Skills and Managerial Skills with the Performance of Engineers. Convergent validity can be used to analyse the statistical element of concept validity. Convergent validity examines the degree of correlation between two assessments that claim to measure the same thing. The convergent validity of an instrument can be determined by comparing it to another instrument that is being used to measure the same thing. The constructs were subjected to factor analysis to ensure that all the measurements found in this study indicated construct validity (FA). All variables in this study have a dimensional construct. As a result, the goal is not only to confirm the scales but also to evaluate the variable set-in order to reproduce only the most important information revealed by the interactions between the variables (Davis & Cosenza, 1998). The extraction of factors has been completed, and any value greater than one is recommended for adoption. The orthogonal approach and varimax rotation were then used to further reduce the interpretation and seek a simpler structure. The advantage of this method was that it tended to rebalance the variance among components, making them more equal in importance. After performing the Varimax rotation on all the main variables of Technical Leadership Skills and Managerial Skills with Engineer Performance, the data was accepted for factor analysis (FA) to establish factor loading. Only variables with a factor loading of 0.32 or higher are usually included (Tabachnick & Fidell, 2001). Nonetheless, Comrey and Lee (1992) considered loadings greater than 0.71 to be "outstanding," 0.63 to be "very good," 0.55 to be "good," 0.45 to be "fair," and 0.32 to be "poor."

However, as Tabachnick & Fidell (2001), stated the magnitude of the loading cut-off point was determined by the researcher's desire. A larger loading of 0.30 would suffice for this investigation because the loading size will be influenced by the homogeneity of scores in the samples and interpretation. Before disseminating the questionnaire to potential respondents, the researcher will conduct pilot testing with successful or

effective project managers and project engineers to test and strengthen the questionnaire's validity (Zahari et al. 2019).

3.5.2 Reliability

Reliability refers to the degree to which a measurement of a phenomenon yields a stable and consistent result. The ability to do something repeatedly is also referred to as "reliability". Cronbach's Alpha is the most used internal consistency metric. The Likert scale is widely accepted as the most reliable measure of dependability. Though there are no solid and constant rules for internal consistency, most experts agree on a minimum internal consistency coefficient and four reliability cut-off points: excellent reliability (0.90 and above), high reliability (0.70- 0.90), moderate reliability (0.50-0.70), and low reliability (0.50 and below) (0.50 and below).

Reliability is defined as the degree to which an item or set of things is consistent with what it is intended to measure. It's also known as the consistency or consistency of measurement devices throughout time. When a study is performed at different times, the instrument produces the same results (Neuman, 2011). The consistency of a more dependable instrument will be greater than that of less reliable instruments (Hair et al. 2010). Cronbach's coefficient Alpha is the accepted method for determining the reliability of a test instrument. The Alpha values demonstrate the instruments' dependability. Instruments with a high Alpha correlate well with genuine scores, whereas instruments with a low Alpha perform badly (Nunnally, 1978). Alpha coefficients of 0.8 or higher are generally considered good, while alphas of 0.70 or less are considered acceptable (Nunnally & Bernstein, 1994). Hair et al. (2010), on the other hand, recommended that an alpha value of 0.60 to 0.70 is modest and nevertheless acceptable and dependable for the study's constructs. The SPSS application for Windows will be used. For this investigation, a coefficient alpha of more than 0.7 will be selected as the reliability cut-off criterion.

3.6 Pre and Pilot Tests

A pilot study is always a tiny study that permits the major study to be created and revised. It is the first element of the entire research process. The pilot or small-scale study frequently precedes the large trial in large-scale clinical research to assess its validity. Researchers must completely understand not only the precise goal and issue of the study but also the experimental approach and timetable before beginning a pilot project. A pilot study is the first step in every research methodology, and it is always a small one. Researchers learn about the processes involved in the major study through the pilot study, which helps them identify the most appropriate research method for addressing the main trial's research question. A pilot study provides the required information for evaluating all other parts of the major study, reducing superfluous efforts by researchers and participants, as well as the waste of research resources. Before beginning the pilot study, all the factors mentioned in the text must be clearly defined and completed to the best of one's ability. It is proposed that dependability be equivalent to an exploratory or pilot investigation. It is recommended that the reliability of an exploratory or pilot study be equal to or greater than 0.60 (In Junyong, 2017).

This pilot testing allows the researcher to identify any flaws, inadequacies, ambiguities, or difficulties in all areas of the study so that they can be addressed before the actual data gathering begins. The questionnaire was administered to a group of people who are randomly selected from a population that is like the target population in this study's pilot test. This helps to test the instruments' dependability for measuring research variables before deploying them in the field for large-scale data collection (Bougie & Sekaran, 2013). The pilot study was carried out using Google Forms online questionnaires, which were accessible via devices such as PCs, laptops, and smartphones. The said Google Forms questionnaires were sent out to thirty (30) possible respondents over the internet. For the Reliability Test, approximately thirty (30) engineers were collected through the web in response to the e-questionnaires and using SPSS software. A pilot test has been conducted for engineers at Tenaga Nasional Berhad (TNB) in this study. Table 2 shows the results of the pilot study.

