

The Effects of Administrative Empowerment on Problem Solving and Decision Making Skills in the Engineering Department

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Abstract

Driven by the recurring defects in the engineering department, which result in rework that could affect on-time project deliveries and increase operational costs, this study explores the effect of administrative empowerment in terms of delegation of authority, continuous training, effective communication, and motivation on problem solving and decision-making skills. This also analyzes the differences in these skills based on individual profiles such as sex, age, tenure, personality, educational attainment, designation, and relevant trainings. A survey was conducted on engineers (individual contributors) within the engineering department where their nature of work requires solving problems and making decisions. The questionnaire has 37 total questions, of which 18 are relevant to administrative empowerment and 19 to problem solving and decision-making skills. A quantitative research design with a descriptive-causal approach was used, employing statistical techniques namely, multiple linear regression, ANOVA, Kruskal-Wallis, T-tests, and Mann-Whitney. The results show that delegation of authority is the only dimension of administrative empowerment that significantly affects problem solving and decision-making skills. Also, the study finds that there is a significant difference in problem-solving and decision-making skills when respondents are grouped according to sex, designation, and external local training. The study recommends that organizations foster a supportive environment for delegation through a more horizontal structure, targeted leadership development programs, and increased access to external local training, to improve problem solving and decision-making skills, contributing to enhanced organizational performance in the engineering department.

Keywords: administrative empowerment; problem solving and decision-making skills; individual profiles; delegation of authority; engineering

1. Introduction

1.1. Background of the Study

Rework involves repeating processes to bring products or services to compliance requirements. It has been considered a fundamental problem affecting operational productivity and financial performance. Studies have shown that rework leads to significant cost and schedule overruns, accounting for approximately 4.53% (USD 40,544) and 8.42% (one month delay), respectively of a one year USD 895,000 project contract (Al-Janabi et al., 2020). According to the book of Okes (2019) entitled, "Root Cause Analysis: The Core of Problem Solving and Corrective Action", many organizations are experiencing recurrence of the problems;

they remain unresolved despite the time and effort to implement improvement actions, which significantly impact the organization's performance, profitability, stakeholders, and standing in the industry. Problem solving and decision-making skills are vital and interconnected in addressing these challenges effectively, i.e., problem solving involves defining the causes to generate innovative ideas and solutions, while decision-making is about selecting the best option considering different factors such as resource, effort, impact, and timeline (Muhammad et al., 2021). Furthermore, this situation, coupled with today's extensive competition and challenges caused by globalization and constantly changing customer needs, as well as shifting technological and business environment, makes every organization strive to achieve the targeted profit level by focusing on their ability to have the right people, develop, and retain talent (Karim et al., 2019; Hongal & Kinange, 2020). The famous mantra of the companies over the years is "People are our greatest asset" as they can either build up or destroy the profitability of the company (Mahapatro, 2021; Karim et al., 2019). The employee skill level and flexibility have a strong and direct impact on employee performance (Diamantidis & Chatzoglou, 2019). The competence of the people is one of the major links to an organization's ability to leverage its success in the marketplace and is as valuable as financial assets (Liebowitz & Beckman, 2020). This is supported by the study results of Kareem & Hussein (2019), which found out that employee performance has a significant positive impact on organizational effectiveness.

With this, the top management considers the adoption of an administrative empowerment strategy instead of having a traditional democratic style, which increases employee empowerment, leading to effective problem solving and decision-making solutions (Al Nagggar, 2022). By empowering employees at various levels, organizations can harness insights and creativity in solving problems and making more informed decisions. The employees are accountable for every decision being made, which serves as a platform for driving the result of problem solving. This administrative empowerment strategy also enhances employee skills through learning by experience with independence at work to think and act (Al Maani et al., 2020). The concept of administrative empowerment is mainly focused on delegation of authority, which fosters trust and synergy across organizations; employee motivation in the means of decision-making involvement and the existence of motivating factors; enhanced skills through continuous training programs; and effective communication in such a manner that employees can understand crucial information relevant to business strategies, goals, and their performances (Lassoued et al., 2019).

Furthermore, according to Lassoued et al. (2019), administrative empowerment affects problem solving and decision-making skills. Problem solving and decision-making involve critical thinking to evaluate the overall situational and environmental factors to come up with the most efficient solutions to complete a task (Nielsen & Minda, 2019). Critical thinking skills include thorough analysis of the challenges, issues, and topics that maximize the approach in identifying alternatives that may work even in difficult circumstances that require decision-making (Turan et al., 2019). As also elaborated by Cahyo et al. (2020), decision-making comes from rational beliefs and reflective thinking that requires consideration in problem solving to determine the correct solution. Research conducted by Garate et al. (2023) shows the relationship between individual profiles and critical thinking as problem solving and decision-making skills.

Some manufacturing organizations are experiencing recurring defects where senior management observed ineffectiveness of root cause and corrective action (RCCA) analysis in the engineering department. This results in unresolved issues and unimproved performance. The Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis highlights the weakness in solving problems and decision-making, which is evident in various key performance indicators and compliance assessments. One of which is a major audit finding driven by the recurrence of the same nonconformity due to the ineffectiveness of corrective actions. Furthermore, the organization's performance report shows that after the implementation of a highly invested tool in quarter one, as the identified corrective action for a defect contribution at 50%, the mid-year Pareto of defect still shows 47% contribution of this defect, with the highest month at 70%. This signifies recurring issues in the organization even when action was taken.

