

Conference Paper

Project Management Performance and Its Influence on Malaysian Building Projects

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Abstract

Working environment and safety behavior are the primary concern in construction projects which in the long run are part of the yardstick in measuring project management performance. Construction safety and performance should be thoroughly investigated empirically by illustrating the current state of accident and performance in construction industries. Entrenched in the Malaysian construction industry experience, three dimensions of the project management performance (resolve cost, schedule, and quality) can buffer the contractor's and project manager's performance in building projects. Following organizational control theory, this research investigated the effects project management performance (resolve cost, schedule, and quality) on construction projects among G-7 contractors operating in Kuantan Malaysia construction industries through a personally administered questionnaire. Structural equation modeling (SEM) opined that schedule and quality have positive and significant influence, while resolve cost has a significant negative influence on Malaysia construction projects.

Keywords: project management performance, building project, contractor, project managers, client, construction industries, PLS-SEM.

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1. Introduction

Most of the industry sectors, like management consulting, information technology and construction, are progressively project-based, of which construction is undoubtedly the most complex and largest one (Adeleke et al., 2018; Whitley, 2006). The significance of contractors and project managers has been extensively recognized in project-based industry sectors, particularly in the building construction industry (Adeleke et al., 2019; Papke-Shields et al., 2010). Due to that, a great amount of research exertion has been made to deeply investigate both contractors and project managers towards their performance to the clients. These investigations as a whole underwrite to an up-to-date

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understanding of current knowledge of contractors and project managers as well as broader project management (Meng & Boyd, 2017; Adeleke et al., 2015).

Likewise, the success of every construction project is the sole objectives of project investors, including the contractors, and clients. The importance of project success has become the basis of almost every studies to investigate the factors that influence the success of every construction project. In addition, the clients of public projects are developing various delivery and procurement methods that consider the project characteristics and the most appropriate contractor for each project. Prior studies have focused on both delivery methods and contractor selection procedures. To ensure project success, the most frequently employed method is by identifying the critical factors influencing project performance and developing a pre-qualification model for selecting the most appropriate contractor or delivery method based on the relationship between project performance and the project characteristics affecting it. Construction work is described as civil engineering jobs and all kinds of new buildings such as hospitals, schools, homes, hotels, factories, and others (Wells, 2000). The construction industry plays a big role in the nation by contributing significantly to Gross Domestic Product (GDP), employment, capital and interaction between various economies (Adeleke et al., 2017; Hillebrant, 2005). This study aims to shed a light on the importance of resolve cost, schedule and project quality in influencing building projects from the global perspectives.

This research attempts to bridge the gap within the growing body of knowledge in this domain. It targets building construction projects in Malaysia. The objectives of this research are twofold: Firstly, to investigate the awareness and knowledge of contractors and project managers about project management performance on building projects; secondly to analyse the relationship between project management performance in terms of resolve cost, schedule and quality on building projects. This research mirrors the shift in building construction from planning till the closing phase of the projects, which implies that the construction industry is replacing traditional management philosophies with new management paradigms. It provides researchers and practitioners with deeper insights gained from construction practice today. Although it is based on construction projects, its findings may also be useful for project management in other industry sectors. The extant literature has indicated the essence of integration in attaining a better project success and performance. Aronson et al. (2013), for instance, outlined the various impacts of the leader's activities and project spirits on the success of construction projects. In the same manner, Ozorhon et al. (2014) enumerated certain enablers in construction innovation, such as leadership and integration. Furthermore,

Crawford (2005) indicated that project directors that are utilizing better integration and scope practices are always the top players in the industry.

Therefore, this study intends to contribute to filling the identified study gap through a conceptual framework that will picture the essentials of project management performance. The rationale for this framework is to bring about a reflection of the relationship between project management performance and building project considering the perceptions of the construction practitioners. In Figure 1, the components of the project management performance derived from this study and its relationship with building projects are portrayed. Likewise, Kuantan has been chosen in this study because it is becoming a centre of focus for more construction projects due to huge numbers of tourist visiting for attraction and relaxation.