Table 2. *Pilot Study*

Variables	Items	Cronbach Alpha
Technical Leadership Skills	12	0.760
Managerial skills	11	0.903
Performance of Engineers	7	0.908

The pilot study's findings are as follows: The internal consistency measurement was confirmed by the pilot study's dependability. For pilot tests, Cronbach Alpha values were 0.760 for Technical Leadership Skills, 0.903 for Managerial Skills, and 0.908 for Engineer Performance. Cronbach Alpha values acquired from this pilot study were, on average, higher than 0.70. Cronbach Alpha must be larger than 0.60 for exploratory research and 0.70 for validation studies, according to previous research (Straub, Boudreau & Gefen, 2004). The Cronbach Alpha values achieved in this pilot study were within range and acceptable, according to the results. It has also confirmed that the measurement is internally consistent and reliable.

3.7 Data Collection Procedures

The source of data that this study used is secondary data. In addition, the data collection method is quantitative through questionnaires. Then this study is using the simple probability (random) sampling technique as a data collection procedure. This study will adopt probability (random). A random sampling design will be accepted because of the need to generalise the study's findings about "How Technical Leadership Skills and Managerial Skills Affect Performance of Engineers in Malaysia".

The following steps will be taken as part of the research procedure:

i. The questionnaire is managed personally by the researcher.
ii. Respondents are assured that their privacy will be respected.
iii. Respondents will be required to fill out an answer sheet. The respondents will be informed that the questionnaire contained statements on special Technical Leadership Skills, Managerial Skills, and Engineer Performance. They are also asked to demonstrate how frequently they behave in a specific manner. Respondents must indicate how strongly they identified the behaviour for each item.
iv. The total time for all items is estimated to be 10 minutes.

3.8 Data Analysis and Techniques

The data analysis for this study used The SPSS Windows program to determine the normality test, linearity, multicollinearity, homoscedasticity, correlation analysis, and regression analysis (direct and indirect mediating). The statistical information is available from the Human Resource Tenaga Nasional Berhad (TNB). The coefficient alpha greater than 0.7 will be used as the study's reliability cut-off point. This section goes into the procedures used and the methodologies (techniques) used to analyse the data. The steps below were taken to ensure that the data collected was in an appropriate format, sufficient, and cleansed for analysis. Data sorting, coding, and entry; response rate, non-response bias, missing values, and outliers; and response rate, non-response bias, missing values, and outliers have all been completed.

3.9 Response Rate

The response rate is calculated by dividing the total number of questionnaires sent to respondents in a survey by the total number of completed questionnaires (Zikmund, Carr & Griffin, 2013). The response rate must be calculated because it indicates whether the returned surveys are suitable for analysis. In multivariate analysis, the rule of thumb for the number of usable questionnaires.

3.9.1 Non-response bias

Non-response is commonly predicted in social science studies. In survey research, non-response happens when some respondents who were given questionnaires do not complete them. As a result, non-response bias refers to a statistical difference between those who completed questionnaires and those who did not (Zikmund et al., 2013).

a. Missing Data

When the values on one or more variables are insufficient for analysis, this is known as missing data. Missing data cases might occur because of the researcher's incorrect data entry. It could also be the result of some respondents refusing to reply to certain questions in the survey. The researcher must discover the causes of missing data and apply the proper solutions if there are occurrences of missing data. It's critical because the analysis of data with missing data might lead to inaccurate and misleading results (Hair et al., 2010).

b. Outliers

Outliers are observations or values that are unusually high or low in comparison to other statements or values. Outliers can skew the results of an analysis and alter the overall picture (Hair et al., 2010). The data was checked for multivariate outliers because this study used multivariate analysis. The Mahalanobis distance algorithm was used (D2).

3.9.2 Multivariate assumptions tests

Overall, there were four factors in this study: two (2) independent variables i.e., Technical Leadership Skills and Managerial Skills, and one dependent variable i.e., Engineer Performance. Then, to address the research questions posed, this study required several regression analyses. In general, several conditions must be met before a multivariate analysis may be performed. As a result, to test multivariate assumptions, the normality test, linearity test, homoscedasticity test, and multicollinearity test were used.

a. Normality Test

To assess whether the results for each variable are regularly distributed, a normality test is performed. Two methods were used to test normality: a statistical method and a graphical method. To begin, the skewness and kurtosis of all variables were calculated, as well as the corresponding z skewness and z kurtosis values. Skewness is the distribution's balance (symmetry), while kurtosis is the distribution's "peaking". The histogram, on the other hand, will display the data's graphical distribution (Hair et al., 2010).

b. Linearity Test

To determine the relationship between the variables investigated in this study, a linearity test was used. To check for linearity, researchers used Pearson product-moment correlation analysis (Hair et al., 2010).

c. Homoscedasticity Test

In a Levene test for homoscedasticity, the independent variables were compared to the dependent variable (Hair et al., 2010).

d. Multicollinearity Test

Multicollinearity refers to the degree of correlation between independent variables. The predictive ability of independent variables is reduced when they have a high degree of correlation. To check for multicollinearity, the Pearson correlation test was used.

