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MANAGERIAL COMPETENCIES AS A BAROMETER FROM CONSTRUCTION PROJECT MANAGERS'S PERSPECTIVE

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Abstract

The Construction Industry faces a significant gap in the managerial competencies of Construction Project Managers (CPM) towards project performance. The identification of a competent project manager is essential as it contributes towards economic growth and the achievement of the current Sustainable Development Goals (SDGs). This research aims to determine the core managerial competencies from the CPM's perspective. Specifically, to achieve the aim of this research it comes with two (2) objectives, which are to identify the managerial competencies and to determine the core competencies required by CPM. The research method adopted was a quantitative approach via structured questionnaire survey. Based on research findings, it establishes the core managerial competencies which are knowledge, skills, and attitude as a crucial barometer for CPM led to a positive impact on the help of Machine Learning (ML) toward project performance. The contribution of this research is imperative and can serve as reference benchmarking for CPM.

Keywords: Managerial Competencies, Construction Project Managers (CPM), Machine Learning (ML), Competencies Benchmarking, Project Success.

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INTRODUCTION

In the Construction Industry nowadays, managerial competencies are indeed synonymous with project performance (S, 2023) which becoming the focus is to lead to higher efficiency and more effective performance towards SDGs 9 adopted by The United Nations (UN) in 2015 agenda. The effective culture of the current CPM's managerial competencies scenario is significantly reflected in the UN, SDGs. Sustainable development is all the rage and Malaysian Construction too has been quick to jump on the bandwagon, especially with regards to their effective culture (Ineza, 2022) and efficient technology initiatives. To evaluate the project success which of business in any organization depends on its organizational culture (Osodlo, 2021). In this research, a pilot study has been conducted to determine whether managerial competencies as a critical barometer for Project Managers in the Construction Industry are indeed feasible. Absolutely, integrating managerial competencies with an understanding of the specifics of culture can greatly enhance communication effectiveness, foster technology innovation, and ensure compliance with the Construction Industry Competency Standard (CICS). The key factor is to identify the critical core competency governed by the CIDB, particularly in the CICS, which is best suited for the needs of the industry. In addition, managerial competencies concerned in the construction industry will need more robust competency (Osodlo, 2021) as opposed to the competency needed for other industries. Any misfits would be detrimental to the whole process and would result in project delays (Tariq, 2022).

LITERATURE REVIEW

Managerial Competencies for Construction Project Managers

In this study, the following definition of competency is best suited to fulfil the scope of the whole study within the context of managerial competencies. Taking the cue from this definition of competency, which is, "the state of having sufficient quality knowledge, skills and experience, positive mental attitudes and physical soundness to perform a particular task as expected'. (Ineza, 2022) This research will explore in detail the core competencies required from the perspective of Project managers. Competency is a set of related knowledge, attitudes, skills, and other personal characteristics that influence a significant part of the work that they performed. It correlates with job performance (Nik Sarina et.al, 2023), can be measured against well-accepted standards, and improved through training and development. A person's competencies include personality traits, knowledge, skills, experience, and are supported by motivation, and self-esteem related to functioning in a group. Competencies can be divided into two basic groups, i.e., hard and soft competencies. Hard ones relate to a specific job position. They are defined as technical and functional competencies. On the other hand, soft competencies are personality traits contributing to given professional roles (behavioural, social, interpersonal). Hence, competency is the ability of a

person, team, or company to mobilize and combine resources (i.e., knowledge, skills, and attitudes) to act in each situation (Jesperson, et. al.., 2021). Challenges such as problem-solving, conflict-handling, negotiating, and communicating effectively are some of the competencies managers must be able to deal with confidence. Not only they must be competent in one aspect of the job, but they must be competent in many other aspects as well. The only way to ensure this is for managers to be equipped with multiple competencies with promising advance (Hafez et.al.,2023) by their position. The findings of researchers discovered that managerial competencies, including attitudes that project managers possess, do have a significant impact on project performances (Xiang et al., 2018).

