

The Improvement Factors of Leadership Skills among Project Managers in Pre-Construction Phase of Sustainable Construction Projects

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Abstract

Leadership skills are required in any area, including the construction industry. Compared to conventional construction projects, the obstacles of practising leadership skills are more significant in sustainable construction projects. In the context of managing a project, a project manager is accountable for overseeing the project from the pre-construction phase to the post-construction phase. Nevertheless, project managers often encountered utmost difficulties in sustainable construction projects during the pre-construction phase. Despite that, improving leadership skills would emerge to boost project manager performance in managing sustainable construction projects. Thus, this paper aims to determine the improvement factors of leadership skills among project managers in the pre-construction phase of sustainable construction projects. A questionnaire survey was developed with 44 improvement factors of leadership skills among project managers in the pre-construction phase of sustainable construction projects, in which 153 experienced project managers in sustainable construction projects in Malaysia responded. Data were analysed using normality test, exploratory factor analysis (EFA) and reliability analysis via IBM SPSS version 24 software. The finding reveals that all improvement factors were significant to improve leadership skills among project managers in the pre-construction phase of sustainable construction projects. Hence, this paper's findings would assist project managers in grasping the improvement factors that can improve their leadership skills, particularly in sustainable construction projects.

Keywords: Improvement factors, leadership skills, project manager, pre-construction, sustainable construction projects

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1.0 INTRODUCTION

The swift growth of sustainable construction projects also has vast the responsibility of the project manager as a team leader. Leadership is one of the critical factors in the sustainability of project management of construction projects (Hwang & Ng, 2013; Opoku & Fortune, 2011; Opoku et al., 2015; Tabassi et al., 2016; Wang et al., 2015). In contempt of leadership, leadership skills are among the primary skills in all subjects of sustainable construction (ILO Skills and Employability Department, 2011). This is because project managers encounter challenges in sustainable construction projects that are greater than in conventional projects. Thus, the improvement of leadership skills in sustainable construction projects is very much required. Besides that, the project manager is responsible for managing throughout the project, beginning with the pre-construction phase and ending with the post-construction phase. The most challenging phase that project managers need to deal with is the pre-construction phase because of the more extended period needed compared to conventional construction projects (Hwang & Ng, 2013). Despite the issue occurring in the pre-construction phase, the project manager needs to possess the necessary leadership skill to manage successful sustainable construction projects. The issues regarding leadership skills in the pre-construction phase will also reflect project managers' quality of leadership in other phases. Thus, this paper aims to determine the improvement factors of leadership skills among project managers in the pre-construction phase of sustainable construction projects.

This paper is structured into five (5) sections, which are discussed in detail below. Following the introduction part, Section 2 goes into the literature review in further detail. Section 3 discusses the methodology that was used, while Section 4 presents the outcomes and discussions. Finally, Section 5 explains the conclusions, limitations and recommendations for further research in this paper.

2.0 LITERATURE REVIEW

2.1 Sustainability Concept in Construction Project

Sustainability is a concept that encompasses all areas of existence in order to attain a balance between environmental, economic and social concerns. Typically, a sustainability concept has gained attention and widespread recognition across the globe, particularly in the construction industry. In the construction industry, sustainability is critical since the primary goal is to achieve a consistent and sustainable balance between the three aspects (environmental, economic and social). Concerning the interest in sustainability concept, Malaysia established the Construction Industry Transformation Plan (CITP) as part of its global strategy to become a productive and sustainable country by 2020 by implementing an environmentally sustainable strategic thrust (CIDB, 2016). The CITP report indicates that from January 2016 to December 2020, the environmentally sustainable strategy thrust had a 90% success rate (CIDB, 2021). This finding is consistent with the increased demand for sustainability concepts in construction projects.

Furthermore, with regards to construction projects, project managers play critical roles in ensuring the project's success. However, the ineptitude of project managers concerning sustainable construction principles appears to be a hindrance to the development and sustainability of the construction projects (Pham et al., 2020). According to Borg et al. (2020), increasing endeavours to ensure a more sustainable development approach in construction projects has raised the need for project managers to be competent in this area and play a leadership role in the development of sustainable construction projects. Indeed, this point of view has been reaffirmed throughout literature by a variety of different authors. For example, a study conducted by Silvius et al. (2017) revealed that project managers are in a unique position to take a leadership role in considering sustainability in every decision and activity in delivering the project. Aside from their traditional project leader role to achieve project goals, they also have a responsibility to implement sustainability concepts into their activities. Hence, from this perspective, the relationship between sustainability and leadership of the project manager is quite positive, resulting in the delivery of a successful sustainable construction project.