2. Literature Review

2.1. The influence of project management performance on the building project

In this study, we intend to measure project management performance through project success, as suggested in the previous related studies (Demirkesen & Ozorhon, 2017; Mir and Pinnington, 2014). Majority of the previous studies on project success-focused mainly on timely completion (Meng & Boyd 2017), completion that are under budget (Bassioni et al., 2004; Berssaneti and Carvalho, 2015), quality criteria (Chou et al., 2013), customer satisfaction (Gayatri & Saurabh, 2013; Cserhati and Szabo, 2014; Nassar & Abourizk, 2014), as well as safely completed work (Almahmoud et al., 2012). Based on these reviewed previous works, this study also adopts the factors that are mostly discussed to measure project management performance in order to determine project success. The attributes of influencing project performance have been defined extensively. The study conducted by Ling et al. (2004) presented the project attributes affecting project performances, which were divided into three categories: (i) project attributes, (ii) owner and consultant attributes, and (iii) the contractor attributes. The project attributes include the gross floor area of the project, the form of contract, the type of building, the level of design and construction complexity, the percentage of repetitive elements, the time given to contractors to prepare their bids, the number of bidders, the bid evaluation and selection criteria, the author report a positive influence of cost, time and quality on construction projects. Alhazmi and McCaffer (2000) also outlined the type of project, degree of flexibility and complexity, time constraints, method of

payment, as well as the integration of the design and construction as project features that are important in positively influencing project performance.

Quality, cost, and time are the major project performance attribute that requires measurement and continuous improvement. The Quality Performance Index (QPI) is a measure of consistency in the application of the project standards and procedures, and the compliance of the delivered product with the project specifications. Inconsistency in the application of project processes will lead to rework, poor quality audits, and a high number of Non-Conformance Reports (NCRs). From the contractor's perspective, the QPI is best measured by the Construction Field Rework Index (CFRI) as defined in Fayek et al. (2003). The costs resulting from rework caused by change orders do not contribute to the quality performance and are excluded in the QPI calculations. These aforementioned project performance attributes have a significant relation to construction projects (Nassar & AbouRizk, 2014). Others, such as Lo et al., (2006) also identified poor performance (in terms of time delays and cost overruns) as a common phenomenon in construction projects delivery, and some of the reasons behind these identified anomalies have been attracting the attention of construction researchers and practitioners. Earlier, Mansfield et al. (1994), for instance, identified four important issues that are mostly responsible for time delays and cost overruns. Their study beamed their searchlight on finance and payment problems, changes in site conditions, poor contract management, and material shortage. According to Kaming et al. (1997), the predominant factors that are capable of influencing time delays include design changes, inadequate planning, poor labour productivity, as well as a shortage of resources. Frimpong et al. (2003) also affirmed that there is a positive relationship between cost and time in construction project delivery in Ghana. Hence, the following hypothesis was developed based on the strong evidence provided by the literature considering the influence of project management performance on construction projects, specifically building projects as depicted in Fig.1.

H1. There is a significant positive relationship between resolve cost and building project.

H2. There is a significant positive relationship between schedule and building project.

H3. There is a significant positive relationship between quality and building project.

3. Methodology

This research method is based on SEM, and the research model was ascertained through the SmartPLS 3.0 software (Ringle, Wende, & Becker, 2015). PLS-SEM seems an

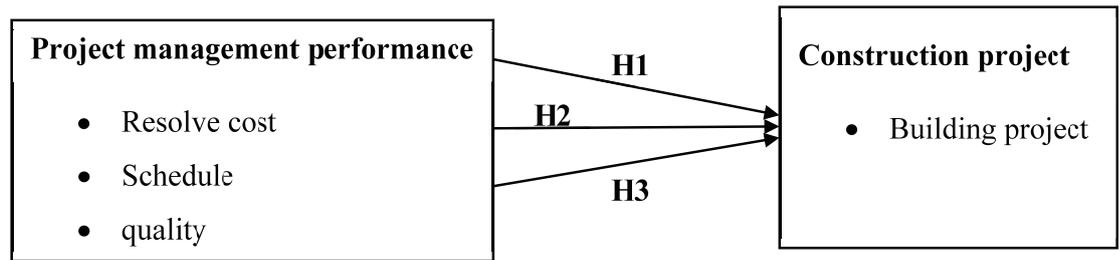


Figure 1: Conceptual Model.

appropriate method to assess the results in the current research because its algorithm permits the unrestricted computation of cause-effect relationship models that employ both reflective and formative measurement models (Diamantopoulos & Siguaw, 2006); therefore, the reflective approach was employed in this research. Project management performance is a second-order reflective construct with three dimensions: resolve cost, schedule, and quality.