Core Competencies for Construction Project Managers

Numerous studies have demonstrated that project teams must implement universally accepted standards and practices in order to achieve CPM success. (Stanleigh, 2010; Ahadzie et al., 2009; Crawford, 2005; 1998). However, there is an empirical indication that project team members tend to struggle in coping with the needed level of job and task performance in their project roles and management capabilities (Stanleigh, 2010; Ahadzie et al., 2009). This development tends to affect the ability of project team members to perform and deal effectively with their broader functions of creating a CPM culture within the necessary to produce the desired performance outcome (Stanleigh, 2010; Enshassi, Mohamed, and Abushaban, 2009). A project team PM-based environment (Skipper and Bell, 2008). This often leads to managerial inefficiencies, team ineffectiveness, and project failures (Enshassi, Mohamed, and Abushaban, 2009). It is therefore imperative that project managers possess the critical benchmark standard that requires them to perform efficiently and effectively. Discharging their responsibilities by trial and error rather than by competencies should be a thing of the past. Most researchers such as Ahadzie et al., (2009) agree that leadership traits supported by the needed core competencies in their job responsibilities are deemed critical to the success of project completion. The emphasis on core competencies as one of the key drivers to be possessed by project managers such as leadership and management skills, effective communications, and being result-oriented were identified as significant competencies required (Lee et al, 2003) observed that the inner confidence and self-belief from personal knowledge and experience are likely to play an important role in a manager's ability to deliver a project successfully. They emphasized the importance of the competencies of project managers concerning project success. A larger study conducted, by Kendra T, (2004) reached a similar conclusion. They found that certain competencies such as leadership skills, Effective Communication, Team Spirit, and Emotional Intelligence are some of the success factors that contribute toward project success. Core competency has three components, and they are as follows. The first component is knowledge.

The state of having sufficient quality knowledge refers to the body of knowledge the project manager must have acquired during his tertiary level of education. Such knowledge is technical and deals with the subject matter that pertains exclusively to the discipline of study he is involved in. A project manager, having acquired a degree in his chosen discipline for instance and having passed the respective exams would be acknowledged as having sufficient quality knowledge. This type of knowledge is in the form of theoretical knowledge short of having the skills needed to perform a task well. The higher the level of his degree, the more knowledge he is deemed to have acquired (A, 2021). The second component is skill and experience are the necessary subsequent aspects of the competency a project manager must have. Without the relevant skills to support the knowledge a person possesses the transference of knowledge into something tangible may not be realized. So, the project manager must use his knowledge to good use by applying whatever knowledge he has to something beneficial to the people and environment he interacts with. When he applies what he knows consistently, he will be very skilful in what he does. Applying those skills to different situations would result in him acquiring the necessary experience to make use of the knowledge and skills productively. The experiences he is exposed to would ascent him to the level of an expert.

The third component is having a positive attitude. A project manager who is devoid of a positive attitude would amount to nothing even if he has the knowledge and skills required for the job. A person lacking a positive attitude (S, 2023) would also lack the passion to do a given job. More often than not, he will complain and make unnecessary demands before he gets the job done. Possessing a positive attitude is the motivational factor that drives knowledge and skills to be manifested in tangible form. Attitude is defined as 'a disposition a person takes about an object or subject'. The disposition may take the form of cognition, emotion, and action or part thereof. A project manager with a positive attitude will think, feel, and act according to the requirements of his duties and responsibilities to the best of his abilities (Crawford, 2005). A person with a positive attitude is believed to be more likely to demonstrate a tendency for good behaviour than a person who is not. It is imperative, therefore, to take note that possessing sufficient knowledge, having the required skill set, and adopting a positive attitude is key to being competent.

The correlation between Competencies and the positive impact of the help of Machine Learning (ML) towards the sustainability of project performance

The correlation between competencies, project performance, and even organizational performance has been underlined by various authors, among them Schmitt and Kozar (1978), Mullay (2003), Crawford (2000 and 2005), Kendra and Taplin (2004), Koong and Liu (2006). Following this scenario, it is well supported by Project Management literature that project managers need to

