

# UNDERSTANDING THE RELATIONSHIP OF LEADERSHIP SKILLS IN THE PRE-CONSTRUCTION PHASE WITH THE SUCCESS OF SUSTAINABLE CONSTRUCTION PROJECTS

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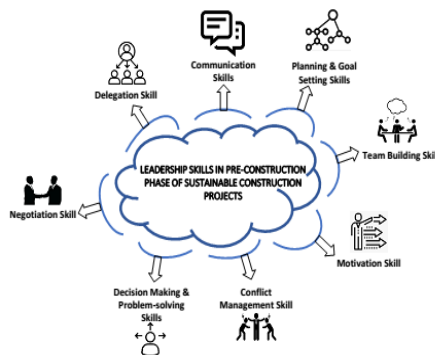
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## Graphical abstract



## Abstract

Since the construction industry has been focused on sustainable construction projects presently, the roles of project manager as a leader have become more complex as they have to balance various stakeholders' interests to create sustainability approach mainly in the pre-construction phase. This study aims to investigate the relationship of leadership skills of project managers in the pre-construction phase with the success of sustainable construction projects. The Partial Least Squares Structural Equation Modelling (PLS-SEM) technique was used to analyse data collected from a questionnaire survey of 153 project managers with experience managing Malaysian sustainable construction projects. The findings imply that communication skills, planning and goal setting skills, team building skills, and conflict management skills in the pre-construction phase have a significant relationship with the success of sustainable construction projects. This study has a theoretical implication that can assist the project manager and construction organisation to understand better that the leadership skills of a project manager in the pre-construction phase can lead towards the success of sustainable construction projects. The findings of this study may be useful for the project manager and construction organisations to deliver a successful sustainable construction project.

**Keywords:** Leadership skills, project manager, sustainable construction projects, pre-construction phase, PLS-SEM

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## 1.0 INTRODUCTION

The role of a project manager as a project leader is undeniable in the construction industry. Particularly in sustainable construction projects, the project manager carries high responsibility where every decision made is critically important to achieving sustainability goals. When managing a project, the project manager is responsible for the entire project lifecycle, from initiation to completion. However, the pre-construction phase is the most time-consuming in the project management process and consumes the most of project manager's time throughout the project's lifecycle [1]. This is because the need to fulfil stakeholders' requirements is crucial at this stage, and their lack of awareness of the importance of sustainable construction can be perplexing [2]. In addition to that, due to

the enormous growth of interest for sustainable construction projects, project managers are faced with new issues. They are obliged to take on roles not previously assigned to them in conventional projects [1]. Hence, project managers need to acquire new skills and knowledge to manage sustainable construction projects effectively [3].

Eventually, leadership is a key aspect in ensuring the sustainability of project management [1, 4-7]. Likewise, project managers accountable for overseeing sustainable construction projects must demonstrate excellent leadership skills [1, 5, 8-9]. This can be an efficient approach applied by the project manager, which substantially affects the project result. Undoubtedly, the success of a sustainable construction project relies on the critical leadership skills that the project manager retains. Thus, by using Partial Least Square Structural Equation

Modelling (PLS-SEM), this study aims to investigate the relationship of leadership skills of project manager in the pre-construction phase with the success of sustainable construction projects.

The remaining part of this paper is organised as follows. The subsequent section discusses a literature review on the leadership skills of a project manager in sustainable construction projects. In the third section, the method applied (Partial Least Square Structural Equation Modelling, PLS-SEM) is discussed. The fourth and fifth section presents the results and discussion of the data analysis. The last section discusses the conclusion of this study.