3.1. Sample and Data Collection

This study is a cross-sectional research design in nature, that shows data were gathered at a single-point-in-time using structured questionnaire among the G-7 contractors such as contract manager, executive director, marketing manager, project manager and engineer operating in Kuantan Malaysian construction industries (Kumar, Abdul Talib & Ramayah, 2013; Sekaran & Bougie, 2013). Therefore, proportionate stratified random sampling techniques were also employed in this research. A total of 120 questionnaires were obtained through face to face distribution; Hence, the final valid sample comprised of 115 contractors after removing those with incomplete answers.

3.2. Variable Measurement

To ensure that all the constructs in this study are properly measured, the items used in their measurement were adopted from various sources and then adapted to suit the objective of this study. These items were adopted from Meng and Boyd, (2017); and Demirkesen and Ozorhon, (2017) with the main aim of ensuring construct validity in terms of (a) creating contact prior to the main study between the researcher and the organizations (b) ascertain the reliability of the constructs and (c) anticipate the likely challenges that may arise before the actual data collection of the study. Similarly, the study adopted the use of five-point Likert scale rating from 0.1 = 'very low,' 0.3 = 'low', 0.5 = 'medium', 0.7 = 'high', 0.9 = 'very high', to measure the feedback to the questionnaires.

Likewise, all the constructs/variables in this study are multidimensional. The detail of the constructs and their analogous dimensions are depicted in Table 1.

TABLE 1: Sources of measurement.

S/N	Constructs	Dimensions	Sources	Remarks
1	Project management performance	Resolve cost	Demirkesen & Ozorhon, 2017	Adapted
		Schedule	Demirkesen & Ozorhon, 2017	Adapted
		Quality	Demirkesen & Ozorhon, 2017	Adapted
2	Construction project	Building project	Meng & Boyd, 2017	Adapted

3.3. Common Method Bias

Since all the gathered data used in this study have been received through a structured questionnaire and all depend on the contractor’s perceptions, common method variance can cause biased estimations. Podsakoff et al. (2003) suggested that both procedural and statistical methods can be applied to control for this assertions. First, all the participants were well-versed about the anonymous character of the answers to be provided, and questions were organized without any logic or apparent order. Second, if a common method bias exists, a single factor should appear from the exploratory factor analysis (Krishnan, Martin, & Noorderhaven, 2006). The results revealed the presence of two different constructs that together explained 64% of the total model variance for the sample of 115 individuals. The highest factor, related to resolving cost, schedule, quality and building project, explained 32.33%, 27.42% and 41.12% of the total variance respectively. As an outcome, apparent global factor and common method bias is not a problem in the data.

4. Results

4.1. Descriptive Results

Prior to the analysis of this study’s model, a descriptive analysis of the variables in this study’s model is reported. Total of 115 valid responses from the respondents was used for this result. there were 10.9% contract managers, 3.4% executive directors, 5.0% marketing managers, 31.5% project managers and 30.3% engineers. Their work experience is between one (1) to forty-seven (47) years. Based on this description, the sampled respondents can be adjudged conversant with project performance in

the industry and are well-informed to participate in this study. A contingency analysis revealed that there is no significant coincidence between the two constructs ($\text{Chi}^2 = 0.794$; $p\text{-value} = 0.373$).

4.2. Measurement Model Assessment

To ascertain the psychometric behaviours of the scales adopted in this research, individual item reliability, internal consistency reliability, and discriminant validity was computed. First, individual item reliability was determined by analysing the outer loadings of each construct's measure (Hulland, 1999). Following the rule of thumb for holding items with loadings above 0.50 (Barclay et al., 1995). The authors deleted 11 of 29 items because of loadings below the threshold. However, for the whole model, only 19 items were retained with the loading between 0.594 and 0.895, as shown in (Fig 2 and Table 2).