2.2 Leadership Skills in Managing Pre-Construction Phase of Sustainable Construction Projects

The correlation of leadership and sustainability is uncommon and nearly less exposure, particularly in sustainable construction projects compared to conventional projects (Opoku & Fortune, 2011; Tabassi et al., 2016; Zulkiffli & Latiffi, 2019). However, in regards to skills, previous studies have proved that a project manager needs specific skills in managing sustainable construction. For instance, a study conducted by Lokman et al. (2017) discovered 21 skills appropriate for project managers in managing sustainable construction projects, such as communication skills, delegation skill, negotiating skill and others. According to Project Management Institutes (PMI), the necessary leadership skills for a project manager in a project are motivation skill, inspiring skill, team building skill, communication skill, negotiation skill, listening skill and influencing skill (Kumar, 2009). In this study, skills such as communication skills, planning and goal setting skills, team building skill, motivation skill, conflict management skill, motivation skill, decision making and problem-solving skills, negotiation skills and delegation skills are designated as leadership skills. Therefore, it can be justified that these skills are appropriated to be designated as leadership skills. Apart from that, these leadership skills are selected because they are relevant for the project manager in managing the pre-construction phase of sustainable construction projects, as discussed in previous studies. The following sub-section will discuss briefly on leadership skills in the pre-construction phase of sustainable construction projects. Figure 1 illustrates the leadership skills appropriate for project managers in the pre-construction phase of sustainable construction projects.

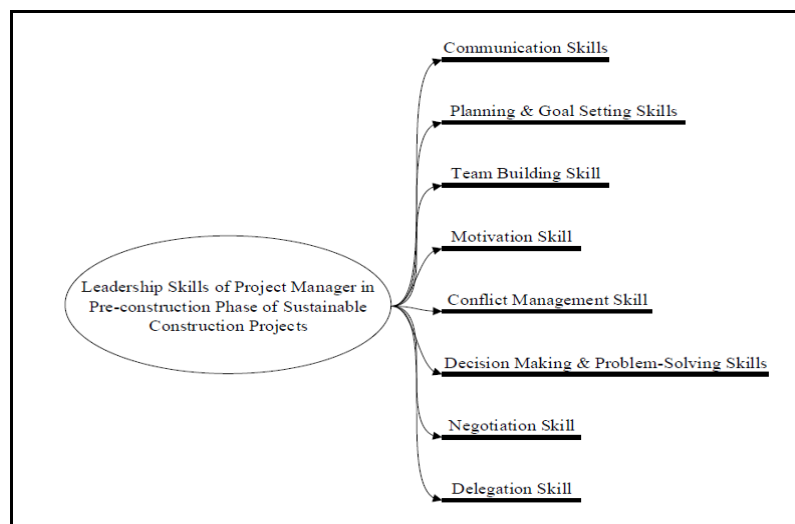


Figure 1 Appropriate leadership skills in pre-construction phase of sustainable construction

(Source: Hwang & Ng, 2013; Li et al., 2013; Lokman et al., 2017; Robichaud & Anantatmula, 2011; Wang et al., 2015; Zulch, 2014)

In accordance with Figure 1, in terms of managing the pre-construction phase of sustainable construction projects, the project manager must possess eight (8) leadership skills. These include communication, planning and goal setting, team building, motivation, conflict management, decision making and problem-solving, negotiation and delegation. Each skill is discussed in depth as follows:

i) Communication skills

Communication skills can be described as transferring content and interacting on a personal or professional level with another individual or group of people. It is not just about the ability to transmit information but also about conveying ideas, requests, impressions, and the ability to attract attention. Furthermore, effective communication is essential in green construction projects to grasp the sustainability practices anticipated by the project team (Hwang & Ng, 2013). Especially in the pre-construction phase, some project teams might not be familiar with sustainable construction projects; thus, an improvement communication skill is needed for the project manager to train and share knowledge among the project team. For example, a project manager could strengthen communication skills by conducting a charette session. This is because conducting a charette can enhance communication between the project manager and stakeholders by sharing and exchanging ideas (Delnavaz, 2012).