3.9.3 Exploratory factor analysis

The adequacy and consistency of the scales in assessing each of the variables studied in this study were evaluated using factor analysis and reliability testing. First, each of the variables was subjected to a factor analysis to determine that the items used to assess them were adequate. Table 3 lists the criteria used to evaluate the factor analysis results. The remaining items measuring each of the factors were then subjected to a reliability test to see if they were internally consistent in assessing the variables. Cronbach's Alpha values greater than 0.70 for all variables were used to determine item reliability (Sekaran & Bougie, 2013).

Table 3. *Criteria for Assessing Factor Analysis Results*

Ss/No	Factors	Standard
1	Intercorrelation among items	> .30
2	Kaiser-Meyer-Olkin (KMO)	> .50
3	Barlett's Test of Sphericity	< .05
4	Measures of Sampling Adequacy (MSA)	> .50
5	Anti-Image	> .50
6	Eigenvalues	> 1.00
7	Total Variance Explained	> .60 (60%)
8	Factor loading	±.50
9	Communalities	> .50

Source: Hair et al., (2010)

3.9.4 Multivariate analysis

The following multivariate analysis, multiple regression analysis, was used to address the research questions and test the hypotheses developed in this study.

a. Multiple Regression Analysis

Engineers' performance is one of the study's dependent factors, with two (2) independent variables: technical leadership skills, and managerial skills. The direct impacts of technical leadership skills and managerial skills on engineer performance were investigated using multiple regression analysis. The independent variables i.e., Technical Leadership Skills and Managerial Skills were jointly regressed against the dependent variable i.e., the Performance of Engineers. The relationship between the dependent variable i.e., Performance of Engineers, and the independent variables i.e., Technical Leadership Skills and Managerial Skills was modelled in the equation below and was applied in running the multiple regression analysis:

$$OE = \beta 0 + \beta 1TLS + \beta 2MS + \xi$$

Whereby, POE = Performance of Engineers; TLS = Technical Leadership Skills; MS =Managerial Skills. β0 is constant while β1and β2 are regression coefficients. For hypotheses 1 and 2, regression analysis will be employed to investigate the relationship between all variables.

Table 4. *Summarises the Hypothesis and the Respective Statistical Tests*

No.	Research Question	Proposed Statistical Test
H1	There is a significant relationship between Technical Leadership Skills and Performance of Engineer.	Regression
H2	There is a significant relationship between Managerial skills and Performance of Engineer	Regression

4. Results and Discussion

This chapter shows the results obtained from the data collected throughout the project. The analysis involved in this study is as followed:

i. Common Method Variance (CMV)
ii. Data Cleaning process (Detection of missing data and outliers' detection)
iii. Validity/Factor Analysis
iv. Reliability of Scales Analysis
v. Correlation Analysis
vi. Descriptive Analysis (Demographic, Mean, and Standard Deviation)
vii. The assumption for Multiple Regression Analysis (Normality Test, Linearity, Multicollinearity, Homoscedasticity, Independence of Residual)
viii. Hypotheses Testing using Multiple Regression
ix. Multiple Regression

Based on Krejcie and Morgan (1970), for a population of n=208, a good sample size is 136. A total of 163 replies were received between November 21st and December 2nd, 2021. It demonstrates that 163 replies meet Krejcie and Morgan's recommended sample size. To put it another way, the results indicate a response rate of 78%, but only 126 samples were valid for further analysis after data cleaning, which is deemed appropriate for any survey approach. Because the data were collected all at once, there is no risk of non-response bias in this survey. (Hair et al. 2010; Sekaran, 2004).

4.1 Common Method Variance (CMV)

To address the issue of Common Method Variance (CMV), this study employed Harman's one-factor test. The test involved performing principal components factor analysis (PCA) on all items in this study. If the results of the PCA indicated that the first factor explains less than 50 percent of the total variance, then CMV is not a major concern. Table 5 below shows the PCA yielded 30 factors with the first factor accounting for only 42.85 percent of the total variance which is below 50 percent. Thus, CMV was not a major concern in this study.

Table 5. *Common Method Variance Test*

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative %	Total	Percent of Variance	Cumulative %
1	12.856	42.852	42.852	12.856	42.852	42.852
2	2.364	7.881	50.732	2.364	7.881	50.732
3	1.516	5.053	55.786	1.516	5.053	55.786
4	1.268	4.226	60.011	1.268	4.226	60.011
5	1.021	3.403	63.415	1.021	3.403	63.415
...	...	...	...			
...	...	...	...			
...	...	...	...			
29	.130	.435	99.692			
30	.092	.308	100.00			

4.2 Data Cleaning

All data is entered into SPSS software for analysis. Before being processed for analysis and interpretation, all collected data is inspected and reviewed to ensure that it meets the statistical criteria. Some steps in the data cleaning process include missing data detection and outlier detection. This process is used to determine whether all the data collected meets statistical measurement standards and is relatively error-free, such as data entry errors.