These facts and literature highlight the human factor in solving issues, which requires administrative

empowerment that will create healthy, productive, and efficient business organizations (Harb et al., 2023). Therefore, this study aims to explore the effect of administrative empowerment in leveraging problem solving and decision-making skills and determine the skills differences by individual profiles. The researcher targets to create a program that may serve as input to organizations in generating programs that will improve problem solving and decision-making skills of their employees.

This research values the importance of establishing and enriching problem solving and decision-making skills of employees in the organization. Poor problem solving and decision-making skills may have significant consequences on business performance, such as operational inefficiencies, recurring quality issues such as defects and non-conformities, and stagnant innovation, which ultimately results in financial losses and competitive disadvantages. This study may be used by companies to highlight the benefits of administrative empowerment in leveraging problem solving and decision-making skills of their employees. This may encourage organizations to implement developmental programs, systems, or policies to increase potential in generating effective solutions and innovations to positively impact the organization's performance.

Also, benefits will apply to professionals in developing their skills and proficiency as it increases their confidence and credentials (Silva & Rosa, 2023). Furthermore, this study may contribute to Sustainable Development Goal 17: Partnerships for the Goals. According to the book of Conn & McLean (2018) entitled "Bulletproof Problem Solving" as cited in Khomokhoana et al. (2021), the challenges of the 21st century are increasing in scope and complexity due to the acceleration of technological and economic pace. An organization needs to solve problems and discover undefined problems to build a better world by meeting SDG 17 targets, such as strengthening science, technology, and innovation capacity.

1.2. Literature Review

The risks of unresolved problems that create waste and less adequate results are significantly impacting an organization's financial performance, as customers have a lot of other sources for their needs (Okes, 2019). Thus, organizations must have strong problem solving and decision-making with the aim of preventing problem recurrences and avoiding financial losses (Yue et al., 2023). Problem solving is simply the process of addressing organizational challenges and the key capability to navigate a higher level of change in the organization (Khomokhoana et al., 2021). Problem solving objective is to recognize business solutions to realize performance improvements (Heerkens & Van Winden, 2021). It is a systematic process to identify the problem, causal factors, and implement the best corrective actions (Yue et al., 2023). The structured approach to problem solving is the culmination of theoretical methodologies and analytical techniques that give reliable information on data analysis (van Blerk & van der Vyver, 2023). In solving problems, actions must not only stop the symptoms but rather eliminate root causes; without the correct root cause, there can be no effective solution to avoid recurrences of the problem (Andersen & Fagehaug, 2006, as cited in Zimmermann & Renaud, 2019). Such a powerful problem solving tool is root cause analysis, offering a systematic and holistic approach to relentless understanding and identification of causes, which is fundamental to solving and mitigating problems (Vo et al., 2020).

The framework of problem solving skills consist of observation and critical thinking skills to comprehensively analyze the gathered information and the ability to conceptualize, apply strategies, and synthesize to effectively find the solution (Rahman, 2019). In addition, the study of Yoon J., et. al. (2020) reveals that problem solving competency is higher for those engineers with higher literacy, numeracy, and work-related experiences. In this regard, there is a positive relationship between solving problems with technology and management skills (Ueki & Martínez, 2019). Also, the success of creative problem solving is influenced by both the fundamental nature skills of the people and the problem itself (Khalid et.al, 2020). While in consideration of problem solving to business, business performance is significantly affected by employee's skills in problem solving, technical, and interpersonal, which means it is essential for the business to holistically integrate relevant training for performance and a competitive economy (Adula et al., 2023).

This calls employers to demand skills in complex problem solving as the data from the World Economic Forum (2020) suggests.

Decision-making on problems and situations is a primary function of management. It is a chosen action, the most promising one, among a set of alternatives to achieve the desired result or deal with a business problem effectively. This includes consideration of the business environment and reliable information available (Muhammad et al., 2021). The decision-making process usually requires a lot of time to solve problems, but the dilemma is that only a little is being accomplished. This condition is given that people lack knowledge on how to do it effectively, and thus it is crucial to have fundamental knowledge in decision-making and elements of problem solving (Harvey et al., 2022). Addressing challenges needs decision-making where the basis of solution selection can be from previous experience or employ different ways. Making a decision is complex in nature considering the huge coverage impact, including the welfare of the organization, and it incorporates cognitive, emotional, and contextual factors (Garate, 2023 & Lupiáñez, 2024).

According to Ady and Mardiah (2024) the difference in individual profiles has an impact on the way, manner, and approach to problem solving and decision-making, and consequently differs in speed and interpretation of information, context of the problem, and quality of solutions. In terms of personality, introverts tend to think thoroughly before speaking, while extroverts clarify their thoughts by talking through them. Personal behaviors are influenced by their foundational ethical values, which are central to problem solving and decision-making (Škėrienė & Jucevičienė, 2020). Other profiles such as gender and age may influence decision-making preferences, with women often being more interpersonally-oriented and both age and gender affecting perceived decision-making abilities (Smith, 2020). Also, the differences in educational background, job level, and tenure may affect an individual's problem solving and decision-making practices (Garate et al., 2023).