ii) Planning and goal setting skills

Planning and goal-setting skills can be defined as planning the activities and meeting the intended goals. Good planning and setting sustainability goals are essential to avoid obstacles during the pre-construction phase or other phases. For example, during the preliminary project, the project manager should develop an ideal financial plan to avoid a financial chain breakdown, resulting in the project's failure (Sang et al., 2018). Apart from that, Robichaud and Anantatmula (2011) highlight that sustainability goals are set during the project feasibility to provide a basis for all future decision making. In sustainable construction, the project manager is responsible for planning and setting a clear goal to avoid project failure. Thus, by improving planning and goal setting skills, the project manager can mitigate the likelihood of significant changes or poor decisions that contribute to cost inefficiencies.

iii) Team building skill

Team building skill is the ability to work cooperatively and persuade the project team to work in a preferred way. Project managers with exceptional team-building skills will boost the coherence and actual quality of the team members (Hwang & Ng, 2013). Notably, in the pre-construction phase, the project manager must demonstrate excellent team building skill to generate a pleasant and cooperative team member. Needless to say, in such a multi-disciplinary and multi-cultural project team, the presence of the project manager is vital to form an integrated project team that has a strong dedication to achieving project goals. Project managers with solid team building skills will boost project team performance and strengthen chemistry among them.

iv) Motivation skill

Motivation skill is the ability to inspire a person to achieve targeted goals. According to Vidaković et al. (2020), motivation is a driver to an employee's productivity. For instance, the project team that is heedless of the sustainable project process is barely motivated (Hwang & Ng, 2013). If the project team is demotivated, any barrier to the project, such as project delay or turnover, is likely to occur. They might feel that they cannot do the task effectively, and the process differs from the ritual process that they have gone through in conventional projects. Besides that, leadership is one of the theoretical aspects affecting an employee's motivation (Cardoso et al., 2015). Therefore, the project manager needs to have the motivation skill to motivate and support the project team to increase their performance and productivity.

v) Conflict management skill

Conflict management skill is referred to as the ability to resolve disagreements constructively. The uniqueness of sustainable construction projects obviously cannot avoid any conflicts issues occurred. For instance, a conflict among the project team might be possible; therefore, the project manager should be prepared to handle the conflict efficiently (Hwang & Ng, 2013). However, the conflict might not only arise among the project team but also the stakeholders. The misunderstanding and unfamiliarity with sustainable construction projects probably become an issue for them. Consequently, the project manager should include all stakeholders in the project briefing meeting to avoid any potential conflicts afterward. Considering the understanding of stakeholders is the major component in implementing sustainable construction projects (Häkkinen & Belloni, 2011). By considering their understanding, any conflict can be avoided and increase their interest in sustainable construction projects.

vi) Decision making and problem-solving skill

Decision making and problem-solving skills are critical for the project manager in managing green construction projects (Hwang & Ng, 2013). Both skills go hand to hand because they correlate with taking the initiative and settling the problem. Particularly in the pre-construction phase, it is essential to create a sustainable priority to structure for all future decision-making (Hwang & Ng, 2013). In addition, problem-solving skill is a process for analysing sustainability and defining a list of potential solutions (Zulch, 2014). At the early phase of a project, all possible risk is calculated, and the project manager has been prepared with the future decision making and problem-solving. This likely can lower the risk of any significant changes or false decision making and problem-solving that might result in cost efficiency. Briefly, a project manager who possesses decision-making and problem-solving skills will examine and assess any potential problem and prepare a solution ahead of time.

vii) Negotiation skill

The ability to wheel and deal to attain a successful settlement is an integral part of practical negotiation skill. According to de la Cruz López et al. (2021), negotiation skill is necessary for the project manager in managing sustainability in a project. Particularly in the pre-

construction phase, the negotiation process between the project manager and multi-disciplinary construction players such as clients, stakeholders, and the project team is to compromise or persuade those parties into settlements. Negotiation is crucial to manage the stakeholders and grasp the specific requirements of the project that will meet the stakeholders' needs (Jena & Satpathy, 2017). In addition, preparing for project sustainability management during the planning process with the active participation of key stakeholders, including potential negotiation procedures, can be useful (de la Cruz López et al., 2021). Hence, by negotiating the requirement of the stakeholders and the capability of the project, the sustainability goals will be achieved.

viii) Delegation skill

Delegation skill is the ability to assign subordinates to initiate guidance, authority, and obligation. It is essential for project managers in managing a successful project (Awan et al., 2015; Deepa & Seth, 2013; Khamaksorn, 2016). This skill entails cooperating with subordinates in order to provide guidance, control and responsibilities. Delegation skills are necessary for the project manager throughout the pre-construction phase, notably during the planning and design stages, to allocate responsibilities among a competent project team (Zulkiffli & Latiffi, 2019). Considering that certain members of the project team probably be new to sustainable construction projects, they should be assigned to specific tasks according to their expertise in order for them to perform efficiently. Therefore, delegation skill is pivotal for the project manager in the pre-construction phase. It is their responsibility to choose and assign the project team task in each activity according to their expertise, experience, knowledge and skills.