possess core competencies in the industry that they are in. The idea or notion of making a big difference between tough and gentle knowledge (Gardiner, 2005). This author explains that the terms tough and gentle refer to the nature of the skills. Soft skills are those related to human capabilities and behaviour, while hard skills are technical. Hard skills are those concerned with the technical aspect of the job which the job holder must possess to perform well. Hard skills come under the term technical competency in the core competency, of which the other two are Functional and Generic skills. The soft skills consist of things such as interpersonal communication, problem-solving and decision making, negotiation, conflict-handling, and motivation. It is also found in the literature that these skills are cited as "human" competencies (El-Sabaa; 2001), "personal transferable skills" (Bennet 2002), "interpersonal" skills (PMBOK Guide 2004), "micro-social" competencies (Kendra and Taplin, 2004), or even "social" skills (Brandel, 2006). El-Sabaa (2001) refers to human skills like the capability to work in a group and to create cooperation among the group members; this is exceptionally associated with the person's perceptions about themselves and others. How managers view themselves, their colleagues, and supervisors will have an impact on how they interact in their capacity to encourage cooperation. Soft skills are more difficult to master and use successfully due to the fact they are associated with a person's EQ (Emotional Quotient) (Gardiner, 2005). The need to ensure that project managers possess a specific set of skills is highlighted by Schmitt and Kozar (1978), as these authors related inefficient and ineffective project managers with assignment failures. Koong and Liu (2006), identified in their research the significance of project managers' competencies as critical to achieving project success. According to this survey, the competencies possessed by project managers will determine if the project being managed will contribute to organizational profitability or otherwise. Mullaly's (2003) study observed that 64.5% of project managers have little or no formal competency-based training. The researcher discovered that the lack of managerial competencies due to the absence of formal training and development is a key reason why project managers fail to manage projects efficiently and effectively. As such, the project managers' failure to comprehend the anticipated effects resulted in projects being poorly executed. Mullaly (2003) explains that there are still a lot of what he termed `accidental´ project managers, who are no longer even conscious that what they are doing requires specific competencies acquired through formal training and development. Following this argument, project managers are not able to accumulate the critical competencies needed to accomplish their job. What normally takes place is that, although project managers are employed for their technical competencies (hard skills), they do not possess the required functional and generic competencies (soft skills) to function well. With the arguments put forth by Schmitt and Kozar (1978), Mullaly (2003), and Koong and Liu (2006) it

becomes clear that project managers need to possess a set of managerial competencies to be efficient and effective.

In project management, although the requirements emphasized the importance of technical competency, this study discovered that project managers must acquire the functional and generic competencies as well to perform their jobs efficiently and effectively. Other researchers such as Stretton (1995), ElSabaa (2001), Crawford (1999, 2000, 2005, 2006), have found that possessing technical competencies (hard skills), has been the main focus of attention and the Functional and Generic skills (soft skills) are somewhat being neglected. Pollack (2007) goes on to assert that the human resource management practices listed in Project Management literature are "elementary". The author asserted that his research in the field has observed that 'soft skills' play a central role in managing projects when people are involved. Flannels and Levin (2005 p.1), give a boost to that point by stating that "people problems can preclude challenging success, specifically in terms of managing projects." However, as Blackburn (2000) mentions, expert bodies keep away from mentioning interpersonal skills in their content material due to the fact they are seen as less easily defined.

Recently greater attention has been given to soft skills necessary to control human initiatives (Edum-Fotwe and McCaffer, 2000; Cowie, 2003; Muzio, et al. 2007; Pollack, 2007). The need for such knowledge in Project Management is further reinforced by Boardman (2006), who states clearly that the challenging part of the job refers to soft skills concerning people. Flannes and Levin's (2005) book entitled "Essential People Skills for Project Managers" supported this trend.

The enhancement of managerial competencies critical to carrying duties and responsibilities and has been agreed by many researchers such as Todd et.al., (1995), Redman and Matthews, (1997), Chan and Swatman, (2000), Bennet, (2002), Gallavin, et.al., (2004), Lai (2005), and Koong and Liu, (2006). The many bodies of knowledge that have emerged in certain countries are examples of previous efforts to determine the potential interest in the area of project management. A greater dynamic and holistic model, which also relates competencies to performance, was introduced by Kendra and Taplin (2004). Their open machine cultural model for assignment success takes into consideration cultural factors and is primarily based on four key aspects: Project Manager Competencies, Performance Measurement Systems, Business Processes, and Organization Designs. Kendra and Taplin's (2004) framework are totally based on four dimensions, the micro, and macro-organizational plan elements; having technical and generic considerations. Kendra and Taplin's (2004) this framework is more complete and shows that different elements also contribute to good performance. Particularly it demonstrates the significance of organizational tradition and values. However, it also acknowledges that the Project manager's knowledge is one of the essential factors that lead to project

