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Abstract: The rapid economic development has increased the demand for construction of infrastructure and facilities globally. Sustainable development and globalization are the new 'Zeitgeist' of the 21st century. In order to implement these projects successfully and to meet the functional aim of the projects within their lifetime, an efficient project management practice is needed. The aim of this study is to identify the critical success factors (CSFs) and the extent of use of project management practice which affects project success, especially during the implementation stage. Data were obtained from self-administered questionnaires with 232 respondents. A mixed method of data collection was adopted using semi-structured interview and questionnaire approach. The result of the analysis of data obtained showed that new and emerging criteria such as customer satisfaction, competency of the project team, and performance of subcontractors/suppliers are becoming measures of success in addition to the classic iron triangle's view of time, cost and quality. An insight on the extent of use of different project management practice in the industry was also achieved from the study.

Keywords: CSFs; Project Management practices; Project success.

1. Introduction

The construction industry is vital since rapid economic development has increased the demand for construction of infrastructure and facilities around the globe. The construction industry also provides the basic living conditions for the sustainability and development of human life on the earth. To cope with an ever-increasing population, pressure on land, and growing economic activity, construction projects are in increasing demand and activities are booming in many countries [26]. More also, projects and initiatives are implemented to ensure sustainable growth of nation economy and to create extensive linkages within the economy. To implement these projects successfully and to meet the functional aim of the projects within their service time, an efficient PM practice needs to be adopted from the planning stage to end.

Frequently, those that are involved in the project handling, fail to take a proactive approach to overcoming the uncertainties [18, 19]. As a result of this, project delays and budget overruns are usually encountered due to an overlook of potential risk. Insufficient information and ineffective management of project not only caused project cost overrun, completion delays but also termination before completion and negatively impact the project team's reputation. To improve the chance of success and reduce the potential failures, the success criteria, and uncertain factors should be carefully identified, assessed and monitored [14].

The Malaysian construction industry plays a vital role in the country's economy, yet it has been plagued with bad publicity of cost overruns, uncontrolled and unrealistic schedules, accidents, poor workmanship, conflict among project team members, abandoned and unfinished private and public construction projects [21]. It is now common to see structures collapsing, roads cracking, bridges toppling and what could be next, show some down pit situations for the construction industry in Malaysia as has left a bad impression on the minds of the public. There is a need and urgency to prevent the failure of projects especially due to poor project management practice in the industry.

Nowadays, projects are far more complicated than ever before due to large capital investments, embrace several disciplines, widely dispersed project participants, tighter schedules, stringent quality standards, escalating cost, environment shocks, increasing stakeholders' power and advancement in ICT [2]. Project success may be judged on the basis of how well the resultant product or service supports organizational governance. It is important for the project manager to be knowledgeable about corporate/organizational governance policies and procedures pertaining to the subject matter of the product or service. To ensure the success of the project, the project manager must have the requisite knowledge of project management.

The 12 CSFs commonly related to the implementation of project success identified from a study on 136 European projects that were executed between 1994 and 2004 are categorized into 3 major areas: project management success, individual project success, and corporate success [6]. Table 1 shows some critical factors for successful project accomplishment from the perspective of authors in their studies.

Table 1: Identified Critical Success Factors (CSFs)