3.0 METHODOLOGY

A quantitative method using the survey questionnaire technique is used to gain data from respondents. A number of 200 questionnaires were distributed via an online survey (Google Docs) to respondents (project manager with prior expertise in managing sustainable construction), and 153 responses were successfully received, resulting in a response rate of 76.5%. A response rate minimum of 50% is considered realistic (Kog, 2019). In light of these points, the response rate can be regarded as capable of producing reliable results.

The project managers from Peninsular Malaysia were chosen to participate in this survey. A list of certified green building projects from January 2018 to December 2018 was obtained from the Green Building Index (GBI) website (<https://www.greenbuildingindex.org/>) to reach the facilitator involved for the assessment of the certified green building. Then, the information of the project managers who have experience in managing sustainable construction projects is gathered from the GBI's facilitator via emails and phone calls. In addition to that, the project managers employed by the clients or developers and consultants and developers are chosen as the respondents. This is due to their responsibility in managing the project and the involvement starting from the early stage of the project. Other than that, snowball sampling is also being used to enhance sample size and access a new prospective respondent. The intention of using snowball sampling is to locate potential respondents when they are difficult to reach. Other than that, this type of sampling is chosen because the researcher does not have a clear view of the total population of the project managers who have experience in managing sustainable construction projects. Snowball sampling is commonly used when a researcher needs to reach a hidden population that is difficult to reach (Sharma, 2017). Both methods were essential due to the scarcity of respondents in Malaysia and a shortage of project managers with experience in sustainable construction. Thus, the 200 respondents were obtained through the sampling techniques that were employed in this study.

Next, a pilot study was conducted before the questionnaire was distributed to the actual respondents. A pilot study was carried out with 44 construction players, including engineers, quantity surveyors, facility managers and project managers, by using a survey questionnaire. In the case of surveys, the purpose of conducting a pilot study is to gather data to verify the research scope, create a hypothesis, and determine the validity and reliability of the questionnaire produced (Kaur et al., 2017). The process consists of checking and verifying the reliability of the item to ensure suitability within the scope of sustainable construction. The feedback obtained was analysed, and some changes were made to the questionnaire before it was finalised.

Finally, the data gathered from the questionnaire survey was analysed using normality test, Exploratory Factor Analysis (EFA) and reliability analysis via IBM SPSS Statistics version 24 software. The normality test was used to measure whether or not the data were normally distributed (Ahmad, 2016). Besides that, the normality test is required before the initiation of the EFA (Kineber et al., 2020). Next, EFA is used to obtain information on the interconnection among the series of variables (Pallant, 2016). Additionally, EFA is frequently used in the early phases of research to obtain information regarding the relationships between a group of variables (Pituch & Stevens, 2016). This paper uses this analysis to group the improvement factors according to the eight (8) leadership skills gathered from the literature review. Finally, the reliability analysis is used to determine the reliability of the retained improvement factors of the project manager's leadership skills in the pre-construction phase of a sustainable construction project using Cronbach's alpha. The Cronbach's alpha assesses the reliability of the feedback to a questionnaire, instrumentation or a rating system reviewed by respondents, which will provide information on the reliability of the tools (Bujang et al., 2018).

3.1 The Instrument

A questionnaire survey is efficient because it may reach a high number of respondents in a brief period of time across a vast geographical area (Yaddanapudi & Yaddanapudi, 2019). The questionnaire survey method was employed in this paper to collect data among project managers with experience in managing sustainable construction projects across peninsular Malaysia. This is because the questionnaire survey is highly effective for data collecting tools (Taherdoost, 2019). Hence, this technique is convenient to be used in this paper.

The questionnaire is divided into two (2) sections, Section A: Respondent Information and Section B: The Improvement Factors of Project Manager's Leadership Skills in the Pre-Construction Phase of the Sustainable Construction Project. Section A was devoted to demographics data of the respondents consisting of education' level, numbers of sustainable construction projects that have been involved,

years of experience in the construction industry and years of experience in sustainable construction projects. Gathering data for demographics is essential to identify the behaviour of the respondents in a specific group and to extrapolate the reliability of the sample by a larger group of potential respondents (Dastane, 2020). Next, Section B presents the opinion of the respondents of the improvement factors of the project manager's leadership skills in the pre-construction phase of sustainable construction projects using 5 points of the Likert Scale from 'strongly disagree' to 'strongly agree'. The next section presents the findings of the survey.