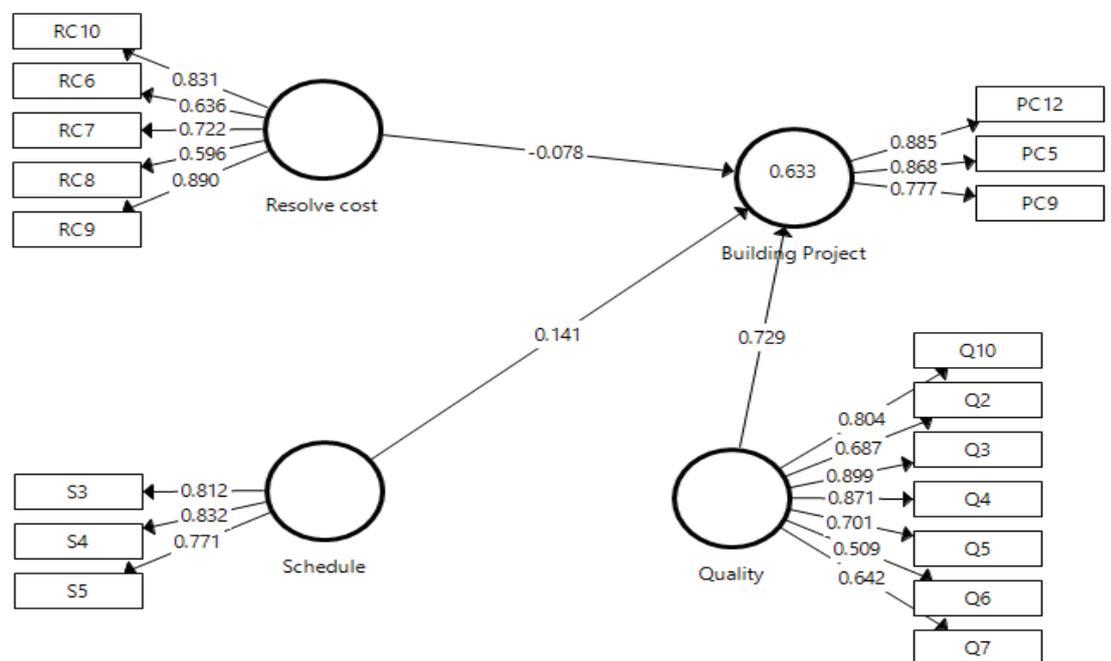


Figure 2: Measurement Model.

Table 2 shows the element that was used to determine construction project (building project) with one dimension, while project management performance dimensions were assessed with resolve cost, schedule and quality. Then, the composite reliability coefficient was used to determine the internal consistency reliability of items measured. Moreover, the composite reliability coefficients, based on the suggestion of Bagozzi and Yi (1998) and Hair et al. (2016) that the composite reliability coefficient should be 0.7 and above, Table 2 depicts these coefficients for each of this study's latent

TABLE 2: Measurement Model Assessment Results.

Construct	Items	Outer Loadings	Cronbach's Alpha	Composite Reliability	AVE
Resolve Cost	RC6	0.662	0.77	0.86	0.556
	RC7	0.764			
	RC8	0.609			
	RC9	0.861			
	RC10	0.803			
Schedule	S3	0.828	0.725	0.847	0.65
	S4	0.834			
	S5	0.754			
Quality	Q2	0.679	0.79	0.893	0.55
	Q3	0.895			
	Q4	0.869			
	Q5	0.701			
	Q6	0.516			
	Q7	0.649			
	Q10	0.807			
Building Project	PB1	0.594	0.578	0.841	0.578
	PB5	0.843			
	PB9	0.782			
	PB12	0.864			

constructs. As indicated in Table 2, the composite reliability coefficient of each latent construct stretched from 0.841 to 0.893, as they are above the proposed threshold of 0.70; therefore, this study consistency reliability is acceptable (Hair et al., 2011).