4.2.1 Detection of missing data

Missing data is inconvenient. To ensure that the data was completely clean, frequency and missing value analyses were performed for each variable in this study. There was no missing data in this analysis, as shown in Table 6. Detecting missing data is critical for data cleaning because it can lead to incorrect results (Hair et al., 2010). In general, researchers have agreed that missing data of 5% or less is non-significant (Tabachnick & Fidell, 2007).

Table 6. *Frequency Analysis*

Variables	Item Code	Valid	Missing
Technical Leadership Skills	B1	126	0
	B2	126	0
	B3	126	0
	B4	126	0
	B5	126	0
	B6	126	0
	B7	126	0
	B8	126	0
	B9	126	0
	B10	126	0
	B11	126	0
	B12	126	0
Managerial Skills	C1	126	0
	C2	126	0
	C3	126	0

4.3 Factor Analysis

To analyse the underlying structure of the inter-relationship among the variables into a set of common dimensions, factor analysis is performed using a Principal Component Analysis (PCA) with a varimax rotation method. PCA was chosen because it is widely used (Hair et al., 2006). Construct validity was evaluated using three criteria: factor loading, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), and percent of the variance, which indicates the amount of variance in the measurement items accounted for by the construct (dimension).

4.3.1 Technical leadership skills

i. The KMO value was 0.908, exceeding the recommended value of 0.6 (Kaiser, 1970, 1974) and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

ii. The extracted factor represents 52.808% of the variance. Only factors with values of 0.3 and above are considered. Therefore, there are no deleted items.

iii. Factor loading for this variable has a factor loading value of 0.520 to 0.855. All 12 items are loaded in one factor and are called Technical Leadership Skills.

4.3.2 Managerial skills

i. The KMO value was 0.94, exceeding the recommended value of 0.6 (Kaiser, 1970, 1974) and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

ii. The extracted factor represents 65.879% of the variance. Only factors with values of 0.3 and above are considered. Therefore, there are no deleted items.

iii. Factor loading for this variable has a factor loading value of 0.710 to 0.891. All 11 items are loaded in one factor and are called Managerial Skills.

4.3.3 Performance of engineer

i. The KMO value of 0.819, exceeding the recommended value of 0.6 (Kaiser, 1970, 1974), and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

ii. The extracted factor represents 69.4% of the variance. Only factors with values of 0.3 and above are considered. Therefore, there are no deleted items.

iii. Factor loading for this variable has a factor loading value of 0.701 to 0.904. All 11 items are loaded in one factor and are called the performance of engineers.

In conclusion, the findings of this research show that the Factor Analysis (Construct Validity) in Table 7 is below the threshold of 0.3, KMO is greater than 0.6, and the percent of the variance is above 50%. These figures indicate that construct validity is satisfactory.

4.4 Reliability Analysis

The researcher used Cronbach Alpha coefficient analysis to test the instrument's reliability for this study. As per Sekaran and Bougie (2016), a measure's dependability would be an indicator of its consistency and stability, which includes an evaluation of its goodness. Reliability is the extent to which a scale produces consistent findings when tested repeatedly, and it is often assessed using Cronbach's Alpha. Cronbach Alpha coefficients of 0.6 to 0.7 were used (minimum acceptable level of reliability). Nunally and Berstein (1974) proposed that a Cronbach Alpha coefficient greater than 0.7 be used as a reliability cut-off for this study.

Table 8 below presented the Cronbach Alpha coefficients for all the variables in this study. With values greater than 0.7, the variables in this study were found to have excellent reliability. The Cronbach Alpha value for the Performance of Engineers is 0.937, followed by technical leadership Skills at 0.913 and Managerial Skills at 0.947.

Table 8. *Reliability of Scale*

Variable	Number of Items	Cronbach alpha
Performance	7	0.937
Technical Leadership Skills	12	0.913
Managerial Skills	11	0.947
Total Item	30	

4.5 Correlation Analysis

The correlation coefficient, r, was examined in this study to determine the strength of the relationship between the variables in the study, which could be negative or positive. The goal of using Pearson Correlation is to determine whether the variables in this study are closely related or independent of each other, as well as the magnitude and direction of correlation between variables. According to Pallant (2010), a correlation value of 0 indicates that there is no correlation (either positive or negative). If the correlation coefficient is +1, the two variables are positively related, while the correlation coefficient of -1 indicates that they are positively related negatively.

In conclusion, the Pearson correlation analysis values are summarised in Table 9 below, SPSS output reveals that Pearson Correlation, r, for all three variables has positive values, indicating that all independent factors have a positive association with the dependent variable. The correlation between Managerial Skills and the Performance of Engineers is 0.674, Technical Leadership Skills and Managerial Skills is 0.842, and the Performance of Engineers and Technical Leadership Skills is 0.665.

Therefore, the strongest relationship is between Technical Leadership Skills and Managerial Skills and the lowest is between the Performance of Engineers and Technical Leadership Skills.