## 2.0 LITERATURE REVIEW

### 2.1 Leadership Skills Of Project Manager In Managing Pre-Construction Phase Of Sustainable Construction Projects

The necessity for leadership in sustainable construction projects is primarily due to the projects' achievement being greatly reliant upon who manages and directs the project. A study by Hwang and Ng [1] revealed that leadership skills are vital skills that can promote the success of green building projects. Apart from that, project managers encounter the greatest difficulties in implementing sustainable building during the pre-construction phase [1, 10]. For example, the primary responsibility of the project manager is during the planning stage [11]. This is due to the planning process during the pre-construction stage being the first step to achieving sustainability goals [12-14]. The requirement for a more extensive (green-friendly) planning process and the engagement of diverse project teams (green experts) may cause the pre-construction phase to extend [1]. The project manager's role as project leader in managing a project and supervising the project team is critical during the pre-construction phase. Hence, the necessity to improve leadership skills for project managers in the pre-construction phase is relevant to deliver a successful sustainable construction project.

Furthermore, as reported by Project Management Institutes (PMI), the critical leadership skills for project managers in managing a construction project include communication skills, team building skills, motivational skills, inspirational skills, listening skills, influencing skills, and negotiation skill [15]. In terms of sustainable construction, there are limitations on references that have been reported related to the leadership skills of project managers. Eventually, prior authors have mentioned specific skills related to leadership skills that are relevant for project managers in the pre-construction phase of sustainable construction projects. A study conducted by Hwang and Ng [1] revealed that communication skills, team building skills, decision-making and problem-solving skills, negotiation skills, and delegation skills are important and appropriate for project managers in green construction projects. Apart from that, de la Cruz López et al. [16] mentioned that communication, negotiation, and conflict management skills are necessary for project managers in managing sustainability projects. Meanwhile, planning and goal-setting skills are essential for project managers to develop clear sustainability goals during the pre-construction phase [2, 10]. Some of the authors are not mentioning these leadership skills are required

for specific phases; thus, it might be appropriate for project managers in the pre-construction phase. Table 1 illustrates the summary of the leadership skills of a project manager in the pre-construction phase of sustainable construction projects.

**Table 1** The leadership skills of project manager in pre-construction phase of sustainable construction projects

No	Leadership Skills	References
1	Communication Skills	[1, 5, 9, 10, 16, 17]
2	Planning and Goal Setting Skill	[2, 10]
3	Team Building Skill	[1, 17]
4	Motivation Skill	[8, 17]
5	Conflict Management Skill	[16, 17]
6	Decision Making and Problem-Solving Skill	[1, 9, 17, 18]
7	Negotiation Skill	[1, 6, 7]
8	Delegation Skill	[1, 18]

Based on the table, eight (8) leadership skills were identified to be appropriate for project managers in managing the pre-construction phase of sustainable construction projects, such as communication skills, planning and goal setting skills, team building skills, conflict management skills, motivation skills, decision making and problem-solving skills, negotiation skill and delegation skill [1, 5, 8, 10]. First, the project manager uses up 90% of their time communicating with stakeholders and the project team [19]. The ability of the project manager to communicate is the most significant factor affecting the success of a project [20]. Moreover, planning and goal setting skills are some of the main leadership skills that project managers need [21]. If the clients are not persuaded of the benefits of sustainability, they do not perceive the adoption of sustainability in a project [1].

Moreover, team building is necessary to deliver a successful project and a long duration of sustainable project management [22]. Project managers with outstanding team building skills will enhance their project team's self-esteem and improve performance [1]. On the other hand, motivation is the most effective method of keeping stakeholders engaged in sustainable construction practices [23]. To vitalize sustainable construction, motivation is required to enhance the productivity of the construction players [24]. Next, project managers who use a proactive conflict management strategy are more responsive to resolve conflicts and considered good leaders [25]. The concept of conflict management is generally viewed as a role in project management and is associated with the role of a project manager to resolve the conflict.

Meanwhile, decision making and problem-solving skills have been essential in managing significant problems for project managers in sustainable projects [1]. Effective decision-making also involves making the correct option to avoid delays within the shortest period [1]. Other than that, negotiation skills can be a medium for communicate with multiple parties in sustainable construction projects [17]. An advanced skill such as negotiation skill should be evolved in sustainable construction [26]. Lastly, delegation skill is vital for project manager in managing a successful project [27-29]. In the context of complex projects, the project manager is responsible for delegating the appropriate project team according to their expertise that can handle the hustle of the project [30].