TABLE 3: Discriminant Validity.

	Building project	Quality	Resolve cost	Schedule
Building project	0.844588			
Quality	0.782158	0.721275		
Resolve cost	0.146548	0.22442	0.744214	
Schedule	0.613547	0.578272	0.396579	0.735469

**Note. The diagonal values in bold signify the average variance extracted (AVE) while the other entries signify the squared correlations.*

In the same vein, discriminant validity was determined using Average Variance Extracted (AVE) based on the suggestions of Fornell and Larcker (1981). This was achieved when the comparison was made in the correlations between the latent variables, which was attained with the square root of the Average Variance Extracted (AVE). To achieve acceptable discriminant validity, these researchers (Fornell & Larcker, 1982) also suggested that the square root of the Average Variance Extracted (AVE) must

be higher than the correlations between the latent variables. In Table 3, the correlations between the latent constructs were compared with that of the square root of the AVEs (indicated in boldface). Table 3 also shows that the square roots of the AVEs were all higher than the correlations between the latent constructs. Therefore, this study proposed sufficient discriminant validity.

4.3. Structural Model Assessment

To establish a significance of the coefficients for the research model, the authors used a standard bootstrapping process with 500 bootstrap samples and 115 cases (Hair et al., 2012). Table 4 and Fig.3 shows the significant paths for this research model. Fig. 3 shows the diagrammatical histrionics of the results for the structural modeling analysis proposed for checking the hypothesized association among the latent variables. Given that the author’s hypotheses are specified in a directional form, and the power of the one-tailed test is higher than for a two-tailed test, the one-tailed test was selected for this research.

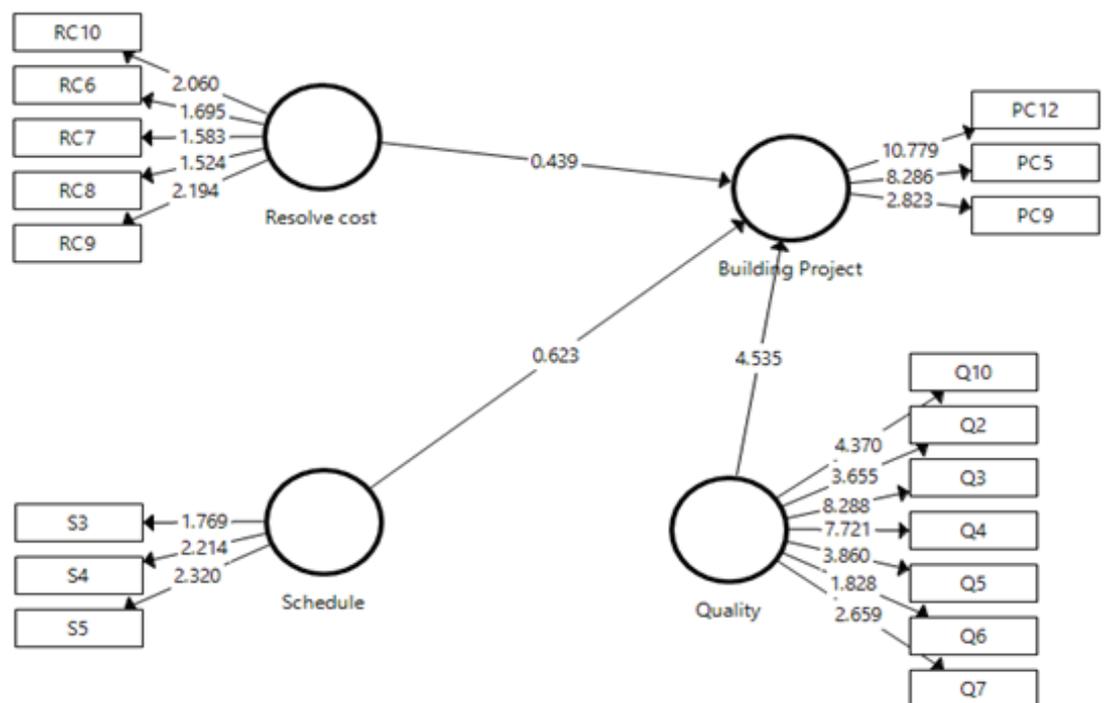


Figure 3: Bootstrapping Outcome.