success. The competencies start to play an extra strategic position (Shenhar and Levy, 1997; Kloppenborg and Opfer, 2002; Gardiner, 2005; Jugdev and Müller, 2005 Söderlund 2005) their consequences will impact organizational performance. In the end, the employer will be affected by way of choice and the combined result of the projects they undertake. The learning with the aid of Soderlund (2005), which was elaborated based on a couple of cases of giant Swedish companies, additionally contributes to demonstrating the significance of soft skills competencies. Another applicable finding was that the companies studied paid a lot of attention and spent magnificent effort to boost teamwork competence (Ruth D, 2005). An article by Boardman (2006) illustrates, that using a storytelling approach, demonstrates how simply important the soft skills. Most of the difficulties faced by the manager had been associated with the softer part of Project Management dealing with and influencing people. Gardiner (2005) also stressed that both types of skills, hard and soft are critical to managing projects successfully.

RESEARCH METHODOLOGY

The research methodology is developed to collect the required data. A quantitative method is adopted in this research. The distribution of questionnaires is carried out. Feedback from many respondents can be collected within a limited time through questionnaire distribution. Besides, data collected from a large sample may result in higher accuracy. Three techniques, namely Cronbach's Alpha Reliability Method, Frequency Distribution Analysis and Kruskal-Wallis H Test, are applied in quantitative data analysis. To determine the managerial competencies, that lead to higher efficiency and more effective performance, a quantitative model is used in this research to gather comprehensive valuable feedback. Online Survey questionnaires were conducted. Feedback was analysed using the 5-point Likert Scale. The questionnaires are distributed via media channels such as WhatsApp, Facebook, LinkedIn, and email. The data is collected within one month. Time allocation for receiving feedback is sufficient to ensure the quality and quantity of the results. Considering an approximate response rate of 50%, questionnaires are sent to 1000 potential respondents. Accuracy can be further improved if the response rate exceeds 50%. In this research, data collection is conducted through an online survey created using Google Forms as well as physical distribution. In addition, physical and virtual interviews are also conducted. In this research which is the most suitable to suit the aimed to determine the core competencies that depending on the results using the Johari window, individuals may need to make adjustments to their communication styles and behavior choices to more effectively convey the (C, 2018) they want others to know about themselves or the things they want to change outright. In this assessment, all the individuals have an open Arena which means open and two-way communication exists in the workplace environment.

Some showed distinctive Arena, especially those who are Sanguine and Choleric in personality. Although there are open communications between leaders and team members, the open Arena is not open wide enough due to the local cultural behaviors as opposed to the West. The Johari Window is therefore an effective communication tool to discover one's strengths and weaknesses that can be further explored. The McKinsey 7S Model (Ruth D, 2006) is a change management tool for analyzing organizational design, alignment, and performance. It offers a simplified method of identifying organizational gaps, inconsistencies, and conflicts. Other than that, in this research, data collection is conducted through an online survey created using Google Forms as well as physical distribution.

ANALYSIS AND DISCUSSION

Data analysis is conducted to interpret the data for discussion on the findings. The process to analyse all the collected data from the research into statistics. In this research the data analysis is used to interpret data and make conclusions from the accumulated data by using Statistical Package for Social Sciences (SPSS). SPSS was chosen and adopted in this research due to it being able to generate the main benefit of utilising the data, making it simple to learn and operate (Landau and Everit, 2004) It possesses extensive statistical capability. Its ability to create variables from pre-existing data makes it special (Maclnnes, 2016). Furthermore, a few techniques such as Cronbach's Alpha Reliability Test, mean ranking and Kruskal-Wallis test have been used to analyse the managerial competencies data required.

Reliability is defined as the quality of the measurements being error-free, hence consistent results are collected (Vehkalahti, 2020) Cronbach's Alpha is used to calculate the reliability of the independent variables and the dependent variable (Koçak, 2014). Cronbach's Alpha Test is a vital tool for those researchers who want to examine the reliability and accuracy of data. The formula shows the range of Cronbach's alpha reliability coefficient (Vehkalahti, 2020). For score of more than 0.7 is usually considered appropriate. Some researchers however, advocate for higher values of 0.90 to 0.95. A low alpha value indicates that the number of items is insufficient, or the items' characteristics are not closely related. The alpha value required for this research should not be less than 0.7. Table 1 shows the reliability level for Cronbach's Alpha values.

Table 1:Reliability Level for Cronbach's Alpha Values.