While in terms of administrative empowerment, Asiri & Al Sharqi (2019) research outlines its effect on skills development of problem solving and decision-making by owning the responsibility for outcomes, communicating effectively, and applying appropriate methods as per the given situation. Al-bdareen (2020) defines administrative empowerment as a means of improving the confidence of individuals to overcome a sense of inability and incompetence. This is a journey in leveling up the ability to make decisions through working as a team with full engagement. Empowerment is strengthening the sense of value of employee contribution and importance in achieving the goals of the company by being involved in decision-making, having delegation of authority, responsibility to act in situations in the work environment, and participating in solving work problems (Vu, 2020). It also means providing control to employees and distributing responsibilities by accounting for the authority, obligation, and liberty to make decisions and solve problems (AlKahtani, 2021). The benefit of administrative empowerment is the organization can have optimal utilization of its resources in achieving its goals while increasing the job satisfaction of its employees (Al-Omari et al, 2020). The four common dimensions of administrative empowerment to operationalize and measure this concept are delegation of authority, continuous training, effective communication, and motivation (Lassoued et al., 2019).

According to Shah & Kazmi (2020), delegation serves as an opportunity for employees to demonstrate and develop their skills, confidence, and morale while elevating their sense of worth in the organization. This development includes being aware of the competency gap and addressing it through learning by doing (Bambang & Hardi, 2019). This is the journey where managers play their role, to unleash the potential of their employees and let them excel more in their fields by delegating authority to an area or task to practice and showcase this talent. The delegation of authority to lower-level reflects the management's capability to allocate tasks properly as per level, impact and scope, which enables employees to be involved in decision-making process and manage their responsibilities effectively (Al Maani et al., 2020). As the delegated tasks increase, the faster the enablement of the employee to the role, not only tactical tasks but also those that require critical thinking and initiative (Bambang & Hardi, 2019). The art of delegation is the interactive process of seasoned and developing professionals to achieve common beneficial goals. This increases the

efficiency and quality of professional development, resulting in effective decision-making and normalized capacity (Badjie, 2021). The study of Ugwa & Uyiokpen (2023) determined the significant impact of delegation of authority on organizational effectiveness and productivity, which also applies to each employee. This is a venue to engage where their interest is and bring their values into this workplace. It enhances their enthusiasm for their roles from the sense of fulfillment and can take pride in each small or huge accomplishment. Furthermore, the research conducted by Jusdienar et al. (2024) indicates that delegation of authority has a statistically significant impact on decision-making which is in line with Tanjung et al. (2023) findings. The realized organization benefits from delegation of authority roots from its proper planning and execution (Nkeobuna & Ugoani, 2020).

As for the dimension of training in administrative empowerment, Karim et al., (2023) highlighted that training is essential for employee growth, especially for those who lack the necessary knowledge, skills, and competencies to deliver what is expected. Training is a structured approach to address these gaps that allows employees to perform effectively in their respective roles and navigate challenging situations. Additionally, training boosts capabilities in a significant way by motivation while helping them become more organized and disciplined, ultimately impacting the overall performance of the organization. In a more focused sense, training equips employees with specific knowledge and skills that they can later apply in their work (Niati et al., 2021). In addition, the higher the level of training in interpersonal, problem solving, and technical skills, the more likely employees are to demonstrate strong commitment (Azam, 2023). Globally, training in interpersonal and problem solving skills is increasingly recognized as a crucial factor influencing the performance of industries (Elvis et al., 2023). The study of Zakii et al. (2023) mentioned that as a result of training, problem solving and technical skills improve employees' understanding of fundamental concepts, as well as their knowledge and decision-making abilities. Additionally, continuous training and tailored programs are highlighted as important factors in improving problem solving and decision-making skills (Kusakli & Sönmez, 2024).

Another dimension of administrative empowerment is effective communication. Communication is essential in this world to convey information, opinions, or emotions to others. Effective communication means the ability to be understood in any situation and environment by clearly communicating thoughts and aiming for effective solutions that benefit all relevant stakeholders (Mercader et al., 2021). This is the channel by which each industry requires it and can be through different platforms depending on what type of information needs to be communicated. Some barriers cannot be avoided, which distort the information (Oke, 2022). Communication within the organization is vital in maintaining employee engagement. This keeps the employees aligned with the business goals, makes them involved, and recognizes their part for a larger purpose (Ananna, 2024). Smith and Lewis (2022) suggest that consistent communication reinforces the trust of employees and management. Effective communication, problem solving, and decision-making are deemed necessary for continuous improvement of service quality (Arslan et al., 2022).

Last dimension of administrative empowerment is motivation. While the financial aspect is significant for employees, this cannot guarantee optimal employee motivation. Motivation is key in enhancing the drive of stakeholders to perform more effectively in their roles, which follows organizational growth and ultimately sustainable development (Kalogiannidis, 2021). Motivation is the force that drives individuals to pursue specific goals (Indahingwati et al., 2019). Motivated employees take greater advantage of development opportunities as they are more oriented towards autonomy and freedom (Demircioglu & Chen, 2019). Motivation is the existence of autonomy support, which means that organizational managers focus on decisions that promote employee well-being (Paais & Pattiruhu, 2020). The success of employee motivation is attributed to management's ability to properly implement its principles of communication, participation, recognition, delegation of authority, and reciprocity (Kuswati, 2020). Also, both internal and external motivators significantly influence decision-making (Wei, 2024).

1.3. Research Frameworks

This study is guided by two frameworks. First is the conceptual framework in Figure 1 from Lassoued et al. (2020) in their study entitled, “The impact of managerial empowerment on problem solving and decision making skills: The case of Abu Dhabi University”. Administrative empowerment is represented through the four main dimensions, including delegation of authority, continuous training, effective communication, and motivation. The data collected from 82 individuals revealed that administrative empowerment in terms of delegation of authority, continuous training, and effective communication significantly affects problem solving and decision-making skills, while motivation is not significant.