In a nutshell, the authors are not suggesting the ignore the two-tailed test while testing a theory because we understand that there are some circumstances in which a two-tailed test is applicable (Kimm, 1957). Zikmund et al. (2009) for example, opined that a two-tailed test is more suitable when the researcher is not sure about the direction

TABLE 4: Path coefficient.

Items	Hypothesis	β	S/E	T	P	Findings
H1	Resolve cost -> Building Project	-0.077	0.182	0.422	0.673	Not Supported
H2	Schedule -> Building Project	0.14	0.214	0.655	0.513	Not Supported
H3	Quality -> Building Project	0.729	0.158	4.627	0.000	Supported

*p < 0.10, **p < 0.05, ***p < 0.01 (one-tailed tests)

of the hypothesis to be tested. Hypothesis 1 predicted that resolve cost would have a significant relationship with the building project. The results (Table 4) revealed that resolve cost has a negative relationship with building project such that the relationship between the variable is weak ($\beta = -0.77$, $p < 0.673$). Therefore, Hypothesis 1 was not supported.

Likewise, it was anticipated with Hypothesis 2 that schedule would have a significant relationship with the building project. The results opined that the schedule has a negative relationship with the building project ($\beta = 0.14$, $p < 0.513$). Therefore, Hypothesis 2 is supported as proposed.

Hypothesis 3 proposed that quality would have a significant relationship with the building project. The results revealed that quality significantly related to a building project with ($\beta = 0.729$, $p < 0.000$).

4.4. Effective Size and Predictive Relevance

After the significance path coefficients for the research model has been accessed, the authors evaluated the level of the R^2 values, effect size, and predictive relevance for the research model. The research model explained 63% of the total variance in building project; all the three exogenous latent variables (i.e., resolve cost, schedule, and quality), individually, explained 63% of the variance in a building project. Falk and Miller (1992) proposed 0.10 as the minimum accepted R^2 level. Effect size shows the relative influence of a specific exogenous latent variable on the endogenous latent variable(s) through the changes in the R^2 values.

Cohen (1988), suggested f^2 values of 0.35, 0.15, and 0.02 can be regarded as a large, medium, and small effects, respectively. Our results opined the effect size of 0.10, 0.38, and 0.77 for resolve cost, schedule, and quality, respectively through the effect size calculator. The present research makes use of the Stone-Geisser test to ascertain the predictive relevance of the whole research model using the blindfolding processes (Geisser, 1974). To be specific, Results affirmed Q^2 statistic of 0.309 for this study's

endogenous latent variable that is greater than zero, indicating predictive relevance of the model (Chin, 2003).

5. Discussion

This paper aimed to analyse if project management performance dimensions will influence building projects among the G-7 contractors in Kuantan Malaysia. Going by the previous research, project management performance has a significant positive influence on building projects as a strategy to deal with quality and how satisfied client are on building projects to be specific. This research proposes that schedule and quality are paramount aspects of project performance that determine client satisfaction on projects. Likewise resolve cost in Hypothesis 1, although this study result viewed it to have less significant influence on building project because at the initial stage of contract agreement between the client and the contractors, the cost of the building project will be sealed and no client will be ready to top-up extra cost incurred by the contractors on additional procurement on project execution. A general conclusion is that schedule and quality will significantly influence the building project.

Our results confirm that the schedule has a significant positive relationship with building projects as proposed with Hypothesis 2, anticipating that projects that keep to a schedule will always reach the heart of every client. This result is consistent with the study of Demirkesen and Ozorhon, (2017) which concluded that there is a significant positive relationship between schedule and building project. In a nutshell, every contractor that execute and transfer a project to the client within the stipulated time will always have the opportunity to be patronised by the client or associate partners for future transactions.

