FACTORS CONTRIBUTING TO POOR PROJECT DELIVERY IN MALAYSIA

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ABSTRACT

Delay is a common issue in the construction industry around the world, and it is also happening in Malaysia. There are many factors that can influence the project delivery in a construction project. Many problems will be arising during the implementation of the construction project. The common problems of the project such as exceed the time and cost estimate and not within the standard required of quality. These are the condition that contributes to poor project delivery when the project that not delivered within the requirement of the client, out of construction budget and not completed within the time and schedule. It can lead to even worse like project failure. It is important to find out the major causes of poor project delivery in order to propose ways to prevent and mitigate these issues. Thus, this study was aimed at identifying the factors that cause a poor project delivery in Malaysia. To achieve the aim of the study, a questionnaire sent out 320 targeted respondents included clients, project managers, contractors and consultants basically in Penang and Kedah states, of these, 264 sets of questionnaires were returned and analyzed with a response rate of 82.8%. As results, it was found that the F-statistics for construct 3 was significant at 5% level, defining enough evidence to accept that values of all the coefficients are different from zero or finally Construct 3 is Statistically Good Fit for the decision making.

Keywords: *Project, Poor, Delivery, Factors, Kedah, Penang, State, Malaysia*

1. INTRODUCTION

In Malaysia construction industry, there are 17.3% of construction projects contributing to poor project delivery which faced more than three months' delay, and some of them were even abandoned due to project' failure (Ali et al., 2010). In the Budget 2013, Prime Minister of Malaysia had announced news about property and house including that government allocated RM100 million to the Ministry of Housing and Local Government to revive 30 abandoned housing projects (Cheong, 2012). Since Construction industry contributes lots to the growth of economy, a study of factors caused to poor project delivery need to be carried out to enhance the performance of the related parties like developer, consultant, project manager and contractor to provide a good project delivery in term of quality, cost and time to assist the growth of the construction Industry. The Associated General Contractors of America (AGC) stated that a project delivery method is the comprehensive process of assigning the contractual responsibilities for designing and constructing a project (AGC, 2004). In other definition, Miller et al. (2000) defined the project delivery as a system for organising and financing design, construction, operation and maintenance activities that facilitate the delivery of goods or services. Thus, project delivery can be concluded as a project that is delivered through a management system, financial and procurement approach to achieving the project's objective from the concept and planning stage to implementation stage, operation and maintenance stage.

Poor project delivery is a condition or situation which the project delivered out of the requirement and expectation of client like not meet the quality, out of budget or construction cost and not on the time as scheduled in the project. The project meets a failure or dangerous stage when the process of construction management is getting worse and result in project termination due to errors in construction system in the professional team and overrun budget. A good project delivery is the one that could be obtained with better quality within the scheduled time with the allocated budget and taking a life-cycle approach to ensuring that the built asset is maintained over the long-term. Cash flow problem, budget overrun and demand shortage will be owing to poor planning that leads to poor project delivery or failure (Wong, 2010). There are cases that unanticipated market conditions and economic uncertainty including a rise in building materials and labour costs will also cause project abandoned or failure rather than poor planning. A comprehensive market study is important to develop a project to avoid them stuck in a project due to poor cash flow.

Situations of poor project delivery are already become a common issue in construction industry around the world especially the developing countries. Thus, it is so important to find out the factors that cause a poor project delivery to reduce and overcome the problem of projects contributing poor project delivery. Although there are many project delivery methods are available like Design-Bid-Build, Design and Build, Construction Management method, Build-Operate-Transfer, Turnkey, etc which are quite popular in construction industry to manage and delivery project by a