Critical Success Factor	Authors
Clear project management objectives	Al-Tmeemy, et al. (2011); Zhang, et al. (2013); Fortune & White (2006); Joyce et al. (2011); Karen, et al. (2010); Khang, et al. (2008); Ofori, (2013).
Top management support	Fortune & White (2006); Hyvari, (2006); Joyce et al. (2011); Khang, et al. (2008); Ofori, (2013); Turner & Muller (2005); Verburg et al. (2013).
Information/ effective communication	Al-Tmeemy et al. (2011); Hyvari, (2006); Joyce et al. (2011); Ofori, (2013); Verburg et al. (2013).
Client involvement	Fortune & White (2006); Hyvari, (2006); Joyce et al. (2011); Khang, et al. (2008); Turner & Muller (2005).
Competency of project team	Zhang, et al. (2013); Fortune & White (2006); Joyce et al. (2011); Ofori, (2013); Verburg et al. (2013).
Authority of the project manager/leader	Zhang, et al. (2013); Fortune & White (2006).
Realistic cost and time estimates	Abu Hassan et al. (2009); Akewushola et al. (2012); Al-Tmeemy et al. (2011); Fortune & White (2006).
Adequate project control	Fortune & White (2006).
Problem solving abilities	Zhang, et al. (2013); Hyvari, (2006).
Project performance and quality	Akewushola et al. (2012); Al-Tmeemy et al. (2011); Karen et al. (2010).
Adequate resources	Abu Hassan et al. (2009); Al-Tmeemy et al. (2011); Hyvari, (2006); Joyce et al. (2011); Khang, et al. (2008).
Effective planning	Fortune & White (2006); Joyce et al. (2011); Khang, et al. (2008); Turner & Muller (2005).
Monitor performance and feedback	Fortune & White (2006); Hyvari, (2006); Joyce et al. (2011); Turner & Muller (2005).
Project mission/common goals	Al-Tmeemy et al. (2011); Hyvari, (2006); Khang, et al. (2008); Turner & Muller (2005); Verburg et al. (2013).
Adequacy of contingency plan (Risk management)	Joyce et al. (2011); Ofori, (2013).
Customer satisfaction	Abu-Hassan et al. (2009); Akewushola et al. (2012); Al-Tmeemy et al. (2011); Zhang, et al. (2013); Ofori, (2013).
Well-laid out specification	Joyce et al. (2011); Ofori, (2013).
Effective selection/use of technology	Joyce et al. (2011); Verburg et al. (2013).

Developing a more comprehensive framework is essential to improve the success rate of projects since more organizations are expected to manage multiple projects in order to achieve competitive advantages [22]. A very comprehensive project management framework should consider other elements to include cultural, structural, practical, and personnel [3]. Due to the myriad challenges faced by this construction

industry. The aim of the study is to identify and assess the critical success factors (CSFs) and the current practice of project management that affects project success at the implementation stage.

2. Methodology

A mixed method of enquiry was adopted for a better understanding of the behavior of Malaysia construction industry in managing a project. Data were collected using a quantitative approach, where a systematic empirical investigation of observable phenomena via statistical, mathematical or computational techniques [27] involved. A questionnaire comprising 16 closed ended questions were developed with a mixture of multiple choices, five-point Likert scale options [14].

After finalizing the questionnaire, a pilot test was undertaken with 30 targeted respondents to ensure that respondents would understand the questions and identify possible problems with the completion of the questionnaire. The widely acceptable response rate in the construction industry for electronic questionnaire is 20 – 30% [4, 7]. The respondents were drawn from the G1 to G7 construction companies in Klang Valley in Selangor state in Malaysia. A total of 378 questionnaires were administered, and only 232 were returned, which represented 61.4% of the expected population. The questionnaire comprised of four sections.

3. Results

In this research, Statistical Package of Social Sciences-SPSS 20 software was utilized for both quantitative and qualitative methods, with cross-tabulations to clarify the relationships between the variables [16]. Basic descriptive analysis was conducted to find the standard deviation of the variable. The aim is to find the most relevant variables in the specified category. Furthermore, the results use as a baseline for comparing independent variables.

The reliability of multiple Likert scale questions was measured using Cronbach's alpha. The alpha value obtained was 0.928 which shows a high level of internal consistency for the scale with this specific sample. Goodman and Kruskal's λ was also run to determine whether the three (3) related variables could better predict by class of contractors and the findings shown in Table 2. The Goodman and Kruskal's λ were 0.110 for the maturity level of PM, 0.057 for organization support and 0.175 for project success. These indicate that there are some proportional reduction in errors in predicting the followed dependent variables when taking into account the class of contractor as an independent variable. However, there was no statistically significant decrease in the proportion of errors due to the tested dependent variables as predictors of the class of contractor.

This indicates that any scale of construction firms should choose appropriate PM practice based on project needs, and its success relies on how well the practices being utilized during the implementation stage. Based on Table 2, the maturity level of project management identified is at "defined level" and the project success rate is average to more successful.