## 2.2 Conceptual model

In examining the relationship between the leadership skills of a project manager in the pre-construction phase with the success of sustainable project construction management by using PLS-SEM, the researcher requires to develop a conceptual model. This model described the relationship between latent variables and respective manifest variables. In this study, the conceptual

model was developed from the relevant literature review that has been grouped into eight (8) leadership skills such as communication skills (C), planning and goal setting skills (PG), team building skills (TB), motivation skill (M), conflict management skill (CM), decision making and problem-solving skills (DP), negotiation skill (N) and delegation skill (D) (see Figure 1).

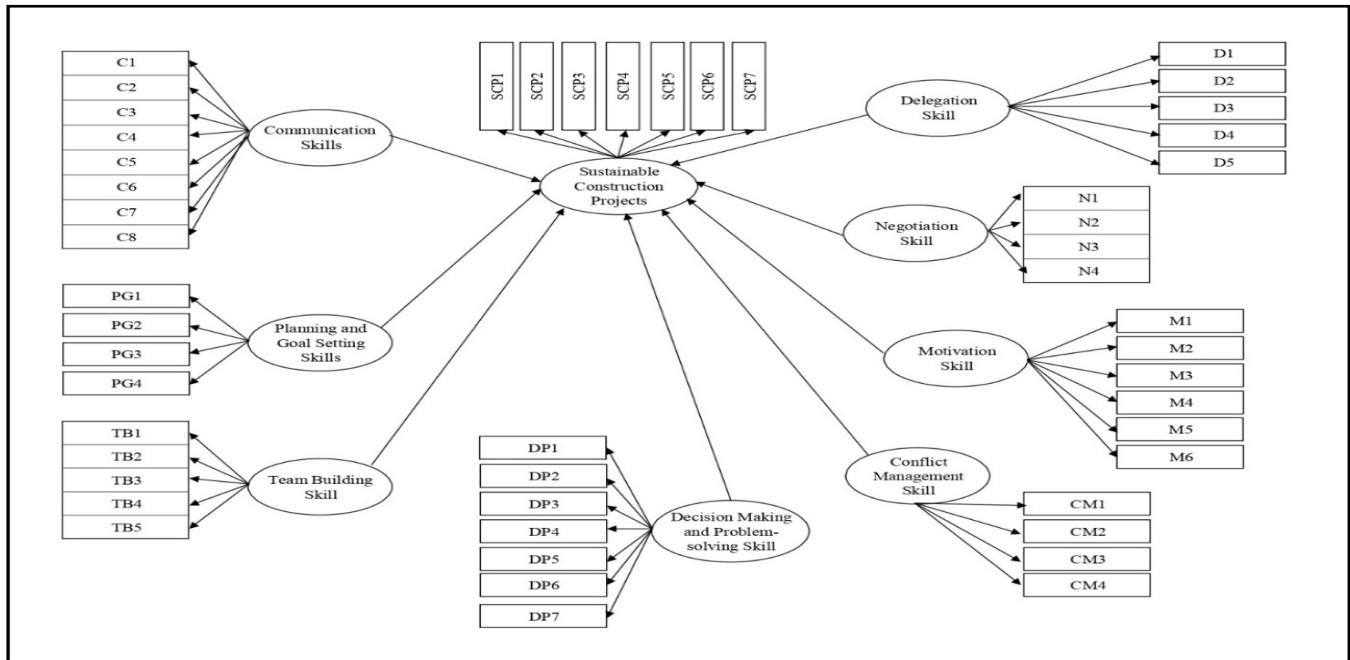


Figure 1 Conceptual model

As shown in Figure 1, an oval shape represents the latent variables; meanwhile, the rectangle shape describes the manifest variables. Additionally, the arrow indicates the direction of influence on the hypothetical structural model, which shows the relationship between latent variables and related manifest variables. Thus, the hypothesis for this study is presented as follows:

**H1:** Communication skills in the pre-construction phase have a significant relationship with the success of sustainable construction projects.

**H2:** Planning and Goal setting skills in the pre-construction phase have a significant relationship with the success of sustainable construction projects.