Cronbach's Alpha Value	Reliability Level
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 \geq \alpha$	Unacceptable

Descriptive statistics method is used to provide a general overview of the data. It measures the frequency distribution, central tendency, dispersion, and relationships between variables (Vehkalahti, 2020). Data can be visualised in the form of diagrams, such as tables, graphs, and charts. The diagrams illustrate the mode, mean, median, variance and standard deviation of the data collected. These values assist in summarizing and presenting the results, as well as identifying outliers. Kruskal-Wallis H test is a non-parametric test to examine whether there are significant statistical differences between groups of an independent variable (Mbuli, 2022). It is determined by the ranking of each variable. The data for each group is ranked, and the rank values are summed up to determine the H value. Figure 2 shows the Kruskal-Wallis H Test Formula.

$$H = \left[\frac{12}{n(n+1)} \sum_{j=1}^{c} \frac{T_j^2}{n_j} \right] - 3(n+1)$$

Figure 1: The Kruskal-Wallis H Test Formula.

Where,
n = sum of all sample sizes
c = number of samples
T_j = sum of ranks in the j^{th} sample
n_j = size of the j^{th} sample

The H value is then compared with a p-value, say 0.05. If it is less than the p-value, it shows that there is a significant difference between groups and vice versa which the discussion is in the findings.

FINDINGS

In the pilot study conducted, the results show that there is a strong correlation between enhanced managerial competencies and high work performance which leads to a significant reduction in project delays. Highly competent project managers are found to be more efficient and effective in performing their job well consistently. Undoubtedly, managerial competencies are one of the critical

factors that can help reduce project delays. The competency model of Jabatan Kerja Raya (JKR) was used as the basis for measuring the competency level of the participating managers consisting of 28 high-ranking CPM selected from each state in Malaysia. They are Heads of the Department of each respective state. The core competency model of JKR was used as a standard benchmark practice to be followed. The core competency model comprises the following core competency clusters which pertain to Technical Competency (competency which is mandatory to be possessed by the Job Holder), Functional Competency (competency which is needed to ensure that works are performed well, and Generic Competency (competency which must be acquired by the jobholder to interact well with other stake-holders. In this context, it is imperative that enhancing managerial competencies be made a standard benchmark for project managers to possess especially in the construction industry. It is proposed that the CIDB Construction Industry Competency Standard (CICS) be used as a benchmark to produce project managers who are certified to handle construction projects efficiently and effectively. The institution of formal Competency-based Training and Development program should model the ISO9001 Quality Management System under Clause 7.2 (Competence) with the view to ensuring that Project Managers do indeed possess the required competency required to handle projects in the construction industry efficiently and effectively. The followings are the discussions and recommendations from the pilot study based on the various management instruments used to gather feedback on a face-to-face basis. The alpha value for each section of the questionnaire is summarised in Table 2. SPSS was used to pilot-test all 140 surveys that were gathered. According to Table 2, each section of the questionnaire generated an alpha value more than 0.70, indicating that the data had strong internal consistency (Gliem & Gliem, 2003). This shows that the pilot study and the result of the responses were reliable. All the 140 responses would be included in the main study since no changes were made to the pilot research questionnaires.

Table 2: Reliability Level for Cronbach's Alpha Values.

Category	Number of items	Cronbach's alpha
Core Competency toward project performance	90	0.879
Good Standard Benchmark	50	0.801

In this research, SPSS used the Kruskal-Wallis test to see if there were significant differences between respondent groups. (Koçak, 2014) states that if the asymptotic significance value is less than 0.05, the null hypothesis is rejected with a 95% confidence level. The core competencies which are ranked by mean and standard deviation based on the opinions of three groups of respondents:

consultants, contractors and developers and client. These core competencies are prioritised according to advantage categories, as shown in Table 3 to Table 6.

The five most strongly agreed were from the views of the consultant, developer (including the contractor), and client.