■ 4.0 RESULTS AND DISCUSSIONS

This section reveals the analysis of collected data and the discussion on the data survey. Further details of this section will be discussed in Sections 4.1, 4.2, 4.3 and 4.4 respectively.

4.1 Respondents' Profile

First and foremost, this section begins with the results of the data analysis and a discussion of the respondent's profile. Table 1 illustrates the findings on respondents' profile.

Table 1 Respondents' profile

Item	Frequency	Percentage (%)
Education's Level		
SPM/O-Level	0	0
STPM/Matriculation/A-Level	2	1.3
Diploma	20	13.1
Bachelor	112	73.2
Postgraduate (Master/Ph.D.)	19	12.4
Numbers of sustainable construction projects have been involved		
<1	11	7.2
1-3	35	22.9
4-6	53	34.6
7-9	54	35.3
>10	0	0
Years of experience in the construction industry		
<1	1	0.7
1-3	11	7.2
4-6	5	3.3
7-9	59	38.6
>10	77	50.3
Years of experience in sustainable construction project		
<1	8	5.2
1-3	38	24.8
4-6	53	34.6
7-9	54	35.3
>10	0	0

As shown in Table 1, the highest level of education among the respondent is Bachelor Degree with 73.2%. It demonstrates that most project managers have a high level of education and gain fundamental knowledge through courses taken while studying. A higher education institution is a centre of knowledge development, long-life learning, and knowledge sharing (Zaki et al., 2016). In this regard, understanding sustainability concepts during studies in higher institutions are critical as the student progressively becomes a new generation that strives to sustain the economy and society (Jeong et al., 2015).

Moreover, the highest number of sustainable construction projects participated by the project manager was between 7 to 9 projects, with 35.3% of respondents. A lengthy year of experience gives the project manager broad exposure to different project phases, experiences, and numbers of projects involved (Ma et al., 2014). Namely, with the increasing number of projects involved, a worthy experience and high understanding of sustainable construction projects will be increased.

Furthermore, 50.3% of respondents have more than ten years of experience as a project manager in the construction industry. Experience is intended to provide construction players with a learning medium to understand construction industry criteria and attributes,

enabling them to work within limitations (Boadu et al., 2020). Having more experience in conventional projects can help project managers understand the nature of construction practice, which makes it easier for them to implement sustainability in a project.

Lastly, the results show that 35.3% of project managers have experience in sustainable construction between 7 to 9 years. A successful sustainable construction project can be achieved with the appropriate experience and understanding of the sustainability concept (AlSanad, 2015). Hence, a more experienced project manager has a significant impact on the success of sustainable construction projects.

4.2 Normality Test

Generally, the use of normality test is to determine if the data contradict the assumed normality (Rana et al., 2021). The clarification of the findings might be inaccurate if the assumed normality is violated. Thus, it is vital to analyse the data using a normality test before conducting any statistical analysis to interpret the findings correctly. In this paper, Kolmogorov-Smirnov as well skewness and kurtosis test was used to determine the normality assumption. Table 2 presents the normality test result.

Table 2 Normality test result

	Kolmogorov-Smirnov		Skewness	Kurtosis
	Statistic	Sig.	Statistic	Statistic
Communication Skill	0.265	0.000	-0.301	-1.179
Planning & Goal Setting Skill	0.302	0.000	-0.384	-1.024
Team Building Skill	0.271	0.000	-0.454	-0.997
Decision Making & Problem Solving Skill	0.255	0.000	-0.388	-1.173
Conflict Mangement Skill	0.301	0.000	-0.327	-1.281
Motivation Skill	0.285	0.000	-0.328	-1.139
Negotiation Skill	0.305	0.000	-0.402	-1.108
Delegation Skill	0.294	0.000	-0.452	-1.114

As shown in Table 2, the result from the Kolmogorov-Smirnov test indicates that all variables have a significant value of 0.000. However, the data is considered normally distributed when the value of $p > 0.05$ (Mishra et al., 2019). Hence, the result reveals that the data are not normally distributed. Moreover, the skewness and kurtosis test result reveals that the data is not normally distributed as the values are not between the suggested threshold -1 to 1. This is due to the suggested threshold for normally distributed data should be between -1 to 1 (Kamaruddin et al., 2017; Mishra et al., 2019; Yuan et al., 2018). Next, EFA is carried out to determine the connection between the improvement factors with each eight (8) of leadership skills in the pre-construction phase of sustainable construction projects.