**H3:** Team building skill in the pre-construction phase has a significant relationship with the success of sustainable construction projects.

**H4:** Motivation skill in the pre-construction phase has a significant relationship with the success of sustainable construction projects.

**H5:** Conflict management skill in the pre-construction phase has a significant relationship with the success of sustainable construction projects

**H6:** Decision making and problem-solving skills in the pre-construction phase have a significant relationship with the success of sustainable construction projects.

**H7:** Negotiation skill in the pre-construction phase has a significant relationship with the success of sustainable construction projects.

**H8:** Delegation skill in the pre-construction phase has a significant relationship with the success of sustainable construction projects.

## 3.0 METHODOLOGY

This study employed a quantitative survey method. The purpose of using the quantitative method is because it is ideal for a big sample size that can cover a large geographical area, such as all states of Malaysia. The information gathered from the GBI website (<https://www.greenbuildingindex.org/>) until March 2020 is the targeted population in this research. The respondents were chosen according to the numbers of certified sustainable building projects. A set of questionnaires form was distributed to the respondents via an online survey (Google Docs) to 200 project managers, with 153 responses received. For data analysis, multivariate analysis (PLS-SEM) was used to investigate the relationship between the variables. Literature

shows that PLS-SEM has been adopted in several previous studies in the field of construction [31-33]. Other than that, PLS-SEM was adopted when the theory was less established, and the goal of applying is to make predictions and explain the target construct. (i.e. leadership skills and sustainable construction projects) [34]. Hence, this study adopted PLS-SEM to construct the significant effect of leadership skills on the success of sustainable construction projects, which offers substantial statements regarding the relationship.

### 3.1 Instrument Development

First, a literature review was conducted, and eight (8) leadership skills of the project manager in the pre-construction phase were discovered. Next, the instrument was adapted from several studies to suit this study (1, 2, 5, 9-10). Table 2 illustrates the questionnaire that has been used in this study.

**Table 2** Research questionnaire

Indicator	Item
<b>Communication Skills (C)</b>	
C1	Conduct charrette to discuss on goals and strategies
C2	Attend training/courses related to communication skill
C3	Use personal cloud storage service such as Google Drive
C4	Use non-verbal cues like head nods
C5	Hold a meeting with stakeholder to discuss on sustainability requirement
C6	Use Building Information Modelling (BIM) to enhance communication
C7	Make eye contact to convey that you are paying attention.
C8	Avoid using short terms
<b>Planning and Goal Setting Skill (PG)</b>	
PG1	Set clearly sustainability goals
PG2	Develop strategy if any require changing
PG3	Assign a deadline for task completion
PG4	Organise an initial consultation meeting
<b>Team Building Skill (TB)</b>	
TB1	Arrange the project team as per their skill sets
TB2	Attend trainings/courses related to team building skill
TB3	Give objective feedback to project team
TB4	Allow clients and project team to become acquainted
TB5	Anticipate the commitment between client and project team
<b>Motivation Skill (M)</b>	
M1	Give unbiased feedback
M2	Compliment project teams with words of encouragement.
M3	Encourage the project team
M4	Make personal conversation with the project team
M5	Hold an initial meeting with stakeholders to pique their interest
M6	Notice the project team abilities
<b>Conflict Management Skill (CM)</b>	
CM1	Apply a flattening technique
CM2	Ensure that all stakeholders are represented at the meeting
CM3	Pursue win-win solutions to resolve disagreement
CM4	Prepare a checklist that includes the expertise that meet client requirements
CM5	Allow each side a cooling-off period
<b>Decision Making and Problem-Solving Skills (DP)</b>	