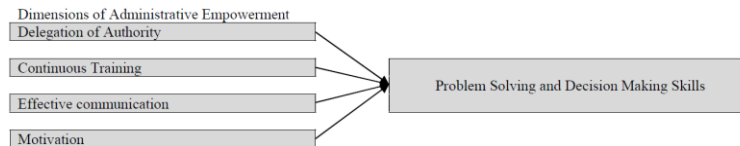


Figure 1. Conceptual Framework

Source: The impact of managerial empowerment on problem solving and decision-making skills: The case of Abu Dhabi University (Lassoued et al., 2020)

The second framework is the study of Garate et al. (2023) entitled, “Problem solving and decision-making skills of school administrators influenced by their individual preferences”. One focus of their study is the difference in problem solving and decision-making skills when grouped according to respondents’ profile variables (sex, age, ethnicity, civil status, computer literacy, personality type, number of eligibilities, highest educational attainment, academic rank, designation, number of years in the position, length of service, and relevant trainings). The locale is Nueva Vizcaya State University Bayombong and Bambang campus in the Philippines with 52 respondents. The result showed problem solving and decision-making skills only differ when respondents are grouped according to educational attainment and designation.

While the studies of Lassoued et al. (2020) and Garate et al. (2023) were conducted in academic settings, this research is pursued in the engineering department. Anchoring on the study of Garate, et. al which tested differences on the problem-solving and decision-making skills, this study extends the study of Lassoued et al. (2020) by exploring the differences in problem solving and decision-making skills when respondents are grouped according to sex, age, tenure, personality, educational attainment, designation, and relevant trainings. This study includes the profiles sex, age, tenure, personality, educational attainment, designation, and relevant trainings, due to its relevance to the engineering function. In the study of Garate (2023), the profiles of academic rank, eligibility, computer literacy, ethnicity, and civil status are in the context of academic university. This refers to professor rank, certification from Technical Education and Skills Development Authority (TESDA) and Alternative Learning System (ALS), and technical skills requirement as admin respectively. These were not considered in the current study considering its applicability. However, the number of years in the position is covered in length of service. The operational framework of this study is shown in Figure 2.

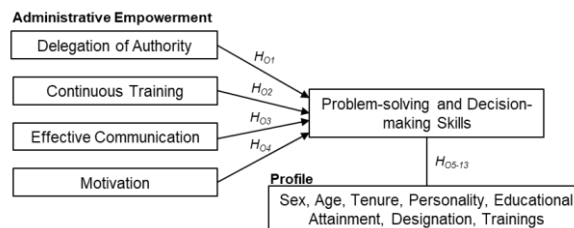


Figure 2. Operational Framework

This study defines problem solving and decision-making skills as the ability to systematically analyze issues being encountered by the engineers on their technical work scope, define contributing root causes and solution alternatives, and decide the solution to execute. It involves the application of appropriate methods to assess thoroughly the advantages, disadvantages, resources, and overall cost of each alternative to come up with decisions as per goals and objectives. This study focuses on the effect of four dimensions of administrative empowerment on problem solving and decision-making skills namely delegation of authority, continuous training, effective communication, and motivation. Administrative empowerment specifically refers to management giving its employees authority, trust, flexibility, and resources to perform tasks independently while promoting personal development through training and open communication. It also emphasizes adequate recognition, fair compensation, and transparent decision-making process to ensure employees feel valued and motivated. Furthermore, the dimension of delegation of authority signifies that the administration is allowing its people to perform specific tasks, own the responsibility, and make decisions. It involves trust and confidence in the employee's skills and abilities to drive results effectively. Another dimension is continuous training which means that the organization supports employee skills development by providing learning opportunities such as classroom or online training, learning by doing, and cross-collaboration. This includes platforms relevant to their roles in making employee skills improved and updated as per business demand. On the other hand, effective communication is defined as the availability of clear and accessible information within the organization. It ensures that instructions and procedures are easily understood which enables alignment and effective decision-making. The last dimension is motivation, it is described as the outcome of providing motivators to employees such as giving rewards and recognition that are equivalent to the efforts and performance of the employees to make them feel appreciated, valued, and empowered to be involved in decision-making.

In addition, this study includes determining the existence of significant differences in problem solving and decision-making skills when respondents are grouped according to sex, age, tenure, personality, educational attainment, designation, and relevant trainings. The sex profile refers to the biological characteristic, i.e. male or female. The age is categorized into four groups: 24-34, 35-44, 45-54, and above 54. While tenure is the total number of working experiences, if 0-2 years, 3-7 years, 7-10 years, and above 10 years. In terms of personality types, the profiles are grouped according to introverts, who tend to be quiet, reflective, and reserved; extroverts, who are usually more outgoing, assertive, and sociable; and ambiverts fall somewhere in between these two extremes. Another profile is the highest educational attainment clustered to college, master's and doctorate. The designation is the job level position of engineers that includes Engineer I as entry level, Engineer II as junior level, Engineer III as senior level, and Engineer IV as principal level. Lastly, the training profile is the type of problem solving and decision-making training, i.e. internal, external local, and external international.

1.4. Objectives of the study

This study explored the effects of administrative empowerment in enhancing problem solving and decision-making skills and determined the skills differences by individual profiles. Specifically, it intended to achieve the following:

1. to describe the profiles of the respondents in terms of sex, age, tenure, personality, educational attainment, designation, and relevant trainings;
2. to describe the status of administrative empowerment in terms of delegation of authority, continuous training, effective communication, motivation, and problem solving and decision-making skill in engineering department;
3. to determine if administrative empowerment in terms of delegation of authority, continuous training, effective communication, and motivation significantly affect problem solving and decision-making skills;

4. to determine if problem solving and decision-making skills are significantly different when respondents are grouped according to sex, age, tenure, personality, educational attainment, designation, and relevant trainings; and
5. to develop a program that will improve problem solving and decision-making skills of employees.

