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Research paper

PLS-SEM Model of Leadership Characteristics facing Challenges in Malaysia Construction Industry

Nur Ain Ngah Nasaruddin, Ismail Abdul Rahman and Mustafa Musa Jaber

Faculty of Civil and Environmental Engineering, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Johor, Malaysia

Abstract

Ensuring successful completion of construction projects within the stipulated time, cost and quality; there are many challenges need to be addressed by construction leadership's team. In addressing these challenges, the team members should possess relevant leadership characteristics. Hence, this paper presents a development of PLS-SEM model on the relationship between the required leadership characteristics with the related construction's challenges. This model was generated using Smart PLS-SEM software based on questionnaire survey data from 50 valid responses. The data consisted of 43 leadership characteristics which are clustered in 5 groups and 9 construction's challenges clustered in 1 group. The developed model indicated that *Constructive Relationship* (CR) group is the most influential group with strength of impact path (β) value of 0.451 in dealing the construction challenges with *Genuine with subordinates* as the most influential leadership characteristic. While, *Quality* is the most challenges item in construction challenges group. The model is beneficial to the industry community in facing dynamism of the construction challenges ahead.

Keywords: *Leadership characteristics. Construction's challenges, PLS model*

1. Introduction

In construction organization, leaders are persons who lead actions to ensure that the given tasks are successfully carried out. Construction leaders navigate the construction process in a sustainable manner [1] which involving activities such as planning, designing, and constructing [2]. Furthermore, the construction industry nature requires construction leaders to confront with various people's attitudes and trades throughout the project life cycle [3]. Good construction leaders should also be able to change the conventional pattern of management in the industry, and setting ideal standards for other businesses to follow [4].

Previous studies had highlighted that leadership is one of the crucial elements to ensure the success of the construction projects ([5]; [6]; [7]; [8]; [9]; [10]; [11]; [12]). Distinctive leadership characteristics are useful in manoeuvring construction project to accomplish its objectives smoothly. Leadership is also a value added to management function [13] in confronting with construction's challenges in order to keep the company outstanding reputation. Hence, this paper was intended to incorporate good quality leadership characteristics for successful leaders in handling construction's challenges for Malaysia construction industry.

2. Leadership for Construction's Challenges

Leadership characteristics are a set of qualities within a person that gives progressive impact on organizational performance. Construction leaders should possess good leadership characteristics for them to confront, respond and strive in performing the project until completion. Even though there are many strong leadership characteristics revealed by previous studies however these characteristics should be selected carefully based on specific demanding situation of construction environment. Several research works unveiled that construction projects failed are due to lacking of leaders to communicate effectively which causing information cannot be imparted efficiently ([14]; [16]; [15]; [17]; [18]). Hence, amongst good characters of construction leaders for steering the project successful are problem solver, communicator and motivator [19]. Literature work related to this study able to derive 43 leadership characteristics.

Naturally construction process is not in orderly and predictable manner ([20]; [21]; [22]) thus management of the project is inevitable facing many challenges. Amongst the challenges are to improve poor team interaction and low quality of workmanship; material unavailability, provide skill to incompetence workers and difficulty of the project itself [23]. Recently, five categories of challenges were highlighted which are management challenges, resource availability & allocation, risks & uncertainties existing in the project onsite, top management support, and cost constraints [24]. For this study, nine construction's challenges were uncovered. These challenges and the identified leadership characteristics were applied as the contents of the questionnaire survey.

3. Data Collection

Data collection was carried out through questionnaire survey where the respondents are construction leaders and being selected

randomly. Valid responses from this survey are from 50 respondents who are having experiences in handling large construction projects. From the demography, the respondents are considered experienced by having minimum of 10 years of working in handling project with more than RM10 Million. The leaders were required to choose the degree of importance of 43 leadership characteristics and also 9 identified construction's challenges based on five-point Likert scale. Survey was conducted using direct distribution approach (*face-to-face*) to increase reliability and also the response rate of the survey.

4. Model Development

Structural relationship of leadership characteristics and construction challenges was developed using PLS-SEM multivariate modelling approach. Model of the relationship was constructed in Smart PLS-SEM 3 software using the collected data from the questionnaire survey. Rational of using PLS-SEM modelling is to develop theories from an exploratory study comprising several multi-stage processes [25]. SEM modelling involves three most important processes which are model specification, measurement model evaluation, and structural model evaluation. Before the modelling process, the 43 leadership characteristics were categorised into 5 groups using exploratory factor analysis technique in SPSS software. In constructing the model, leadership characteristics are considered as indicators (independent variables) while the groups are considered constructs (latent/exogenous variables). These groups are connected to construction challenge which act as construct (dependent/endogenous variable) to form structural relationship of the model.