DP1	Select the best option to meet project goals
DP2	Include clients and examine previous experience (good and bad) to create useful and measurable sustainability and performance targets
DP3	Hold an initial consultation meeting with the client
DP4	Provide information for decision-making and problem-solving purposes to the project team
DP5	Apply project management software
DP6	Develop objective criteria to assist in the coordination of design alternatives
DP7	Discuss on short-term and long-term consequences with project team
<b>Negotiation Skill (N)</b>	
N1	Maintain contact with clients on a frequent basis to foster a beneficial connection
N2	Allow third parties to act as your representatives in negotiations
N3	Prepare a proper document for authority to verify sustainability requirements
N4	Conduct a meeting to discuss on divergent or contradictory goals with client and project team
<b>Delegation Skill (D)</b>	
D1	Consult with individuals in similar roles of other projects for references
D2	Conduct a meeting with project team to discuss any issues
D3	Develop trust and teamwork amongst project teams
D4	Delegate to the right person selected by client
D5	Supporting the project team by letting them create their own idea

## 4.0 RESULTS

### 4.1 Respondents' background

Table 3 presents the demographic data of the respondents.

**Table 3** Respondents' background

Item	Frequency	Percentage (%)
Numbers of sustainable construction project involved		
<1	11	7.2
1-3	35	22.9
4-6	53	34.6
7-9	54	35.3
>10	0	0
Experience in the construction industry		
<1 year	1	7
1-3 years	11	7.2
4-6 years	5	3.3
7-9 years	59	38.6
>10 years	77	50.3
Experience in the sustainable construction project		
<1 year	8	5.2
1-3 years	38	24.8
4-6 years	53	34.6
7-9 years	54	35.3
>10 years	0	0

As shown in the table, the highest numbers (35.3%) of sustainable construction projects involved by the respondents are 7-9 projects. Half of the respondents (50.3%) have experience in the construction industry of more than ten (10) years. Interestingly, 35.3% of the respondents have experience in sustainable construction projects between 7 to 9 years, similar to the numbers of the project involved. Based on the results, it shows that the respondents met this study's eligibility criteria.

### 3.2 Partial Least Square Equation Model (PLS-SEM)

Prior to the empirical PLS analysis and results from interpretation, two (2) types of assessment are required: measurement model and structural model assessment. Briefly, PLS-SEM model assessment starts with the measurement model or outer model assessment to measure the validity and reliability of the instruments [35]. Then, the structural model or inner model assessment was carried out to examine the hypothesis between constructs [34]. The details of the assessment are as follows:

#### The Measurement Model

Measurement model assessment measures the relationships between the indicators and the constructs [34]. This measurement consists of assessment for composite reliability (CR), Outer Loadings, Average Variance Extracted (AVE), and discriminant validity (Fornell-Larcker Criterion). Table 4 and Table 5 show the results for measurement model assessment.

**Table 4** Measurement Model Assessment

Constructs	Outer Loadings	CR	AVE
<b>C</b>	0.840	0.962	0.761
	0.869		
	0.933		
	0.965		
	0.842		
	0.884		
	0.846		
0.885			
<b>PG</b>	0.905	0.956	0.844
	0.924		
	0.926		
	0.918		
<b>TB</b>	0.910	0.974	0.882
	0.942		
	0.954		
	0.961		
<b>M</b>	0.933	0.953	0.771
	0.924		
	0.864		
	0.832		
	0.902		
0.870			

<b>CM</b>	0.923	0.958	0.820
	0.896		
	0.945		
	0.947		
	0.851		
<b>DP</b>	0.925	0.968	0.813
	0.955		
	0.939		
	0.897		
	0.846		
	0.870		
<b>N</b>	0.943	0.968	0.882
	0.916		
	0.940		
	0.966		
<b>D</b>	0.949	0.958	0.820
	0.818		
	0.933		
	0.954		
	0.901		
<b>SCP</b>	0.907	0.938	0.792
	0.911		
	0.831		
	0.884		
	0.886		
	0.865		
0.796			

**Note:** Communication skills (C), planning and goal setting skills (PG), team building skill (TB), motivation skill (M), conflict management skill (CM), decision making and problem-solving skills (DP), negotiation skill (N) and delegation skill (D), sustainable construction projects (SCP).