1.5. Hypotheses

The following hypotheses were tested in the study:

- Ho1: Delegation of authority has no significant effect on problem solving and decision-making skills.
- Ho2: Continuous training has no significant effect on problem solving and decision-making skills.
- Ho3: Effective communication has no significant effect on problem solving and decision-making skills.
- Ho4: Motivation has no significant effect on problem solving and decision-making skills.
- Ho5: Problem solving and decision-making skills does not significantly differ when respondents are grouped according to sex.
- Ho6: Problem solving and decision-making skills does not significantly differ when respondents are grouped according to age.
- Ho7: Problem solving and decision-making skills does not significantly differ when respondents are grouped according to tenure.
- Ho8: Problem solving and decision-making skills does not significantly differ when respondents are grouped according to personality.
- Ho9: Problem solving and decision-making skills does not significantly differ when respondents are grouped according to educational attainment.
- Ho10: Problem solving and decision-making skills does not significantly differ when respondents are grouped according to designation.
- Ho11: Problem solving and decision-making skills does not significantly differ between the respondents with and without internal training.
- Ho12: Problem solving and decision-making skills does not significantly differ between the respondents with and without external local training.
- Ho13: Problem solving and decision-making skills does not significantly differ between the respondents with and without external international training.

2. Methodology

2.1. Research design

This study used a quantitative approach of descriptive-causal to systematically collect and analyze various administrative empowerment and individual profiles to outline prevalence and distribution across the engineering department. Using descriptive design, this research describes the profile, administrative empowerment, and problem solving and decision-making skills of the employees. While using causal design, this research determines the effect of administrative empowerment on problem solving and decision-making skills and test the difference in problem solving and decision-making skills when grouped according to each individual profile.

2.2. Locale of the Study

The survey was conducted within the engineering department of Company A. This is in consideration of the engineering nature of the complex lifecycle that heavily involves human input, which is highly susceptible

to defects. Currently, Company A is experiencing an average rework rate above the target. While the reduction of these defects is challenging, this industry is striving for efficiency to improve the bottom line from the reduction of its operational expenses, which includes rework costs (Alogla & Alruqi, 2021). Also, given that it has immediate practical relevance where results can be directly applied to improve processes, policies, or strategies within the organization.

2.3. Respondents of the Study

The respondents of the study were engineers (individual contributors) within the engineering department, where their nature of work faces concrete problems and decisions in their roles that require solving problems and making decisions. They were the targeted respondents given their direct engagement in problem solving and decision-making regularly as part of their daily responsibilities. Their immediate and hands-on experiences offered rich and authentic data for the intent of this study and understand how these skills are used in practice.

2.4. Sampling Design

The proportional stratified random sampling was used to collect data per engineering department. It is a method in which the sample size from each stratum is selected in proportion to the size of that stratum in the total population. G*Power result with effect size $f=0.25$, α err = 0.05, and power = 0.80, the sample size is 180. The study of Serdar et al. (2021) emphasizes that power of 0.8 is ideal for a study to detect effects. A random sampling from the list of employees and consideration of team; population over total employees, the following distribution was observed: a) design (99); b) manufacturing (43); c) project (11); and d) certification (27) engineering department to satisfy the required sampling size of 180.

2.5. Research Tools and Instruments

The study adapted the questionnaire from Lassoued et al. (2020) which comprises 19 questions in administrative empowerment, where items 1-5 are for delegation of authority, 6-10 for training, 11-14 for effective communication, and 15-19 for employee motivation. Further, there are 18 questions in problem solving and decision-making skills. The questions use a Likert scale to assess the opinions of the respondents. The given scale is 1-5, 1 as strongly disagree and 5 as strongly agree. The researcher used both online and offline (printed form) platforms to send out the questionnaires to the target respondents of this study. The questionnaire includes a section of brief survey information about the researcher, thesis topic, purpose, and ethical considerations such as confidentiality and consent. The following survey sections are demographics, administrative empowerment, and problem solving and decision-making skills.

The study used Cronbach's Alpha coefficient to determine the reliability of measurement tools. This ensures that the measurement tool used to assess administrative empowerment about problem solving and decision-making skills, as well as the test of differences in individual preference, has yielded consistent and stable results over time. The pilot test of the measurement tool with 30 respondents resulted in a Cronbach's Alpha of 0.975, which indicates that the instrument is reliable for use in the study. It is also identified in each questionnaire per variable. The resulting Cronbach's Alpha for delegation of authority, continuous training, effective communication, motivation, and problem solving and decision-making are 0.926, 0.943, 0.940, 0.909, and 0.933 respectively.

2.6. Data Analysis and Interpretation

This study used descriptive analytics of frequency and percentage to describe the profiles of the respondents in terms of sex, age, tenure, personality, educational attainment, designation, and relevant training. While mean and standard deviation were used to describe the status of each administrative empowerment and problem solving and decision-making skills. Table 1 shows the interpretation of means.