Table 9. *Pearson Correlations Between Variables*

	Technical Leadership Skills	Managerial Skills	Performance of Engineers
Technical Leadership Skills	1		
Managerial Skills	0.842**	1	
Performance of Engineers	0.665**	0.674**	1

** Correlation is significant at the 0.01 level (2-tailed)

4.6 Descriptive Analysis

The descriptive analysis counts variables in terms of frequency and percentage. It is used to illustrate the sample used in the analysis based on the demographic information of the respondents, as well as to summarise all variables and support factual statements in response to the research questions in this study. The descriptive analysis outlines data set configurations and general patterns. It is also the phrase used to describe the study of data that helps to summarise and examine data in a detailed way. Furthermore, descriptive analysis allows the conclusion to go beyond the facts.

4.6.1 Demographic of the respondent

The first part of the descriptive analysis is analysing the demographic profile which provided lengthy information on the demographic variables of an engineer that has participated in the research. Even though this information is not too important in this study, the personal data helped contextualise the findings and the formulation of appropriate recommendations to enable more engineers to utilise Technical Leadership Skills and Managerial Skills in their performance in workstations.

The respondents were mainly Male with 77% (n=97) and only 23% (n=29) Female. The range of age for the respondents was categorised into 5 which shows that most of the respondents are between 36 to 45 years old (n=67, 53.2%), followed by those 25 to 35 years old (n=40, 31.7%) and least number of respondents are from age 556 years old and above (n=2, 1.6%). According to Julie et al (2017), a range of literature claims that age may reduce intention to use e-learning for increased performance in terms of technical leadership skills and managerial skills. However, Julie et al (2017) claimed that age is not a significant factor and supports other recent literature, arguing for a more informed discussion around the learning needs of older workers.

As for the educational background, 89.7% (n=113) of the respondents have an education level bachelor's degree and the rest have certification master's holders 10.3% (n=13) of respondents. Besides that, for years of employment, the respondents working experience varies from those who are working less than 5 years (n=25, 19.8%), 6 to 10 years (n=14, 11.1%), 11 to 20 years (n=71, 56.3%), 21 to 30 years (n=13, 10.3%) and the lastly the maximum number of years of working experiences is 31 years and more (n=3, 2.4%). Moreover, most of the respondents are permanent staff (n=110, 87.3%) and the least number of respondents are contract staff (n=16, 12.7%).

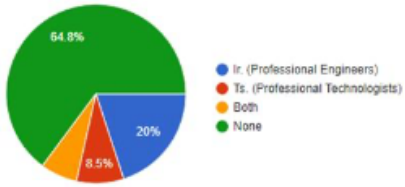

Figure 2. *Other Qualifications*

The findings shown in Figure 2 above, as for other qualifications, most respondents don't have Ir. and Ts. (n=82, 65%) and the rest have Ir. and Ts. (n= 44,35%).

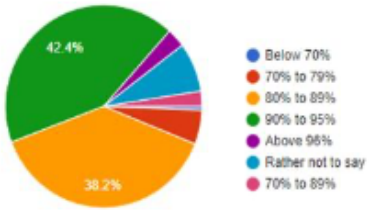

Figure 3. *Key Performance Index (KPI) Achievement*

Lastly, the respondents get the highest KPI at 2.4% (n=3), the second at higher 43.7% (n=55), the third higher at 39.7% (n=50), and the rest get below 79% of KPI and rather not say 14% (n=18).

4.6.2 Mean and standard deviation score

The sample for this study was 126 engineers at all positions and departments in Tenaga Nasional Sdn. Bhd (TNB). This study focuses on engineers who implement construction projects which are considered more in need of technical leadership skills and managerial skills. The information was gathered through online surveys sent via Google Docs and using SPSS version 26 for analysis. The results of the analysis of the mean scores for the independent and dependent variables in this study were presented in Table 10 below. It is found that the highest average score is the Performance of Engineers 3.3984, followed by Technical Leadership Skills of 3.435 and Managerial Skills of 3.2518.

Table 10. *Mean Score for Variables*

Variables	Minimum	Maximum	Mean	Standard Deviation
Performance of Engineers	2.00	4.00	3.3984	.4451
Technical Leadership Skills	2.50	4.00	3.435	.3863
Managerial Skills	1.91	4.00	3.2518	.4473

In the Dependent Variable (Performance of Engineers), the respondents respond well to question number D3 *"I believe Technical Leadership can improve the performance of engineers"* with an average value of 3.524 and a standard deviation of 0.517. This shows that more respondents agree that Technical Leadership Skills increased the performance of Engineers in TNB. In the 1st Independent Variable (Technical Leadership Skills), the respondents respond well to question number B3 *"I express confidence that goals can be achieved if working together"* with an average value of 3.571 and a standard deviation of 0.497. In conclusion, the technical leadership skills are satisfied working together. Working in a team needs better technical leadership skills to achieve the organisation's goal.