professional team consists of architect, engineer, quantity surveyor and project manager but there is still construction delay or not reach to the required quality and over costing that made these fall under category of poor project delivery or even failure. A study by Cheong (2012) indicated that the number of abandoned housing projects recorded by the Ministry of Housing and Local Government (MHLG) continues to increase since 1983 (Zairul, 2008). The ministry reported the existence of 126 abandoned housing projects involving 14,568 houses which affected 6,834 house buyers in 1986 (Abdul Rahman et al., 2013). During 2005, the figure doubled to 261 abandoned housing projects involving 88,410 houses affecting 58,685 house buyers for that year alone. From 1986 to 2005, the number of abandoned housing projects has been increasing every year. In 2012, the statistic of the overall private projects from Ministry of housing which is up-to-date till 30 September 2012 showed the number of abandoned private housing projects was 41, and the number of 'sick' project was about 220 (National Housing Department, 2012). Tan (2011) when examined the sustainability and housing provision in Malaysia, he explained that some of the potential causes for the problem of housing projects are delay in the process for approval of land development, subdivision and issuance of titles. From the daily newspaper, it can easily found out there are many cheating on workmanship contributing to poor workmanship and materials that caused building problems such as building cracking, leaking of water that brings to low building quality. These issues can bring hazard to the safety of the user. An example is at Taman Jaya, Skudai, some 170 residents of block four are living in fear as the building they occupy may collapse anytime due to severe cracks on the walls and floors (Tay, 2008). According to one of the residents of that block, the problem started three years ago when a wall that divided two ground floor units situated at the left side of the building crack. This was a circumstance of poor projTanect delivery in term of quality. Other than that, some of the abandoned projects in Malaysia were caused by management problem, rise of building material and labour cost or financial problem and a shortage of money from sponsors like government or private sector. For instance, Project Taman Raya Indah was one of the housing projects in Kulim that been abandoned due to problems in financial and cash flow (MHLG, 2012). Thus, there is a need of surveying to find out the factors that contribute to poor project delivery (PPD). This will help in determining some solutions to mitigate this issue through identifying the factors that related to this issue. Better project delivery should always be produced and improved by the practitioner and professional in the construction industry.

2. LITERATURE REVIEW

Project delivery can be viewed as delivered the project in the right way by managing the three project constraints such as time, cost and scope (Melton, 2008). Effective of project delivery needs a control management on the uncertainty of project to correctly delivery the project. Mahdi and Alreshaid (2005) stated that the project delivery was the method of procurement which the client or owner transfer the risk and performance to another party. Kemper (2010) provided an overview of the project delivery process. According to Kemper (2010), there was five phase of the delivery process such as strategic plan phase, project laund phase, design phase, construction phase and transition and occupancy phase. AIA (2013) stated that project delivery method was a formal contractual approach to help the owner to secure the design and construction services of a project through effective management. CMAA (2012) further explained that the method of project delivery was designed system which used to achieve the satisfaction of a construction project from conception to occupancy. Mbamali et al. (2004) also stated that a project achieved success when it was completed within stipulated time, budgeted cost, specified quality and delivery safely. There was difficult to find a definition for poor project delivery. However, the project was considered as delivered in poor condition when it was:

- Not delivered as promised and not meet the stakeholder expectation;
- Not delivered on time as it is not completed in the approved schedule of project;
- Not delivered in the budget (cost-overrun) when the project completed over the approved budget;
- Not delivered with quality as the project deliverables not meet the functional, specification of quality and performance; and
- Not delivered with an original purpose which fails to achieve the project original objectives and goals.

In reality, there are several factors that can lead to a poor delivery of project in the construction industry. In order to achieve a success and good project delivery to the client, there is a need to understand the reason why the project is late, not within the budget or not meet the required standard of quality. Numerous studies have been conducted to address the issue and factors that cause poor project delivery in construction. For instance, a study by Egan (1998) stated that delivering quality involved with a process like waste elimination, innovation ideal that benefits for the client, and delivery within budget and time with no defects. Ankrah (2007) said that there will be a challenge to deliver quality in construction especially in the situation where client will choose designers and contractors based on lowest cost criteria rather to focus on the quality. He further stated that the elements related to challenging of delivering quality such as insight, adaption and innovation, speed and degree of feedback, learning, focus on details attitudes of delivery the project on time and within budget and also attitude to get elimination of defects. In order to