Table 2: Level of Project Management Practice, Organization Support and Rate of Project Success

Variable	**Nominal by Nominal: Lambda**			
Dependent Variable	Value	Asymp. Std. Error	Approx. T[b]	Approx. Sig.
Maturity level of PM	0.110	0.074	1.408	0.159
Organization support	0.057	0.040	1.406	0.160
Rate of project success	0.175	0.055	2.945	0.003

Table 3: Descriptive Statistics for Contractors' Critical Success Factors (CSFs)

Critical Success Factors (CSFs)	**N of Valid cases**	**Mean**	**Std. Dev.**	**Symmetric Measures**		**Rank**
				Value	**Approx. Sig.**	
Financial attributes (Turnover	223	4.36	.754	-0.08	0.366	3

history, credit history, etc.)						
Effective planning and controlling	222	4.38	.683	0.022	0.808	2
Realistic cost and time estimation	223	4.32	.626	-0.051	0.571	4
Competency of project team	223	4.30	.702	-0.037	0.672	5
Adequacy of resources (Labour, plant, etc.)	221	4.26	.670	-0.09	0.322	7
Contractual awareness	221	4.16	.681	0.05	0.579	10
Past projects' experience and performance records	222	3.99	.751	0.083	0.323	13
Organization attributes (Image, length of time in business, etc.)	222	3.76	.781	0.09	0.274	15
Top management support	222	4.21	.717	0.131	0.119	8
Performance of subcontractors/suppliers	222	4.29	.717	0.205	0.016	6
Total quality management	220	4.17	.724	-0.016	0.851	9
Environmental, health and safety attributes	223	4.09	.775	-0.161	0.054	11
Customer satisfaction	223	4.44	.669	-0.106	0.23	1
Managing new technologies	223	3.86	.694	-0.003	0.968	14
Mutual learning/knowledge sharing	223	4.03	.677	-0.051	0.581	12

A total of fifteen (15) CSFs for project implementation were identified for this study. The targeted respondents were asked to indicate the level of importance for each factor as shown in Table 3. The response rate for each CSFs (220 – 223 responses or 94.83 – 96.12%). Goodman and Kruskal's was run to determine the association between a list of critical factors and class of contractor. The results in Table 2 showed a weak association between the critical success factors and class of contractor, which were not statistically significant ($P > 0.0005$). This indicates the representative respondents from the various class of contractor do not affect in choosing CSFs that can contribute to the success of the project. Table 3 shows the mean and standard deviation values for each CSFs. The twelve (12) CSFs had a mean average between 4.03 to 4.44, this indicates that the mean responses to this questions were Important, with the exception of C7, C8, and C14, which had average mean values of 3.99, 3.76 and 3.86which are also moderately important.

In order to assess the extent of use of the project management standards, methods, methodologies, tools, and techniques that are widely used, questions were asked in order to measure the extent of use for twenty-three (23) research variables which grouped into four (4). This is shown in Table 4 below.

Table 4. Descriptive Statistics for Extent of Use of PM Practices

Item	No of Valid Cases	Mean	Std. Dev.	Symmetric Measures	
				Value	Approx. Sig.
Project Management Institute (PMI)	215	2.91	1.151	0.264	0.000
International Project Management Association Competence Baselines (IPMA)	214	2.79	1.219	0.327	0.000
Projects in Controlled Environments (PRINCE/ PRINCE2)	215	2.82	1.201	0.302	0.000
ISO10006.2003	215	3.02	1.298	0.338	0.000
In-house project management methods	220	3.34	1.079	0.289	0.000
Other project management methods	160	2.71	1.355	0.224	0.006
Cost benefit analysis (CBA)	218	3.61	.909	0.128	0.114