4.3 Improvement Factors of Leadership Skills in Pre-Construction Phase of Sustainable Construction Projects

This section is discussed on the main data analysis, which is the EFA. The purpose of using EFA in this paper is to confirm the interlinked between improvement factors with the eight (8) leadership skills in the pre-construction phase of sustainable construction projects. First, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity was explored to identify whether the data is significant for factor analysis. Table 3 illustrates KMO and Bartlett's test results.

Table 3 KMO and Bartlett's test result

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.905
Bartlett's Test of Sphericity:	
• Approx. Chi-Square	2824.6
• df	28
• Sig.	0.000

Based on Table 3, the results Kaiser-Meyer-Olkin (KMO) adequacy signifies a value of 0.905. This finding confirms the previously mentioned acceptable limit value of 0.60 (Mathur et al., 2013; Osborne, 2015). Besides that, the p value of 0.000 is significant in the Bartlett Test of Sphericity. This is because the significant value should be less than 0.05 (Osborne, 2015). Moreover, the coefficient correlation value must also be greater than 0.30 in order to use the factor analysis (Tabachnick & Fidell, 2013). Therefore, EFA is suitable to be utilised in this paper.

Next, factor extraction determines how many factors should be retained (Field, 2013). In this paper, the factor extraction according to Kaiser's criteria (Eigenvalue > 1 rule) resulted in eight (8) factors extracted. Lastly, factor rotation is used to discriminate between factors (Field, 2013). As suggested by several previous scholars (e.g. Ahmad, 2016; Field, 2013; Funso et al., 2016; Mathur et al., 2013), the rotation was carried out using orthogonal varimax to optimise the distribution of loadings within factors that were not correlated. Accordingly, the finding from factor extraction analysis shows that all improvement factors were retained under the same leadership skills group. Table 4 presents the list of items with their factor loadings.

Table 4 Factor loadings of improvement factors

Improvement Factor	Factor Loadings							
	1	2	3	4	5	6	7	8
Communication Skill: <ul style="list-style-type: none"> • Conduct a charette • Attend trainings/seminars • Use private cloud storage service • Provide non-verbal signals • Conduct a meeting • Use advanced technology (building information modelling, BIM) • Make eye contact 	0.701							
Planning and Goal Setting Skill: <ul style="list-style-type: none"> • Set specific sustainability objectives • Develop sustainability planning • Determine a timeline for the project team • Set up an introductory consultation meeting 		0.563						
Team Building Skill: <ul style="list-style-type: none"> • Assemble the project team according to their areas of expertise • Attend trainings/seminars • Provide constructive criticism • Permit project team and clients to interact personally and professionally • Anticipate engagement between project team and clients 			0.728					
Decision Making and Problem-Solving Skill: <ul style="list-style-type: none"> • Choose the most appropriate solution • Examine previous experience (good or bad) • Carry out an early stage consultation with the client to discuss sustainability criteria • Share the details with the project team for decision making and problem-solving to meet project objectives. • Utilise project management software • Define objective to regulate the design choice to meet the specified client requirements • Discuss short-term and long-term consequences with project team 				0.680				
				0.663				
				0.599				
				0.693				
				0.540				
				0.635				
				0.775				

Conflict Management Skill: <ul style="list-style-type: none"> • Apply smooth approach • Include all stakeholders in project briefing to avoid conflicts • Create a win-win solution for both parties • Create a checklist document addressing expertise of a project team that meets client criteria • Give both parties a cooling-off period 					0.589			
					0.601			
					0.611			
					0.716			
Motivation Skill: <ul style="list-style-type: none"> • Provide decisive comment • Praise project teams • Entrust project team • Encourage project team in direct interaction to motivate them • Conduct kick-off meetings with stakeholders to raise interest • Acknowledge project team strength 						0.637		
						0.743		
						0.653		
						0.865		
Negotiation Skill: <ul style="list-style-type: none"> • Interact regularly with the clients to form a solid connection • Consult with the third-party representatives • Prepare a planning agreement to ensure compliance with sustainability standards • Conduct a meeting to address the client's and project team's conflicting or misaligned aims 							0.546	
							0.632	
							0.712	
							0.582	
Delegation Skill: <ul style="list-style-type: none"> • Discuss with people in same position of different projects for references and guidance • Hold a meeting with project team to identify a problem for a clear reporting structure • Develop confidence, collaboration and teamwork between project teams to achieve convergence and meet the project goals • Appoint the right person assigned by the client • Allowing the project team to develop their ideas to build up confidence in them 								0.603
								0.644
								0.552
								0.697
								0.705