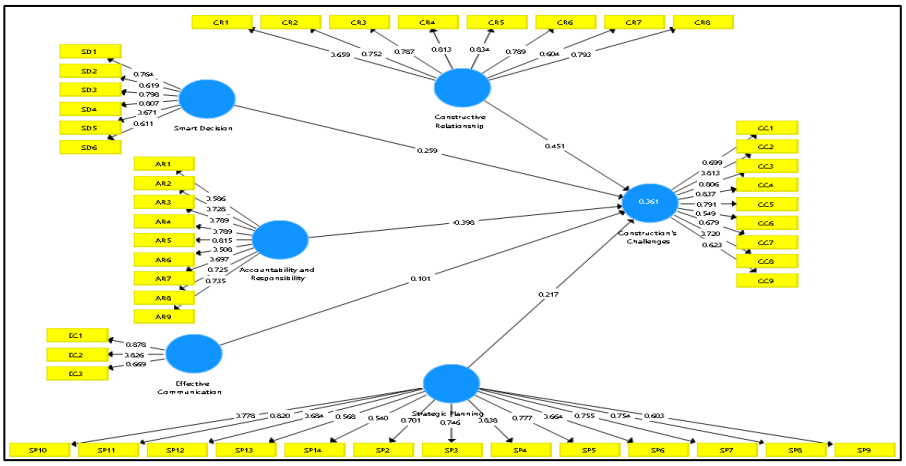

Figure 1.0: Final model

The final model in Figure 1.0 shows the measurement model which is the relationship between 48 indicators and 5 exogenous constructs and also the structural model which is the relationship between 5 exogenous constructs and 1 endogenous construct. The shape of the model is categorised as reflective model because path of the indicators are in outward direction from the constructs.
Hence, model evaluation was conducted according to the processes and regulations which comply with reflective model specification [25].

5. Model Evaluation

Evaluation of the model was conducted in two levels where the first level is measurement model and the second level at structural model. In measurement (outer) model, the evaluation was on the relationship between constructs and its observed indicators whereas in structural (inner) model, the evaluation was on the relationship between endogenous construct with exogenous constructs [27].

5.1. Evaluation of Measurement Model

According to [25], evaluation for reflective measurement model is based on two set of criteria where the first set of criteria are item reliability [*indicator factor loading >0.5*]; convergent validity [*Cronbach's alpha* (α) $\geq$ *0.7; Composite Reliability (CR)>0.708 and Average Variance Extracted (AVE)>0.5*] and the second set is discriminant validity [*square root of the AVE>correlation values between the other exogenous constructs*]. Model evaluation is usually conducted after each iteration process that uses PLS algorithm. The model evaluations and iterations are carried out alternatively until fulfilled all the evaluation criteria. This model involved 4 iterations and evaluation processes and resulted to deletion of 4 indicators in *Strategic Planning* (SP) construct/group which are having low factor loading (<0.5). By deleting these indicators, it improved the errors of Average Variance Extracted (AVE) to an acceptable level from 0.434to 0.512. The 4 deleted indicators are SP1 (*Innovative way of doing thing*), SP15 (*Create changes in construction*), SP16 (*Effective time management*), and SP17 (*Work according to the plan*). Hence, the overall results of the measurement model evaluations are as shown in Table 1.0.

Table 1.0: Results of measurement model evaluation

Constructs	Items	Description	Item reliability	Convergent validity		
			Loading	α	CR	AVE
Constructive Relationship (CR)	CR1	Collaborative approach	0.659	0.895	0.914	0.574
	CR2	Respectful in social interaction	0.787			
	CR3	Building and maintaining partnership	0.813			
	CR4	Genuine with subordinates	0.834			
	CR5	Tolerance to enhance teamwork	0.789			
	CR6	Resolving conflict	0.604			
	CR7	Counsel effectively	0.793			