Decision analysis (DA)	216	3.42	1.004	0.171	0.039
Sensitivity analysis (SA)	217	3.24	1.046	0.25	0.001
Expressed preferences	218	3.27	1.043	0.178	0.023
In house decision making techniques	219	3.48	1.085	-0.025	0.771
Other decision making techniques	157	2.82	1.346	-0.003	0.972
Critical Path Method (CPM)	217	3.37	1.198	0.296	0.000
Work Breakdown Structure (WBS)	214	3.33	1.159	0.253	0.001
Gantt bar chart	216	3.44	1.148	-0.397	0.000
Project management software	215	3.21	1.202	0.323	0.000
In-house project management tools	217	3.32	1.164	0.212	0.008
Other project management tools	156	2.58	1.344	0.045	0.580
Life-Cycle Cost Analysis (LCCA)	215	3.09	1.144	.333	0.000
Event tree analysis	214	3.02	1.150	.227	0.002
Probability Analysis (PA)	214	3.01	1.190	.304	0.000
In-house risk assessment tools	217	3.19	1.156	.156	0.047
Other risk assessment tools	158	2.59	1.302	.046	0.581

The association between the tested PM practices was ranging from weak to moderate and not all the variables were statistically significant. These indicate that the usage of some variables depends on size and complexity of projects. Choosing appropriate variables, guide the organization to achieve their goals easily. Meanwhile, the extent of usage of each variable ranges from “rarely" to "occasionally", which shows that the industry less utilized PM practice for project implementation due to lack of knowledge and exposure based on real successful case studies. The best use of PM practice associated with the size and complexity of projects and choosing appropriate practices, guide the construction firms to achieve their goals easily.

4. Discussion of Result

There is a more considerable dispute about PM practice and its contribution towards project success. Any agreement has not been reached, even the topic has discussed for an extended period. The study identified the top five factors that influence the project success to include customer satisfaction, effective planning and controlling, financial attributes, realistic cost and time estimation, and competency of the project team. The concept of CSFs presents a smarter way to identify certain factors which could be possible to make the project successful.

Applying PM practice has become important issues in many developed countries due to its successful application in various industries and its proven effectiveness and flexibility in attaining project goals and objectives. Due to its nature with high risk and consuming many resources, construction industry requires better application and utilization of efficient and effective PM practice. Studying the use of PM standards, methods, methodologies, tools and techniques that widely applied in this industry, serves as eye openers to the contractors and another decision maker to better plan their effort toward the efficient application of PM practice. If properly utilized, PM practice would result in concrete benefits in all aspects of project implementation.

The result from the study showed that the limited use of PM practice, an ad hoc approaches were preferred due to high cost, lack of expertise in PM and difficulty in real world modeling. CBA, Gantt Bar Chart, and CPM are some of the most widely applied PM tools and techniques by the respondents because of their simple and user-friendly nature. To tackle these crucial obstacles, the respondents stated that adequate training should be given to the employee in the art of PM and on real successful case studies. However, contractors are main players related to construction projects and their success rely on the actual work of the project accomplished. The findings from this study provide a clear understanding of contractors' role and potential construction project success.

5. Conclusion and Recommendation

The following are the conclusions and recommendation for proper application of PM practice in Malaysian construction industry in general:

- PM tools and techniques should be applied gradually especially in small-scale firms. The drastic use should be avoided so as not to lead to a disruptive change in their business.
- Adequate PM training or courses should be conducted in higher education institutions, to increase the knowledge of practitioners about different PM tools and techniques available for appropriate choice at the early stage.
- The government should step up its commitment in applying PM practice in all governments' projects, so as not to become inefficient and unproductive. A special allocation should be prepared to enhance the efficient and effective application of PM tools and techniques among contractors.
- The undertaking of construction projects in metropolitan regions is a risky competitive and dynamic due to their surrounding environments, which are complicated in term of transportation, the number of direct and indirect stakeholders involvement and the handling of existing facilities [14].
- The lack of documentation on project management in construction industry reduced the data available that could have incorporated into the study.
- The study only focused on the extent of use of the most common PM practice that used for project implementation in this country.
- The construction activity has a greater impact on the environment than other industries, an urgent need to apply sustainable development principles to construction industry practices [26]. Meanwhile, further study can be carried out in the same context by including other variables for project implementation or applying for different phases of the industry that might have a significant effect on the project success.

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