Similarly, Hypothesis 3 proposed that quality will have a significant influence on a building project. Result confirms that a significant positive relationship exists with quality and building projects. This is not surprising because it is the utmost expectations of every client even with low cost on a project, the quality will be the hammering point to the contractors, consistent with the study of (Meng & Boyd, 2017).

The contribution from this research to the growing body of knowledge within this domain, specifically construction management literature, is twofold. First, we opined evidence that schedule and quality as project management performance factors can positively influence building projects. These project management performance factors are different from customer satisfaction factors because the former are performance mechanisms that are within the control of contractors, while the latter pre-empt the

development of the clients and are beyond control because satisfaction is subjective due to different yardstick from every client's perspectives. These findings ratify project management performance on building projects; hence this theoretical framework is appropriate for this research. Second, it contributes by providing new evidence that resolves cost is not having a strong positive influence with building projects due to the client's requirements on a certain project and by investigating comparison in customer satisfaction preferences. This attributes of project performance provide better knowledge about how the revealed dimensions (schedule and quality) can buffer the building project and of course, successful delivery of the project to the clients by meeting their objectives.

5.1. Implications

This research permits us to provide some useful and interesting implications. Contractors should take into account that schedule and quality can increase building projects through their timely consciousness and quality attainment in every project. As a result, these contractors should be trained in meeting the delivery period has been undertaken by the clients and to avoid extension of time (EOT), more so, quality should always be at the back of the contractor's mind in order to provide the clients with the satisfaction they deserve, in the long run, the contractors will as well meet their own project objectives. Schedule monitoring software like Gantt chart and Primavera will also help the contractors to keep to time and track every project tasks till milestone stages. Contractors should as well hire team members with high team competency, effective communication, and active leadership as this will help to increase the quality and allow timely delivery of the projects. Furthermore, team members should be persuaded in attending training and courses on effective project management performance through resolve cost, schedule, and quality.

Although the project management performance dimensions (resolve cost, schedule, and quality) investigated in this study are not easily controllable social factors, project managers should try to adopt persuading approaches in dealing with the clients when it comes to late delivery of project which might lead to extension of time (EOT) to avoid total abandonment of the whole project, likewise techniques in presenting the overall project to the clients because quality identification depends on the preferences of individual clients requirements. Our research also provides contractors, project managers, team members, and clients with some strategies as to know how to deal with difficult situations in project execution and delivery.

In the same vein, the result of this study echoes that, when compared to resolve cost, schedule, and quality, construction industries with efficient project management performance would likely exhibit higher project success. Implementation of the project performance dimensions could also result to more projects issuance by the clients which will foster ease of life within Malaysia because, in the long run, it will lead to the affordability of houses and other buildings. More so, Increase in projects issuance might aid to develop new job opportunities to people, and richly buffer wealth formation, which is required to support Malaysia's economy. It might also lift Malaysia's global recognition in term of building projects and thus, brings in more investors. Besides, there is also a need for the development of policies that encourage and support projects issuance. Policymakers should, therefore, develop initiatives that can motivate contractors and project managers to adherence to effective project management performance in order to attract client's patronage. Policymakers might as well consider organizational control theory to mitigate the occurrence of less quality, cost overrun, and time overrun on projects.

5.2. Limitation and Paths for Future Research

Our research is not without limitations, which allows us to give rooms for future researchers. First, the data were gathered through a survey conducted in one of the states in Malaysia, so the generalization of these results should be carried out with caution. Future studies might carry out this research in other countries contexts to ascertain if the results investigated in Malaysia will be similar. Likewise, a longitudinal analysis might provide better findings, such as going to the field to obtain the data more than once and test if differences exist.

Second, our study focused on resolve cost, schedule, and quality in the building project. Therefore, these dimensions of project performance can be used in another aspect of construction projects, such as road projects, bridges, airports, and dam projects. So, further research might investigate other Grades of Malaysian construction industries apart from Grade 7 contractors to know if there is similarity in the results because other Grades of the contractors might have potential positive contributions to the construction industry as well.

Some precautions are needed in generalizing this study's results, as data for this research were obtained from a single state in Malaysia. This study has been directed solely to the contractor's perceptions. Future studies might consider investigating other top management in construction industries such as decision and policymakers.

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