Table 1 Verbal Interpretation of Variables

Mean Ranges	Interpretation
1.00-1.49	Poor
1.50-2.49	Fair
2.50-3.49	Average
3.50-4.49	Good
4.50-5.00	Excellent

Multiple linear regression analysis was used to determine if administrative empowerment in terms of delegation of authority, continuous training, motivation, and effective communication significantly predicts problem solving and decision-making skills. A *p-value* of <0.05 indicates a significant effect. Further, the *standardized beta coefficient* identifies which among the four dimensions of administrative empowerment has the greatest contribution to problem solving and decision-making skills. ANOVA, Kruskal-Wallis, T-test and Mann-Whitney were used to determine if problem solving and decision-making skills are significantly different when respondents are grouped according to individual profiles. A *p-value* of <0.05 indicates significant differences.

2.7. Ethical Considerations

The study follows the ethical guidelines by Institution's Research Ethics Review Committee (RERC) to ensure the research process adheres to key principles of ethics and integrity. Approval to conduct the survey is secured from the Legal and Ethics, Operations Engineering, and Engineering Director of Company A. The survey respondents are informed of their participation consent accompanied by a clear explanation of the study's scope and purpose to have an informed decision about their participation. It also emphasizes voluntary participation which allows individuals to withdraw at any time without consequences. Any data collected was destroyed upon withdrawal. It also ensures the privacy and confidentiality of the data by collecting the data anonymously and storing data with security to protect the identity of the individuals. The research findings were disseminated responsibly, ensuring that participants contribute positively to the body of knowledge in this field of study. Additionally, ethical considerations are continuously monitored and make necessary adjustments to the uphold welfare of the participants. This commitment to ethical research guidelines reinforces the study's integrity and credibility, fostering trust among stakeholders.

3. Results and Discussion

3.1. Profiles of the respondents in terms of sex, age, tenure, personality, educational attainment, designation, and relevant training

Table 2 presents the profile of the 180 respondents according to seven groups. In terms of sex, the majority of the respondents are male, accounting for 68.9%, while female is 31.1%. For the age group, most of the respondents are between 24 to 34 years old representing 67.8%, followed by 35 to 44 years old at 30%, and a smaller proportion from 45 to 54 years old at 2.2%. While for tenure, the greater population is 0 to 2

years at 41.7%, while 27.2% have 8 to 10 years work experience, 22.8% have 3 to 7 years, and 8.3% have above 10 years. This can be considered a young demographic and most participants are relatively beginners to the company. When it comes to personality, the majority of the respondents identified themselves as ambivert, comprising 53.9%, while introvert is 30.6% and extrovert is 15.6%. This may be due to the nature of engineering work that requires a deep focus on designing and analyzing while also involving team collaboration and presentation. In terms of educational attainment, a vast majority are college graduates, accounting for 98.3%, while MBA graduates are 1.7% only. For the designation, respondents are primarily Engineer II level at 55.6%, followed by 30% Engineer I, 11.1% Engineer III, and 3.3% Engineer IV. This can be attributed to the need for mid-level proficiency and experience typically required in engineering roles. Lastly, in terms of training, the total number of responses is 170, which is lower than the total number of respondents (180), as some respondents indicated that they had not attended any of the three training options. Moreover, out of all the responses, 71.8% had internal training for problem solving and decision-making, while 22.4% had external local training, and 5.9% had external international training. This suggests that the organization is actively investing in employee development and ensuring that learning opportunities are readily accessible within the workplace.

Table 2 Profiles of the Respondents

Profile	Group	Frequency	Percent
Sex	Male	124	68.9
	Female	56	31.1
Age	24 to 34 yrs old	122	67.8
	35 to 44 yrs old	54	30.0
	45 to 54 yrs old	4	2.2
Tenure	0 to 2 yrs	75	41.7
	3 to 7 yrs	41	22.8
	8 to 10 yrs	49	27.2
	Above 10 yrs	15	8.3
Personality	Introvert	55	30.6
	Ambivert	97	53.9
	Extrovert	28	15.6
Educational Attainment	College Graduate	177	98.3
	MBA Graduate	3	1.7
Designation	Engineer I	54	30.0
	Engineer II	100	55.6
	Engineer III	20	11.1
	Engineer IV	6	3.3
Training	Internal	122	71.8
	External Local	38	22.4
	External International	10	5.9

3.2. Status of administrative empowerment in terms of delegation of authority, continuous training, effective communication, motivation, and problem solving and decision-making skill in engineering department

Table 3 presents the data on respondents' perception of administrative empowerment in terms of four dimensions. Based on the result, delegation of authority can be interpreted as Good with a *mean* score of 4.11 and a *standard deviation* of .56772, which means respondents perceive a good level of delegation of authority in their roles. This result can be attributed to the response of usually agreeing involving delegation of authority questions with the highest *mean* on administration authorizing the respondents to perform their job well. In terms of the continuous training dimension, respondents positively view the support and effort of the organization in providing growth opportunities with a *mean* score of 3.83 and a *standard deviation* of .59238, but slightly less than delegation of authority. While the respondents generally agree that the organization provides training and encourages learning exchange, there is a weaker perception of a clear training plan. For effective communication, the *mean* score is 3.70 and a *standard deviation* of .63041 which means respondents perceive good communication within the organization. However, aspects such as clarity of instructions and information systems have relatively lower *mean* scores. Lastly, with regards to motivation, the 3.55 *mean* score and .68433 *standard deviation* indicate a generally good perception but are the lowest among the four administrative empowerment dimensions. This can be attributed to the average *mean* score for salary satisfaction and fairness of the promotion system.