	CR8	Recognize person strength and weaknesses	0.752			
Accountability and Responsibility (AR)	AR1	Honest and trustworthy	0.586	0.881	0.902	0.510
	AR2	Willingness to take responsibility	0.728			
	AR3	Project success orientation	0.789			
	AR4	Involve with unspecified construction activities	0.789			
	AR5	Responsive to subordinates	0.815			
	AR6	Leads by example	0.508			
	AR7	Motivate and inspire construction subordinates	0.697			
	AR8	Check and balance	0.725			
	AR9	Continuous quality improvement (CQI	0.735			
Smart Decision (SD)	SD1	Sound and confident decisions	0.764	0.821	0.862	0.513
	SD2	Consensus decision	0.619			
	SD3	Decision based on previous experiences	0.798			
	SD4	Assertive in decision making	0.807			
	SD5	Dynamically handling changes	0.671			
	SD6	Assign appropriate worker to specific task	0.611			
Strategic Planning (SP)	SP10	Visionary	0.778	0.921	0.931	0.512
	SP11	Adaptable and flexible	0.820			
	SP12	Courage	0.684			
	SP13	Effective use resources	0.568			
	SP14	Familiarize with the given task	0.540			
	SP2	Proactive in tackling problem	0.701			
	SP3	Knowledgeable	0.746			
	SP4	Develop good team members	0.838			
	SP5	Setting priorities	0.777			
	SP6	Ability to identify obstacles	0.664			
	SP7	Create strategies	0.755			
	SP8	Effective delegation	0.754			
	SP9	Positive thinking	0.603			
Effective Communication (EC)	EC1	Tailored communication	0.878	0.714	0.837	0.634
	EC2	Imparting information effectively	0.826			
	EC3	A good listener	0.669			
Construction's Challenges (CC)	CC1	Resource allocation	0.699	0.889	0.910	0.533
	CC2	Time management	0.813			
	CC3	Cost management	0.806			
	CC4	Quality	0.837			
	CC5	Safety	0.791			
	CC6	Complex issues	0.549			
	CC7	Change	0.679			
	CC8	Uncertainties	0.720			
	CC9	Communication	0.623			

Results from Table 1.0 indicate that all the values of item reliability and convergent validity of the measurement model are above the cut-off values or meeting the first set of evaluation criteria. The most dominant characteristic with loading factor in each of the leadership characteristic group are CR (*Genuine with subordinates*, 0.834), AR (*Responsive to subordinates*, 0.815), SD (*Assertive in decision making*, 0.807), SP (*Develop good team members*, 0.838), and EC (*Tailored communication*, 0.878). However for the second set of criteria which is discriminant validity, the evaluation was conducted according to Fornell-Lacker criterion which is to compare the square root of the AVE with the correlation of exogenous constructs [25]. Results of discriminant validity evaluation are as in Table 2.0.

Table 2.0: Fornell-Lacker criterion for discriminant validity

	AR	CR	EC	SD	SP
AR	0.714				
CR	0.713	**0.758**			
EC	0.388	0.381	**0.796**		
SD	0.750	0.654	0.386	0.716	
SP	0.788	0.751	0.412	0.717	**0.716**

#note: AR= Accountability and Responsibility, CR=Constructive Relationship, EC=Effective Communication, SD=Smart Decision, and SP=Strategic Planning

The results in Table 2.0 show that three constructs which are CR, EC and SP are having values of square root of the AVE (*which is bolded*) larger than other correlation values among the exogenous constructs and are considered to achieve the discriminant validity [29]. However for the AR construct the value of its square root of the AVE is lower when compare with AR-SD and AR-SP values with the differences of 0.036 and 0.074 respectively. Similarly, SD construct also having value lower than SD-SP value with the difference of 0.001. Even though the overall discriminant validity is partially established but the differences of square root of the AVE are significantly small and hence can be accepted [34].

5.2. Evaluation of Structural Model

Evaluation on the structural model based two criteria in which the first criteria is by checking the strength of impact path (β) of independent variable to the dependent variable. According to [31] β value should be above 0.1 regardless its signage either positive or negative [25]. While the second criteria, is the explanatory power (R^2) of the model which describes the overall ability of the model in representing the impact of independent variables toward the dependent variable [32]. According to [33], R^2 is considered substantial, moderate, and weak if R^2 is approximately around 0.26, 0.13 and 0.02 respectively. Results of the evaluation of the first criteria are as in Table 2.0.

Table 2.0: Results of impact paths

Rank	Independent Variables	Path Co-efficient (β value)	Dependent Variable
1	Constructive Relationship	0.451	Construction's Challenges
2	Accountability and Responsibility	-0.398	
3	Smart Decision	0.259	
4	Strategic Planning	0.217	
5	Effective Communication	0.101	

Results in Table 2.0 show that all path coefficient absolute values are more than 0.1 which indicate strong impact of predictor independent variable on the dependent variable. Based on **β** values, it indicates that Constructive *Relationship* (CR) group is having the strongest influence in handling construction's challenges. For the second criteria, the generated R^2 value for the structural model is 0.36 means the developed model has substantial explaining power in representing the impact of the 5 groups of leadership characteristics in handling construction's challenges.

6. Conclusion

There are many challenges in ensuring the success of implementing construction project. It requires several techniques and tools to overcome these challenges. Amongst them is the good leadership characteristics approach. This paper has succeeded in establishing the relationship between the required leadership characteristics with the respected construction challenges through PLS-SEM model. It also describes on the development and the evaluation of the model to ensure that the model is fit for relationship representation. The model implies that *Constructive Relationship* (CR) group has the highest influences on the construction challenges with *Genuine with subordinates* is the most influential leadership characteristic. While, *Quality* is the most challenges item in construction challenges group. This model is beneficial to the industry community in facing dynamism of the construction challenges ahead.

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