Ultimately 2nd Independent Variable (Managerial Skills) consists of eleven (11) questions. The respondents responded well to question number C11 *"I ensure compliance of project implementation with standards and regulations"* with an average value of 3.349 and a standard deviation of 0. 551. The findings of this research are, Managerial Skills are highly beneficial. More respondents ensure during project implementation that they must follow the standards and regulations to get better results.

4.7 Assumption for Multiple Regression

This study uses multiple linear regression to understand the relationship between multiple predictor factors and a response variable. However, we must first ensure that five assumptions are met before performing multiple linear regression. Before performing multiple regression analysis, five assumptions must be met. Normality, linearity, multicollinearity, homoscedasticity, and residual independence are among the assumptions (Tabachnick & Fidell, 2007). Histograms, normal probability plots (P-P plots), scatter plots (including Q-Q plots and Q-Q scattering plots), and Durbin Watson statistics were used to test this assumption (Hair et al., 2006).

4.7.1 Normality test

Normality tests are a prerequisite for the inferential statistical method. These tests are performed to ensure that the data collected are normally distributed. One of the most popular methods to test normal distribution is to determine skewness and kurtosis. Skewness and kurtosis refer to the shape of the distribution and the internal data and the ratio, unimodal bell-shaped symmetry (Coakes et al, 2010). Normality can also be tested using methods such as the Kolgomorov-Smirnova and Shapiro-Wilk Test as illustrated in Table 11, histogram, and normal Q-Q plots (Figure 4) as well as the Skewness and Kurtosis Test (Table 12). Table 11 in this study demonstrated that if both values are greater than 0.05, the data collected has a normal distribution. Both tests show that the data distribution is normal when all items have statistical values of Kolgomorov-Smirnova and Shapiro-Wilk greater than 0.05.

Table 11. *Normality Test - Kolgomorov-Smirnova and Shapiro-Wilk Test*

Variables	Kolgomorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Performance of Engineers	.231	126	.000	.854	126	.000
Technical Leadership Skills	.192	126	.000	.893	126	.000
Managerial Skills	.205	126	.000	.889	126	.000

[a]Lilliefors Significance Correction

Table 12. *Normality Test – Skewness and Kurtosis*

Variables	Skewness	Kurtosis
Performance	-0.166	-1.029
Leadership Skills	0.482	-1.034
Communication Skills	0.279	-0.433

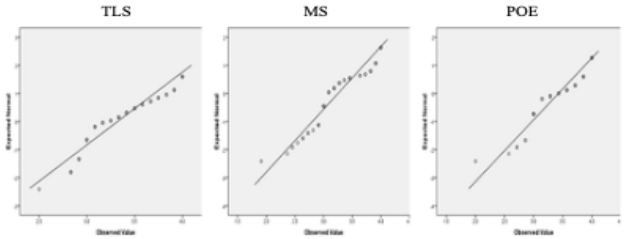

Figure 4. Normal Q-Q Plot Technical Leadership Skills (TLS), Managerial Skills (MS), and Performance of Engineers (POE)

4.8 Hypotheses Testing Using Multiple Regression

According to the summary table of the model above, two independent variables, Technical Leadership Skills, and Managerial Skills affect 48.7 percent of the variance (R square/(R2) coefficient of determination). This means that the variables Technical Leadership Skills and Managerial Skills predict 48.7 percent of the Performance of Engineers model as a set of predictors, while the remaining 51.3 percent is contributed by factors not included in the study. Overall, the Engineers' Performance confirms that the variables of Technical Leadership Skills and Managerial Skills affect 73.8 percent.

Table 13. *Multiple Regression*

Variables	Standardize Coefficients Beta	T	Sig
Technical Leadership Skills	.335	2.801	.006
Management Skills	.392	3.277	.001

Dependent Variables: Performance of Engineers

The first goal of this research was to determine whether there is a significant relationship between Technical Leadership Skills and Engineer Performance. Under this goal, a hypothesis was developed to test the direct relationship between Technical Leadership Skills and Engineer Performance. The first hypothesis is as follows:

H0: Technical Leadership Skills have a significant relationship with the Performance of Engineers. The results from the multiple regression analysis as shown in table 4.15 above show that Technical Leadership Skills have a significant relationship with the Performance of Engineers, with a mean value of $p<0.05 = 0.006$.

The beta coefficient of this relationship is $\beta = 0.335$ and the value $t = 2.801$. Therefore, H0 is ACCEPTED. Thus, Technical Leadership Skills are a variable that affects the Performance of Engineers.

The second goal of this research was to determine whether there is a significant relationship between Management Skills and Engineer Performance. Under this goal, a hypothesis was developed to test the direct relationship between Management Skills and Engineer Performance. Under this goal, a hypothesis was developed to test the direct relationship between Management Skills and Engineer Performance.

The second hypothesis is as follows:

H1: Management Skills have a significant relationship with the Performance of Engineers.