Table 3 Status of Administrative Empowerment's Four Dimension and Problem solving and Decision-making Skills

Variable		Mean	Std. Deviation	Interpretation
Administrative Empowerment's Four Dimension	Delegation of authority	4.11	.56772	Good
	Continuous training	3.83	.59238	Good
	Effective communication	3.70	.63041	Good
	Motivation	3.55	.68433	Good
Problem solving and decision-making skills		4.06	.44087	Good

Furthermore, problem solving and decision-making skills can be interpreted as Good with a *mean* score of 4.06 and a standard deviation of .44087. Most respondents leverage ideas, suggestions, and data in problem solving and decision-making. The respondents also have good skills in analyzing problems using the gathered information. Further, the respondents utilize systematic methods and apply a structured approach to problem solving and decision-making to come up with the best alternative to implement. On the other hand, the motivation in dealing with problems and early anticipation of these problems have the lowest *mean* score.

3.3. Effect of administrative empowerment in terms of delegation of authority, continuous training, effective communication, and motivation on problem solving and decision-making skills.

In Table 4, the data shows the effect of administrative empowerment on problem solving and decision-making skills. It reveals that continuous training shows a positive effect on problem solving and decision-making skills, with a *standardized beta* of 0.145. However, the *p-value* is 0.097, which means the effect is not significant. This result opposes the findings of Puccio (2020) and Siebert (2021) that continuous training has a significant effect on problem solving and decision-making. Similarly, effective communication has a positive effect but is not statistically significant, with a *standardized beta* of 0.174 and *p-value* of 0.073. Ahmad & Chowdhury (2022) imply that effective communication has a linear relationship with problem solving and decision-making, as inaccurate information leads to misperceptions that influence the analysis of the problem. Conversely, motivation exhibits a negative and not significant effect on problem solving and decision-making skills, with a *standardized beta* of -0.081 and a *p-value* of 0.383. This result supports the findings of

Aigbogun et al. (2024) that in terms of motivation, it shows that external motivation does not influence problem solving skills. Overall, the result indicates that actions related to continuous training, effective communication, and motivation has no significant effect on improving problem solving and decision-making skills in the engineering department.

Table 4 Effects of Administrative Empowerment on Problem solving and Decision-making Skills

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.125	.227		9.384	.000
Delegation of Authority	.305	.059	.393	5.169	.000*
Continuous Training	.108	.065	.145	1.666	.097
Effective Communication	.122	.068	.174	1.803	.073
Motivation	-.052	.060	-.081	-.874	.383

a. Dependent Variable: Problem solving and decision-making skills

b. $R = .551$; $R^2 = .304$; $F = 19.102$; $Sig. = .000$

*Significant

On another note, the administrative dimension of delegation of authority shows a positive and statistically significant effect on problem solving and decision-making skills with a *p-value* of .000 and the highest *standardized beta coefficient* of .393, indicating the greatest contributor among the four dimensions of administrative empowerment. This suggests that as delegation of authority increases, problem solving and decision-making skills also tend to increase. This finding supports the study of Ali et al. (2021), Hassan Alhosani (2022), and Jusdienar (2024) which also reveals that delegation of authority has a significant effect on decision-making skills. Delegation has a strong linkage to empowerment such as participation in decision-making on solving issues (Harb, 2023). The study of Hassan (2023) shows a statistically positive correlation of empowerment on problem solving abilities. Mathebula & Barnard (2020) concluded that delegation of authority enables employee participation in solving problems and administrative decisions, and their study result suggests the practice of increased delegation of authority. This can be guided through a training and development program to effectively enhance the abilities and skills of employees (Mrunali & Pathak, 2021; Abid, 2021).

3.4. Difference in problem solving and decision-making skills when respondents are grouped according to sex, age, tenure, personality, educational attainment, designation, and relevant trainings

The statistical analyses using Kruskal-Wallis, ANOVA, Mann-Whitney, and T-tests were conducted to compute differences in problem-solving and decision-making skills among respondents grouped by age, tenure, personality, educational attainment, and participation in internal or external international training. The findings presented in Table 5 show no statistically significant differences, with *p-values* of .443, .314, .815, .315, .095, and .100, respectively. On the other note, using the T-test and Kruskal-Wallis, there is a significant difference in problem solving and decision-making skills when respondents are grouped according to sex, designation, and external local training with *p-values* of .000, .048, and .048 respectively. The result shows that males have a greater *mean* score than females with a difference of .25918.

Table 5 Differences in Problem Solving and Decision-making Skills of the Respondents When Grouped according to Nine Profiles

Profile	Groupings	Mean	Mean Rank	t-value/ F-value	Chi-Square/ Mann-Whitney U	p-value
Sex	Male	4.141 1	-	3.785	-	.000*
	Female	3.881 9	-			
Age	24 to 34 yrs old	-	87.48	-	1.630	.443
	35 to 44 yrs old	-	95.76			
	45 to 54 yrs old	-	111.63			
Tenure	0 to 2 yrs	4.114 1	-	1.193	-	.314
	3 to 7 yrs	3.953 9	-			
	8 to 10 yrs	4.059 0	-			
	Above 10 yrs	4.088 9	-			
Personality	Introvert	4.039 4	-	.205	-	.815
	Ambivert	4.059 6	-			
	Extrovert	4.105 2	-			
Educational Attainment	College Graduate	-	91.01	-	176.000	.315
	MBA Graduate	-	60.67			
Designation	Engineer I	-	79.87	-	7.888	.048*
	Engineer II	-	90.15			
	Engineer III	-	117.10			
	Engineer IV	-	103.33			
Internal Training	No Training	3.980 8	-	-1.680	-	.095
	With Training	4.098 4	-			
External Local Training	No Training	4.027 0	-	-1.987	-	.048*
	With Training	4.185 7	-			
External International Training	No Training	4.047 4	-	-1.653	-	.100
	With Training	4.283 3	-			

*Significant

This implies that there is a statistically significant difference in problem-solving and decision-making skills between males and females, with males exhibiting better problem-solving and decision-making skills. Also, the result shows that a higher level of designation, Engineer III to IV, has greater problem solving and decision-making skills than Engineer I and II. Lastly, the finding reveals that among the three types of training, external local training is the only one that has a statistically significant difference in problem-solving and decision-making skills ($p\text{-values} < .05$).