Based on Table 4, the communication skills improvement factors consist of seven (7) items, with factor loadings from 0.534 to 0.887. The highest value of factor loadings shows that project managers can improve their communication skills in sustainable construction projects by applying advanced technology such as BIM. This finding coincides with the prior studies by Zhang et al. (2020) and Ismail et al. (2019), who unveiled that using BIM technology can enhance communication among project teams. The project manager is responsible for communicating with all stakeholders and convincing them to adopt sustainable practices. In terms of a project, communication is vital to keep stakeholders/clients updated on project progress and maintain their pace to achieve project goals (Muszynska, 2015). Other than that, the project manager's ability to communicate effectively is the most critical element determining the project's success (Zulch, 2016).

The project manager has to specify which signals should be conveyed correctly to the receiver and translate it in a comprehensible manner to the recipient (Dinsmore & Cabanis-Brewin, 2014).

Moreover, in planning and goal-setting skills, the improvement factors include four (4) items with factor loadings between 0.563 to 0.709, respectively. The highest outcome justifies a study by Sang et al. (2018) that project managers can learn more about the project and how to manage it more effectively by developing a sustainability plan. This is because the project manager must grasp the project requirements thoroughly, plan accordingly, and clearly set the project goals. In sustainable construction projects, the project manager is responsible for planning and setting a clear goal to achieve sustainability in a project. The project's planning, design and major decision on schedule, quality and budget are decided during the pre-construction phase (Isa, 2019). Good planning and setting sustainability goals are essential to avoid any obstacles during the pre-construction stage of sustainable construction projects. Next, the result for team building skill indicates that the improvement factors for five (5) items with factor loadings value range from 0.593 to 0.728. Team building skills are required to ensure that the project team understands the rationale for decisions made, emphasises key preferences, and fosters learning and knowledge sharing (Giri, 2019). Since the project team contains green expertise, the project manager can improve team building skill by organising the project team according to their expertise.

There are seven (7) items in decision making and problem-solving skills with factors loadings from 0.540 to 0.775. The item *discusses short-term and long-term consequences* received the highest factor loadings value of 0.775. Decision-making and problem-solving strategies can be created by discussing the project's short and long-term consequences with the project team during the pre-construction phase. A charrette was shown to be the most successful method for promoting effective communication and sharing ideas when it was applied early in the project's life cycle (Isa et al., 2014). During a charette, the stakeholders and the project team will discuss the project's strategy. A study by Delnavaz (2012) stated that conducting a charette during the pre-construction phase can expedite the decision-making process and encourage stakeholders to set the fundamental decisions early in the project's life cycle.

Other than that, the improvement factors of conflict management skill consist of five (5) items with factor loadings ranging from 0.589 to 0.782. The item of *give both parties a cooling-off period* with the highest factor loadings value of 0.782 is the factor that can improve the project manager's conflict management skill. This is in line with JICA (2012), which stated that making provision for a cooling-off period to avoid unnecessary extension of the conflict and the additional expenditure of creating an arbitration agreement to consider and resolve the conflict. Allowing for a cooling-off period makes it possible to prevent the conflict from being heated on both parties and for them to come up with a more satisfactory conclusion later.

Furthermore, there are six (6) items of improvement factors for motivation skill with factor loadings from 0.538 to 0.865. The item *encourages the project team indirect interaction to motivate them* with the highest factor loadings value of 0.865. To achieve the desired sustainability outcomes, project managers need to motivate the project team during the pre-construction phase of a sustainable building project. In order to vitalize sustainable construction, motivation is required to enhance the productivity of the construction players (Alhyari, 2017). It is necessary to develop motivation that will increase the performance, which might promote the success of sustainable construction.

The negotiation skill improvement factors include four (4) items with factor loadings of 0.546 to 0.712. The improvement factor of the item *prepares a planning agreement to verify sustainability standards* gained the highest factor loadings value. By preparing a screening letter, the project manager can negotiate with local authorities regarding the sustainability standards of the project without neglecting the client's requirement. This statement coincides with Sulaiman and Maidin (2015) who revealed that the connection between developers and local authorities by negotiating through planning agreement is quite significant. Negotiation skill can be a medium for communicating regarding sustainability in various phases of sustainable construction projects and can be beneficial in agreements with multiple parties (Zulch, 2016).