The results from the multiple regression analysis as shown in table 4.15 above show that Management Skills have a significant relationship with Management Skills, with a mean value of $p<0.05 = 0.001$. The beta coefficient of this relationship is $\beta = 0.392$ and the value $t = 3.277$. Therefore, H1 is ACCEPTED. Thus, Management Skills are a variable that influences the Performance of Engineers.

Table 14. *Hypotheses Result Summary*

Hypothesis	Result
H0: Technical Leadership Skills has a significant relationship with Performance.	Accepted
H1: Managerial Skills has a significant relationship with Performance.	Accepted

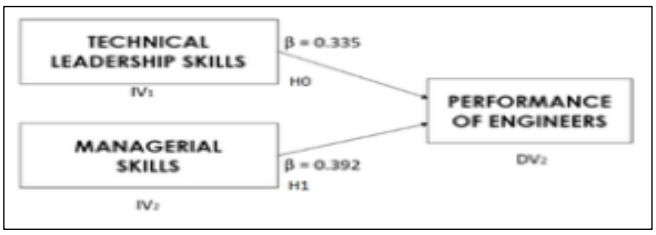

Figure 5. *Model of Multiple Regression for Technical Leadership Skills and Managerial Skills with the Performance of Engineers*

5. Conclusion

This section of the project report will explain and list down the results of the research conducted based on the items identified in Chapter one (1) which are research objectives and research questions. This research was conducted among the engineers in Tenaga Nasional Berhad (TNB), Malaysia, regarding A Study on the Relationship between Technical Leadership Skills and Managerial Skills in the Performance of Engineers. At the beginning of the research, a group of 30 employees has been selected randomly (pre and pilot-test) to identify the suitability, through reliability analysis which is explained in chapter three (3). Then, the questionnaires were developed before it was extended to the 208 respondents, and the collective result from 126 samples has been collected and analysed.

5.1 Recapitulations of Research Findings

The overall objective of this research is to comprehend the relationship between the independent variables (Technical Leadership Skills and Managerial Skills) and the dependent variable (Performance of Engineers). A total of 208 sets of questionnaires were distributed to the engineers and 126 questionnaires were collected and analysed, representing 78% participation. After the main data collection using google forms, this study conducted Common Method Variance (CMV) analysis, Data Cleaning Process, Factor Analysis, Correlation Analysis, Descriptive data (Mean and Standard Deviation), Assumption Multiple Regression Analysis (normality, linearity, multicollinearity, homoscedasticity, independence of Residual), Hypothesis Test ad Multiple Regression Analysis using employing SPSS software version 26. The result and data analysis in Chapter Four (4) indicated that all two (2) independent variables (Technical Leadership Skills and Managerial Skills) have significant relationships with the dependent variable (Performance of Engineers) to support hypotheses H1 and H2.

There were no missing data points, and 37 outliers were discovered out of 163 total respondents during the cleaning process phase. With a Cronbach Alpha value for the Performance of Engineers, the reliability test for all variables in this study has an excellent value. is 0.937, followed by Technical Leadership Skills at 0.913 and Managerial Skills at 0.947.

5.2 Discussion of Findings

Engineers are filling more managerial jobs every year because of contemporary technical and high demand for staff developments, such as promotions in utility industries. However, a key issue in the contemporary sector is that, because of the lack of experience, engineers are frequently regarded as unsuitable for management roles. Engineers' performance is influenced by insufficient management education during their studies, managerial skills, technical leadership abilities, interpersonal skills, personality, career orientation, and management awareness. Engineers were given questionnaires to fill out to get their thoughts on the relationship between Technical Leadership Skills Managerial Skills and Engineer Performance. Engineers at all levels are frequently unaware of the importance of technical leadership and non-technical qualities for success. They must demonstrate a positive attitude and the discipline that both hard and soft skills are required for long-term success.

The research was productively conducted among engineers of a utility company in Tenaga Nasional Berhad (TNB), Malaysia. The research was conducted to study the relationship between Technical Leadership Skills and Managerial Skills that influence the Performance of Engineers. Based on the literature review, a set of

questionnaires was established to identify the relationship between Technical Leadership Skills and Managerial Skills in the Performance of Engineers. From the developed questionnaires, a sum of 208 surveys was circulated and several 163 responses were collected and analysed. Since the primary data collection in this study is through the survey, thus the survey distribution method applied was through an online survey platform, email invitation-rich messages via messenger apps. The total respondents collected were 163 samples with a confidence level of 78%. The challenging experience in acquiring responses and answers from engineers is their disinclination to take part in the surveys and their worries about confidentiality issues concerning their personal information and data.

5.3 Research Implications

The purpose of this research was to determine how the relationship between Technical Leadership Skills and Managerial Skills influenced engineers in Tenaga Nasional Berhad (TNB), Malaysia. Furthermore, this research is experimentally collected to investigate the literature review in the Performance of Engineers. The following subheadings examine the implications of this study from a policy, theoretical, and managerial implications.