identify out the relevant factors cause to poor project delivery, there was a need to review back the previous studies of the researchers related to factors of delay in a construction project in term time, cost and quality. Ramanathan et al. (2012) carried out a critical review on the construction delay related to time and cost. In their studies, 41 studies had been review by this paper to survey the related factors of delay in order to carry out the detailed review. They found most of the previous researches on the factors of delays conducted through the questionnaire survey and rank from the data collection. The finding showed that the top five ranking of responsible groups among 18 categories to delay was the owner, contractor, design related and plant and equipment, labour and consultant and contractual relationships. Madsen (2011) found the factors contribute to poor project delivery were lack of solid business case and strategy, lack of executive direction and buy-in, lack of end user involvement, failure to adequately identify and document requirements, inadequate resources, inadequate focus on QA and testing, lack of success criteria, failure to effectively manage changes to scope, poor planning and estimation processes, unrealistic time scales, poor risk and issue management, poor leadership and ability to focus the team and poor or delayed decision-making. Other studies by Aziz (2013) and Marzouk and El-Rasas (2014) in Egypt had also studied the factors that cause a delay. For instance, Aziz (2013) aimed to identify and ranked the factor affected delay in the Egyptian construction project after the revolution of Egyptian. They found that the top ten factors induced delay were included owner delay in progress payments, different tactics patterns for bribes, shortage of equipment, contractor ineffective project planning and scheduling, poor site management and supervision of contractor, contractor poor financial control on site, rework due to errors, selecting inappropriate contractors by owner, sudden failures actions and owner inadequate planning. Marzouk and El-Rasas (2014) analyzed the delay in construction projects in Egypt and they found the top ten factors had been identified and they were include late in revising and approving design documents by owner, finance and payments of completed work by owner, effects of subsurface conditions, variation orders by owner during construction, ineffective planning and scheduling of project, low productivity level of labours, type of project bidding and award, shortage of construction materials in market, difficulties in financing project by contractor, and unqualified workforce.

Within the Asian context, several authors conducted studies on the factors causing delay and poor project delivery in construction projects. For instance, in Vietnam, Long et al. (2004) identified general problems in the large construction projects and they found that the problems can be categorized into five main factors such as incompetent designer/contractors, social and technological issue, poor estimation and change management, site related issues and improper techniques and tools. In Hong Kong, Chan and Kumaraswamy (1996) identified the principal factor that contributed to delays in Hong Kong building industry. Their finding showed that three group agreed the most significant factors caused a delay in building work were low speed of decision making, poor site management and supervision, and unforeseen ground condition. In Thailand, research carried out by Ayudhya (2012) investigated the factors causing a delay in payment from owner to the main contractor and also about the delay related to high-rise building construction projects in Bangkok. Durdyev et al. (2017) identified the various attributes for construction project delay in the residential building projects in Cambodia. Their findings indicated that shortage of materials on site; unrealistic project scheduling; late delivery of material; shortage of skilled labour; complexity of project; labour absenteeism; late payment by the owner for the completed work; poor site management; delay by subcontractor; accidents due to poor site safety are ranked by the contractors and consultants as the main causes of project delays. Pourroustam and Ismail (2011) identify the following as the causes of cost overruns; increase in the cost of labour, working force, materials and equipment and other factors. In Afganistan, Niazi and Painting (2017) identified the significant factors that lead to construction cost overruns in Afghanistan and they found that the key critical causes that potentially result in construction cost overruns were corruption, security, delay in progress payment by owner, difficulties in financing project by contractors, change the order by the owner during construction and market inflation. Haseeb et al. (2011) investigated the causes of delay in large construction projects in Pakistan and the stated that the most influential factors were natural disaster; financial and payment problems; poor site management; lacking experience; improper planning; shortage of materials and equipment. Al-Khalil and Al-Ghafly (1999) had carried out research to determine the most important causes of delay in public utility projects which was water and sewage projects based on the frequency and severity of the causes in Saudi Arabia. They found that the causes were also grouped into six major categories of delay and the analysis showed lack of agreement among the parties on the ranking of the major categories of delay. In this study, the contractors, consultants, and owners were shown to agree statistically on the relative importance ranking of the causes of delay. Among the most important causes found were cash flow problems and financial difficulties by the contractor, difficulties in obtaining permits and the requirement to select the lowest bidder without regard to prequalification's.

From the Jordanian construction perspective, studies conducted by Odeh and Battained (2002) and Al-Momani (2000) on the factors causing construction and their findings, Odeh and Battained (2002) showed that the major factors that caused to delay and agreed by contractor and consultant were owner interference, inadequate contractor experience, financing and payments, labour productivity, slow decision making, improper planning and