Table 3: Top 5 of Core Competencies from Consultant's CPM Perspective

Rank	Core Competencies	Mean	SD
1	Knowledge	4.46	0.886
2	Technology innovation	4.34	0.639
3	Skills	4.26	0.980
4	Attitude	3.51	1.067
5	Culture	3.46	1.291

Table 4:Top 5 of Core Competencies from Developers' CPM Perspective

Rank	Core Competencies	Mean	SD
1	Technology innovation	4.34	0.902
2	Knowledge	4.09	0.995
3	Skills	4.00	0.984
4	Culture	3.87	1.129
5	Attitude	3.72	1.301

Table 5: Top 5 of Core Competencies from Client's CPM Perspective

Rank	Core Competencies	Mean	SD
1	knowledge	4.56	0.669
2	Skills	4.03	0.897
3	Attitude	3.84	1.051
4	Technology innovation	3.53	1.047
5	Culture	3.38	1.212

Table 6: Overall Ranking on Managerial Competencies

Rank	Managerial Competencies	Mean	SD
A1	Knowledge	4.28	1
A4	Skills	4.04	2
A3	Attitude	4.02	3
A2	Technology innovation	3.69	4
A8	Culture	3.59	5
A6	Experience	3.37	6
A5	Personality	3.25	7
A7	Sustainable benchmarking	3.21	8

This ranking was done based on the mean and standard deviation values. According to the ranking, knowledge is ranked as the highest ranked competency for managers particularly in the context of CPM. Three of the eight of the managerial competencies, are significantly related to the sustainable industrialization towards SDGs fostered. The key issues contributing to the Malaysian government's programmes' low effectiveness are a lack of enforcement and implementation (Tsiga, 2016). From the Malaysian government's perspective, the core competencies of CPM is an alarming issue that needs to be significantly improved. Hence, the client and government focus on SDGs establishes of managerial competencies as a crucial barometer for CPM to build the resilient infrastructure, promote effective sustainable industrialization and foster efficient technology innovation. (Ahmad. I, 1997) Next, perception of knowledge is identified as the core competencies most agreed by the CPM. A Negative perception on the culture is ranked on the lower argument because it is based on the attitude and personality of CPM itself. This result shows significantly, most CPM still have a strong concept that build resilient infrastructure, promotes effective sustainable industrialization, and fosters efficient technology innovation. It is mentioned by Gardiner, (2005) that notably imperative to appraise as managerial competencies as a crucial barometer for CPM as established in Construction Industry Competency Standard (CICS) the Construction Industry Development Board (CIDB) Malaysia which the result enhancing the establishment of managerial competencies that be made a standard benchmark for CPM to possess effective culture and the machine learning as an efficient technology innovation.

Table 7 shows that the Kruskal-Wallis test was applied in this research to compare consultants', contractors' and developers' opinions towards the managerial competencies as a crucial barometer to CPM. The significance level for this study is set at 0.05. The Kruskal-Wallis test generated the following hypotheses:

1. Null hypotheses (H0); there is no statistically significant difference on managerial competencies between consultants, contractors and developers.
2. Alternative hypotheses (H1): A significant difference in managerial competencies exists between consultants, contractors and developers.

The finding shows CPMs equipped with the relevant core competencies are found to be more efficient and effective in performing their job consistently. Undoubtedly, managerial competencies are found to be the crucial barometer factors that can help to boost project performance.

Table 7: Kruskal-Wallis Test for Managerial Competencies

Managerial Competencies	Sig p-value	Decision (Reject/Failed to Reject)
Knowledge	<0.001	Reject
Skills	0.029	Reject
Attitude	<0.001	Reject
Technology innovation	0.071	Failed to Reject
Culture	0.064	Failed to Reject
Experience	0.098	Failed to Reject
Capital	0.514	Failed to Reject
Marketing	0.153	Failed to Reject

CONCLUSION

The results significantly determined the managerial competencies as a crucial barometer for CPM. It identifies the essential managerial competencies as a critical barometer for CPM to advance towards resilient infrastructure, encourage successful sustainable industrialization, and support effective technological innovation. It also establishes the core competencies in the imperative standards benchmarking. It thus looked at improving managerial skills that resulted in a favourable effect and the high success rate of sustainability project completion. It is recommended that to make the outcome of the CICS last its effectiveness. The follow-up action in formal training should be made at regular intervals on the acquired knowledge. ML consistently is the needed skills that formed to stay effective sustainable industrialization towards efficient technology innovation strives. These could be done by preparing a Monitoring and Control mechanism using ML as an efficient technology innovation to ensure that the succession planning process is implemented according to agreed schedules. This research would also provide valuable insights and opportunities for researchers to do further research which indirectly contribute to the accomplishment of various SDGs and overall UN goal accomplishment.

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