4. Conclusion and Recommendation

In conclusion, respondents generally perceive the organization positively in terms of delegation of authority, continuous training, communication, and motivation. However, some areas could benefit further attention, particularly related to salary satisfaction and promotion system. In terms of problem solving and decision-making skills, most respondents rated it positively, with the highest ratings given to the ability to gather information, consider alternatives, and adopt systematic approaches. On the other side, there is a slight area for improvement in anticipation of problems and the identification of solutions early in the process.

Furthermore, the only administrative empowerment dimension that has a significant effect on problem solving and decision-making skills is the delegation of authority. Therefore, the study rejects H_{01} . On the other hand, the other administrative empowerment dimensions of continuous training, effective communication, and motivation have no significant effect. Therefore, the study failed to reject H_{02} , H_{03} , and H_{04} . This implies that when engineers are given more authority and responsibility, they are likely to develop stronger problem solving abilities and make more effective decisions.

In addition, the result also reveals that problem solving and decision-making skills significantly differ if respondents are grouped according to sex, designation, and external local training. Therefore, the study rejects H_{05} , H_{010} , and H_{012} . The skills are greater for males and for those with the engineering designation of Engineer III-IV. The results could also point to potential inequities in how problem-solving and decision-making opportunities are distributed in the workplace. It also indicates that employees in lower-level positions may need additional support or training to develop similar competencies. This finding highlights the importance of experience and role expertise in enhancing these skills. While the result also suggests that problem solving and decision-making skills does not significantly differ if respondents are grouped according to age, tenure, personality, and educational attainment. Therefore, the study failed to reject H_{06} , H_{07} , H_{08} , and H_{09} . This may indicate that these profiles do not appear to influence how employees perform problem solving and decision-making.

Based on these results, it is recommended to foster delegation of authority within the organization. It is important to create a supportive environment that encourages both managers and employees to embrace delegation as an opportunity for growth. Nevertheless, attention is recommended to be given when selecting employees for delegation, ensuring they are equipped with the necessary skills and experience. By offering targeted leadership training and workshops, mentorship and coaching programs, clear performance metrics, strong feedback system, and a succession plan, organizations can improve the overall effectiveness of delegation. The programs are suggested to be tailored to the identified skills gap of the employees. In turn, this will enhance problem solving, decision-making, and overall performance across the organization.

Furthermore, the fact that external local training correlates with better skills, it emphasizes the importance of investing in employee development programs. It would be best for organizations to offer more external local training opportunities to improve problem-solving and decision-making skills. Also, the organizational structure could be redefined to be more horizontal rather than hierarchical, enabling employees to gain certain authority and specialization and demonstrate their skills in ways that contribute to the growth of the organization. The assessment to the current hierarchy will define the guiding principles like autonomy and transparency to shift toward a horizontal structure. This shift includes the change in traditional management layers to empowered cross-functional teams, implementation of skill-based authority systems, reinforcement of managerial role as mentor, and use agile practices and collaboration tools.

In line with the recommendation, the proposed program of this study uses the six-level delegation model (see Figure 3) where associated training and experience opportunities are accessible to all.

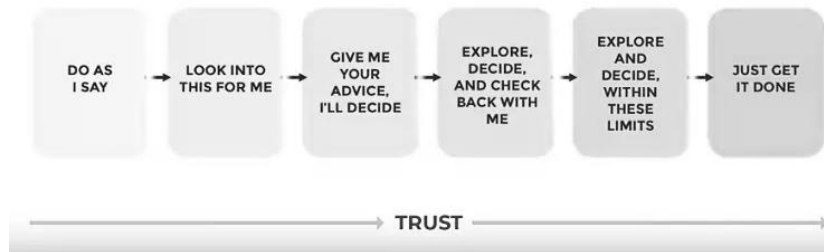


Figure 1. The 6 Levels of Delegation

Source: How to delegate effectively with these 6 levels of delegation (Rigby., 2021)

Additional support is provided to employees at lower-level designation to build strong problem solving and decision-making skills. This program empowers employees at all levels through guided task delegation, mentorship, and hands-on experience. It promotes accountability, equity, and clarity to support the confidence and capability growth of the employees. The program is designed to have a customized development plan as per needs assessment and includes problem solving and decision-making training and journals, regular feedback through mentorship structure, targeted task allocation by delegation level, and progression evaluation.

5. Limitations of the Study

This study is limited to the engineering department and non-managerial engineers within a single organization. This sample may not represent the broader population of engineers in different industries and other functional departments. It may have administrative empowerment variations even within the same organization, which may influence the results. In addition, the focus of the study is the effect of four specific dimensions of administrative empowerment – delegation of authority, continuous training, effective communication, and motivation. Other potential factors, such as organizational culture or leadership styles, are not included in the analysis, which may also have an effect on problem-solving and decision-making skills.

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