5.3.1 Research implication policy

According to the findings of this study. Management must effectively and successfully manage the company's owned and managed capital, such that the assets are significant, rare, unique, and non-replaceable, according to the findings of this study. The value of technical leadership and managerial skills in addition to engineer performance was shown in this study. Engineers can add value to their business experience by gaining knowledge and skills from extra education and experience, enabling them to adapt more quickly to a rapidly changing business environment, more effectively assess business issues, and improve their professional performance. The advantages of this study are that it may provide important guidance for developing a more effective future strategy for the utility sector, particularly in Malaysia. This research could be beneficial to other developed countries as well.

5.3.2 Research implication theory

Overall, this study found empirical evidence for theoretical linkages stated in the research framework. From a theoretical standpoint, the findings of this study provided some empirical support to the research framework. The relationship between Technical Leadership and Managerial Skills and the Performance of Engineers was established through this study.

5.3.3 Research implication managerial

Some managerial implications may be learned and developed because of this study. Human Resources could submit a proposal or work with top management to form and run engineering sessions to determine the best and most practical combination of effective human resource management practices, which can include Technical Leadership Skills and Managerial Skills that will contribute toward positive results in the Performance of Engineers. In addition, the human resource and manager should establish the competency of engineers. This may include ensuring an understanding of organisational policies, procedures, and activities concerning Technical Leadership Skills and Managerial Skill as to explore and expand via change management to increase the Performance of Engineers.

5.4 Limitations of The Study

There are two (2) limitations to this study as below:

i. The sample of the population was collected from Engineers in Tenaga Nasional Berhad (TNB), Malaysia. As a result, the study's findings may not apply to all Malaysian businesses. If larger samples were gathered, the results might have been different.

ii. The results' validity may be limited to the Malaysian electric utility company, Tenaga Nasional Berhad (TNB). The findings could be applied to other developing countries that are like Malaysia but not to other regions of the world. Aside from that, due to the specific characteristics of each sector, this research is limited to the utility industry and may not apply to other industries.

5.5 Recommendation to the Utility Company

Significant findings were obtained from this study on the relationships between Technical Leadership Skills of Managerial Skills in the Performance of Engineers in Tenaga Nasional Berhad (TNB), Malaysia. Nonetheless, the following recommendations for improvements for future research on the findings are made:

i. Using the discussion above, this study explained a few independent variables that influence Engineer Performance, such as Technical Leadership skills and Managerial Skills. However, more variables concerning Engineer Performance could be investigated. Other variables that may impact

Engineer Performance could be included in future research. Although Technical Leadership and Managerial Skills accounted for only 48.7% of the variance in Engineer Performance (R square / (R2) coefficient of determination), the remaining 51.3 percent is accounted for by other factors not included in the study. Future research should investigate the effects of financial skills (budgeting), IT skills (project management software, special applications, operating systems, and information systems), legal skills (general legal background, drafting contracts, trade unions, and public authority's industrial relations), and general skills (understanding of organisation control) on engineer performance.

ii. This study only looked at engineers at Tenaga Nasional Berhad (TNB) in Malaysia. As a result, the results cannot provide or represent a comprehensive picture of engineering performance in the state or country. As an idea, future research could be conducted with a larger sample size, perhaps among engineers in other Malaysian utilities.

iii. Further research should probably investigate how demographic differences such as gender, level of qualification, size and location of the organization, Key Performance Index (KPI) achievement, and work experience affect the performance of engineers. All these variables could be researched further for the future development of Malaysia's utility sectors and industries, particularly for the creation of successful engineers.

iv. Future research may use a qualitative approach, interviewing respondents who represent organisations about their strategies for achieving Engineer Performance in their organisations. Diverse perspectives and findings may help to support current conclusions reached through the application of various methodologies.

v. To improve the study, it is advised that future research include other types of employees, such as non-executive groups or technicians, to better understand their perspectives on Technical Leadership Skills and Managerial Skills in comparison to engineer groups. The results of their impressions can be compared and studied to come up with a viable approach for fully integrating Technical Leadership and Managerial Skills within the firm. Then it can be embedded as a culture for them.

vi. Finally, future research should investigate using different statistical tools to evaluate the data, such as SmartPLS and Structural Equation Model (SEM) to discover what may be more profound of its statistical values.

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The Authors:

Mohd Tajuddin Ismail, Engineer/Head of Zone Project Delivery (Eastern Zone) at Tenaga Nasional Berhad, Malaysia. E-mail: tajuddini@tnb.com.my.

Hafizan Matsom (https://orcid.org/0000-0002-5282-6141), Lecturer at School of Computer, Science, Faculty of Science, Engineering, and Agrotechnology, University College of Yayasan Pahang, Malaysia. Her research interest includes Computer Digital and Information System, Electronic Learning, Technology-Enhanced Education, Corporate Leadership, and Corporate Strategic Planning. E-mail: dr.hafizan@ucyp.edu.my.

Nor Aishah Hashim (https://orcid.org/0000-0002-9561-3672), Dean at Center for Continuing Education, University College of Yayasan Pahang, Malaysia. Her research interest includes Higher Education Performance, and Entrepreneurship. E-mail: noraishah@ucyp.edu.my.