Based on the table, all outer loadings values are more than the satisfactory threshold of 0.708 [36-37]. The loadings for all the indicators were indeed greater in their construct than in any other constructs. Hence, this shows that every construct is distinct from each other. Next, the value of composite reliability (CR) of each construct is within the range of 0.938 to 0.974, respectively. All these values are above the recommended threshold value of 0.70. Several authors claimed that a higher value of the CR represents a higher level of reliability of the scale [34, 38]. Hence, the items used to represent the construct have satisfactory internal consistency reliability. The average variance extracted (AVE) value of each construct is more than the threshold value of 0.50, meaning that the set items in the constructs represent one and in their specific construct. It is recommended that the minimum value of AVE be higher than 0.50 [34]. Furthermore, discriminant validity is measured to examine if one construct differs from another. Discriminant validity refers to the degree to which indicators discriminate or measure separate concepts by assessing correlations between measures of possibly overlapping constructs [39]. The discriminant validity results are presented in Table 5.



Table 5 Fornell-Larcker Criterion

	C	CM	DP	D	M	N	PG	TB	SCP
C	<b>0.944</b>								
CM	0.914	<b>0.979</b>							
DP	0.912	0.905	<b>0.962</b>						
D	0.872	0.964	0.959	<b>0.968</b>					
M	0.911	0.936	0.916	0.923	<b>0.947</b>				
N	0.897	0.971	0.957	0.952	0.878	<b>0.982</b>			
PG	0.876	0.941	0.944	0.918	0.909	0.925	<b>0.951</b>		
TB	0.937	0.976	0.901	0.905	0.924	0.939	0.918	<b>0.989</b>	
SCP	0.938	0.939	0.936	0.921	0.909	0.907	0.897	0.861	<b>0.968</b>

**Note:** Communication skills (C), planning and goal setting skills (PG), team building skill (TB), motivation skill (M), conflict management skill (CM), decision making and problem-solving skills (DP), negotiation skill (N) and delegation skill (D), sustainable construction projects (SCP)

As shown in Table 5, the bolded values indicate the square root of the AVE values, whilst the non-bolded values imply the intercorrelation value between the constructs [39]. It should be noted that values meet satisfactory discriminant validity if the square root of each construct's AVE (bolded) is greater than its highest correlation with any other construct (non-bolded) [34]. Based on the results, all the square root of AVE values exceeds the inter-correlation of values between the construct in their corresponding row and column. Thus, the results confirmed that the Fornell-Larcker criterion was met.

### The Structural Model

The structural model is evaluated to measure the explanatory strength of the framework and to test the hypothesis [34]. In this study, the structural model investigates the significant relationship of project manager's leadership skills with the success of sustainable construction projects. The structural model assessment is started with a coefficient of determination ( $R^2$ ) and path coefficient, effect size ( $f^2$ ). The findings of the structural model assessment are presented in Table 6.

Table 6 Structural model assessment

Hypothesis	$\beta$	T-values	p-values	Result
H1 C->SCP	0.402	5.314	0.005	Supported
H2 PG->SCP	0.426	2.596	0.005	Supported
H3 TB->SCP	0.264	2.574	0.003	Supported
H4 M->SCP	-0.063	0.293	0.385	Not Supported
H5 CM->SCP	0.260	2.787	0.002	Supported
H6 DP->SCP	-0.304	1.329	0.092	Not Supported
H7 N->SCP	-0.199	0.576	0.283	Not Supported
H8 D->SCP	0.053	0.270	0.394	Not Supported

**Note:** Communication skills (C), planning and goal setting skills (PG), team building skill (TB), motivation skill (M), conflict management skill (CM), decision making and problem-solving skills (DP), negotiation skill (N) and delegation skill (D), sustainable construction projects (SCP)