Lastly, there are five (5) improvement factors of delegation skill with factor loadings of 0.552 to 0.705. The item of *allowing the project team to develop their ideas to build up confidence in them* obtained the highest factor loadings value in improvement factors of delegation skill. Delegation skill includes working with the project team to provide guidance, responsibility and commitment. The project manager should allow the project team to come up with their ideas in order for them to increase the confidence to bear the responsibility. This is in line with Berg & Karlsen (2014) by revealing that the project team become more confident and experience a sense of control over the project when given responsibility. Project managers might also demonstrate support in integrated project teams by refraining from dishonesty, which can harm project team trust and confidence (Delnavaz, 2012).

The factor loadings of all improvement factors are more than the threshold value of 0.512, respectively. According to Stevens (2012), the acceptable factor loading value depends on the sample size, such as the sample size 100, factor loadings should be greater than 0.512. Added to that, factor loadings exceeding 0.50 is a sufficient value to retain the item (Hidayat et al., 2018). In this paper, the factor loadings value is from range 0.534 to 0.887. Therefore, all of the improvement factors were retained because the factor loading value exceeded the threshold value. Hence, all improvement factors were grouped into eight (8) leadership skills relevant to project managers in the pre-construction phase of sustainable construction projects.

4.4 Reliability Analysis

The purpose of reliability analysis using Cronbach's alpha is to analyse the internal consistency of improvement factors of project manager's leadership skills in the pre-construction phase of sustainable construction projects. This is to prove that all improvement factors are worth being retained in this paper. The result of Cronbach's alpha is presented in Table 5.

Table 5 Reliability analysis

Leadership Skills	Number of Items	Cronbach's Alpha
Communication Skill	7	0.955
Planning & Goal Setting Skill	4	0.946
Team Building Skill	5	0.968
Decision Making & Problem Solving Skill	7	0.954
Conflict Mangement Skill	5	0.932
Motivation Skill	6	0.914
Negotiation Skill	4	0.950
Delegation Skill	5	0.934

As shown in Table 5, the range of Cronbach's alpha value is from 0.914 to 0.968. The results showed that all the improvement factors of the project manager's leadership skills in the pre-construction phase of sustainable construction projects exceeded the threshold value of 0.70. According to Hair et al. (2016), Cronbach's alpha value of more than 0.90 is considered excellent. Thus, all retained improvement factors of the project manager's leadership skills in the pre-construction phase of sustainable construction projects are valid and reliable items with an adequate internal consistency that can be utilised in this study.

5.0 CONCLUSION, LIMITATION AND FURTHER RESEARCH

A sustainable construction project is technically complex, and it involves a diverse group of construction players with varying levels of experience, which may impair the project manager's ability to implement effective leadership skills. Particularly in the pre-construction phase, the engagement between project managers with stakeholders, clients, and project teams increases the importance of leadership skills. Hence, it is important for the project manager to improve leadership skills, particularly in the pre-construction phase when all the planning and the beginning of the project life cycle starts in this phase. From the literature review, eight (8) leadership skills were identified as appropriate for project managers in the pre-construction phase of sustainable construction projects. Leadership skills include communication skills, planning and goal setting skills, team building skill, motivation skill, decision making and problem-solving skills, conflict management skill, negotiation skill and delegation skill. This paper has focused on the improvement factors of leadership skills among project managers in the pre-construction phase of sustainable construction projects. The normality test, EFA and reliability analysis were used to analyse which improvement factors can be retained in this study. The finding reveals that all improvement factors are significant and appropriate with eight (8) leadership skills of the project manager in the pre-construction phase in sustainable construction projects.

Despite the fact that this study's aim was achieved, there are still certain limitations to be considered. First, reaching the respondents was difficult since there is no defined population of project managers with experience in managing sustainable construction projects. Next, the findings of this paper were obtained from the Malaysian construction industry context; thus, it may vary from the perspective of other countries. Needless to say, the findings of this paper are relevant and beneficial in representing the first enlightening study into the improvement factors of leadership skills among project managers in the pre-construction phase of sustainable construction projects. For future research, it would be interesting to investigate the approach to improve the project managers' leadership skills for managing pre-construction phase in sustainable construction projects.

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