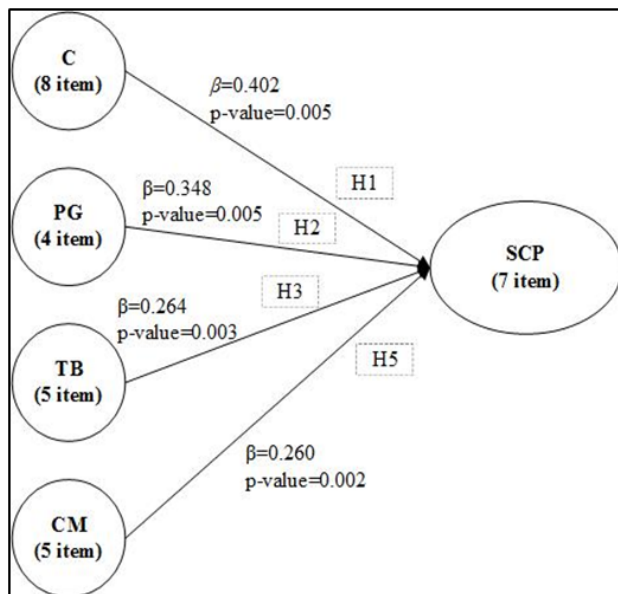
Based on Table 6, the path coefficient ( $\beta$ ) value for communication skill ( $\beta=0.402$ ), followed by planning and goal setting skills ( $\beta=0.348$ ), team building skill ( $\beta=0.246$ ), motivation skill ( $\beta=-0.063$ ), conflict management skill ( $\beta=0.260$ ), decision making and problem-solving skills ( $\beta=-0.304$ ), negotiation skill ( $\beta=-0.199$ ) and delegation skill ( $\beta=0.053$ ). According to Hair et al. [34], the path coefficients ( $\beta$ ) should exceed 0.250 to account for a particular impact within the model with a significant level of 0.05. This result supports the hypothesis that communication skills, conflict management skills, planning and goal-setting skills, and team building skills have a significant relationship with the success of sustainable construction projects. The t-value of the path for communication skills, conflict management skills, planning and goal setting skills, and team building skills are 5.314, 2.787, 2.596, and 2.574, respectively, and more than 2.57 with p-values < 0.01. Therefore, the path is significant, implying that the effect of communication skills, conflict management skills, planning and goal setting skills, and team building skill with the success of sustainable construction projects is significant at a 70% confidence level.

The next assessment for the structural model is effect size,  $f^2$ . This measure is used to assess whether a predictor variance influences the dependent variable. In doing so, the effect size of project manager's leadership skills of sustainable construction projects can be explored. According to Hair et al. [34], citing Cohen's (1988) guideline to measure the effect size. Thus, according to the guideline, the value of  $f^2$  is regarded as substantial if ( $f^2 = 0.35$ ), medium if ( $f^2 = 0.15$ ) and small if ( $f^2 = 0.02$ ). In this study, the result of  $f^2$  value for communication skills, conflict management skills, planning and goal setting skills, and team building skills are 0.095, 0.060, 0.035, and 0.043, respectively. The guidelines mentioned above indicate

that the predictor construct has a substantial effect on the dependant construct. In summary, the effect size result indicates that the leadership skills of the project manager in the pre-construction phase have a substantial effect in producing R<sup>2</sup> for sustainable construction projects.

## 5.0 DISCUSSIONS

This study investigates the relationship of leadership skills of a project manager in the pre-construction phase with the success of sustainable construction projects. From the hypothesis testing, it shows that communication skills (C), planning and goal setting skill (PG), team building skill (TB), and conflict management skill (CM) has a significant relationship with the success of sustainable construction projects. Figure 2 depicts the significant relationship between leadership skills and the success of sustainable construction projects.



**Figure 2** The significant relationship between leadership skills and the success of sustainable construction projects

As shown in Figure 2, communication skills (C) have a significant relationship with the success of sustainable construction projects. This result corroborates with a study by Hwang and Ng [1], Robichaud and Anantatmula [10] that project managers must have excellent communication skills in the pre-construction phase in sustainable construction projects. The project manager is in charge of communicating with all actors and persuading them to adopt sustainable practices in the early stage of the project. In particular, the ability to communicate effectively between the project manager and project team will help resolve important difficulties that have a detrimental impact on the project's success [40]. Besides that, project managers must commit extra effort to interact with stakeholders for them to grasp the project's sustainability approach better. To provide practical insight into the current industry scenario, it is vital to understand what stakeholders desire from the green project life cycle [41]. The ability for a project manager to communicate with parties involved is likely

to avoid any misleading information regarding the sustainability approach.

Moreover, planning and goal setting skills (PG) have a significant relationship with the success of sustainable construction projects. This finding coincides with the statement that planning and setting a clear sustainability goal is essential to organise and select future decision making [10, 12, 42]. In terms of planning and goal-setting skills, a project manager should recognise and articulate problems in strategic planning to minimise project risks. Apart from the market conditions and visible requirements typically considered in conventional projects, setting clear goals for sustainable construction is critical for environmental goals, the sum of funds invested in sustainable technology, and the required level for a rating system [10].

Next, team building skill (TB) has a significant relationship with the success of sustainable construction projects. The project manager needs to implement the team building skills in their practices to achieve a successful sustainable construction project. According to Giri [21] and Rose [43], team building skills are required for project managers to manage a project successfully. Other than that, the team members in a project are all working toward the same goal. Nevertheless, due to competing and conflicting interests, they may be unable to work together effectively and efficiently. If a project manager is unfamiliar with the complexity and ignorant of their abilities, they will not profit from the project team's contributions [29]. Team building skill is necessary to make the project team recognise the reason of decisions are decided and convey critical preferences, encouraging learning and sharing knowledge [21]. Consequently, the project's success can be achieved by adopting team building skills in project managers' work culture throughout the pre-construction phase.

Furthermore, conflict management skill (CM) has a significant relationship with the success of sustainable construction project. Conflict management is frequently seen as a vital soft skill that outlines a project manager's obligation to assure the project's success [44]. Conflict management is frequently inextricably linked to the project manager's responsibility of managing the relationship with the stakeholder [45]. The relationship between the project manager and the stakeholders is highly beneficial during the pre-construction phase. When it comes to green construction projects, the breach of trust between project managers and clients has been identified as one of the most significant hurdles [46]. This is due to the clients are not fully aware of sustainability approaches; thus, project managers must take a proactive approach to how to deal with it. Although conflict within a project team is inevitable, project managers should always be equipped to handle it professionally to keep the project on track [1]. A project manager with strong conflict management skills can handle the nuances of stakeholder and project team interactions, preventing the project from incurring and minimising the cost of resolving conflicts.

Ideally, all eight (8) leadership skills are considered appropriate for project managers in the pre-construction phase of sustainable construction projects. However, the result indicates that motivation skills, decision making and problem-solving skills, negotiation skills, and delegation skills are not significant in relationship with the success of sustainable construction projects. Although these leadership skills are considered unimportant for project managers in the pre-

construction phase, they can be essential for project managers in other phases of sustainable construction projects.

## 6.0 CONCLUSIONS AND FURTHER WORK

The results indicate that the leadership skills of project managers such as communication skills, planning and goal setting skills, team building skill, and conflict management skill in the pre-construction phase have a significant relationship with the success of sustainable construction projects. Leadership skills are critical for project managers that can directly affect the success of sustainable construction projects. As a leader, it is the project manager's responsibility to strategically improve leadership skills to manage sustainable construction projects. However, if the project manager continues to mismanage the project, the project may face delays and cost overruns. Therefore, it is predicted that this paper will disclose the objectives of enhancing the critical leadership skills of project managers towards the success of sustainable construction projects. This is essential to facilitate the management of sustainable construction projects and to encourage project managers to improve their leadership skills whilst still focusing on the demand to achieve the sustainability goal.

Although this study's aim was met, certain limitations are indeed to be addressed. First, it was not easy to reach the respondents. This is because there is no designated population of project managers with experience managing sustainable construction projects. Furthermore, there are limitations on the reference related to leadership skills that focus on specific phases in sustainable construction projects. Additionally, most of the references are general for the whole phases of sustainable construction projects. Needless to say, the selected leadership skills in this study are relevant for project managers based on their responsibility in the pre-construction phase. Finally, for further work, the development of appropriate tools or methods is needed to assist the project manager in improving leadership skills in sustainable construction projects.

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