subcontractor while Al-Momani (2000)' study identified that the major causes of delay in public projects related to designer, user changes, weather, site condition, increase in quantity, late deliveries and economic condition. In Iran, Fallahnejad (2013) identified and ranked the factor of delay in Iran's gas pipeline project. He found shows that the ten significant factors of delay were project duration, imported materials, unrealistic land expropriation, client-related materials, change orders, contractor selection methods, and payment to the contractor, obtaining permits, suppliers, and contractor's cash flow. In Kuwait, Koushki et al. (2005) generated a study on the delay and cost increases related to private residential projects in construction, and they found out that the three main causes of time delays were changing orders, owners' financial constraints and owners' lack of experience in the construction business. For cost overrun, the three main causes were contractor-related problems, material-related problems and owner- financial constraints. Strategies of minimisation of time delays and cost overruns had been the main suggested thing in their study. In the Kingdom of Saudi Arabia, Al-Kharashi et al. (2009) had identified owner interfere, difficulties in obtaining work permits, non-payment of contractor claim, slow decision making by the owner, delay in progress payments by the owner, lack of finance to complete the work by the client, uncooperative owner with the contractor complicating contract administration and poor communication by owner and construction parties that cause the delays in public sector construction projects. Within the context of Saudi Arabia, Majid and McCaffer (1998) stated that the major causes of contractors' performance delays were a material-related factor, equipment related factor and labour-related factor. This survey on factors of non-excusable delays that influence contractors' performance found out that the main causes of non-excusable delays, excusable and compensable delays to identify the factors lead to those causes of delay. Delay was distinguishing to three type liked compensable delay by the client, non-excusable delays (by contractors) and excusable delays by third party or acts of God.

From the African context, Ogunde et al. (2017) conducted a study on the factors causing poor delivery of construction projects in Lagos Island Construction sites, Nigeria: Contractors' Perspective and they found that cost overrun, late payment, rescheduling, disputes, and arbitration were the five major effects of delay in construction faced by contractors. They also added that the methods of minimizing delay on construction projects from the contractors' perspectives include proper payment from client, use of proficient project manager, use of experienced subcontractors and suppliers, use of appropriate construction methods, and experienced project team, were the top methods for mitigating delay in Lagos Island construction sites. Tumi et al. (2009) examined the most important causes of delay in projects of construction of Libya. Their findings did rank factors 'making risk management'; 'proper planning and proper payment from client'; prepare insurance claims and good scheduling programme'; 'client representative for project, selecting expert to understand their assignment'; and 'clear contract and bill quantities; compute the amount of financial damages' contributed to delays in construction projects of Zentan city in Libya. A study by Sambasivan and Soon (2007) had also identified the top ten factors of delay were contractor's improper planning, inadequate contractor experience, contractor's poor site management, inadequate client's finance, and payments for completed work, problems with subcontractors, shortage in material, labour supply, equipment availability and failure, lack of communication between parties and mistakes during the construction stage. In the other study by Ogunlana and Promkuntong (1996), their finding indicated that the problems can be listed as three layers such as problem of shortages, problems caused by client and consultant and problem caused by contractor incompetence/ inadequacies. In Nigeria, Aibinuand and Odeyinka (2006) looked at the causes of delays with deep concentration on actions and inactions of project participants and external factors and they found that the top ranking factor was clients' cash flow problem, late valuation of variation works, architects' incomplete drawing, slow mobilization, incomplete structural drawing, Incomplete services drawing, contractors' financial difficulties late delivery of ordered materials and price escalation each factor categories. Kikwasi (2012) assessed the causes and effects of delay and disruption in Tanzania's construction project. He found that the major causes of delay included design changes, funding problems, information delays, poor project management, delays in payment to contractors, compensation issues and disagreement on the valuation of work done. In North America, a specifically in the Florida Construction Industry, a generated a study by Ahmed et al. (2002) found that the ten most critical causes had been identified across the six sub-headings given above of delays were building permits approval, change order, changes in drawings, incomplete documents, inspections, changes in specifications, a decision during the development stage, shop drawings approval, design development, and changes in law and regulation. From the European perspectives, a study carried out in Norway by Haugen et al. (2017) identified the project delivery method of a large road project and to explore the nature of the challenges the project faces. They concluded that some of the client's challenges were shortcomings in the design, as well as lack of control of the subcontractors. They concluded that involving the contractor's knowledge in the early phase, some of the challenges could be reduced. In Australia, Doloi et al. (2010) conducted a study on 29 contractors' qualification criteria and their links to contractors' performance on a project in medium size construction projects. They found that technical planning and controlling expertise of contractor is key in achieving success on projects.

There more studies conducted by different scholars on poor project delivery, delay in construction, success and failures of projects. Almost all of these studies did use similar factors. For example, Fallahnejad (2013) and Marzouk and El-Rasas (2014) found out that change scope order or variation orders by the client were the major causes of delay to the construction project. Koushki et al. (2005) stated that factors like change order of client and lack of experience of client had been the highly contributed factors to delay in construction projects. Studies by Odeh and Battained (2002) and Sambasivan and Soon (2007) had identified the factor finance and payments of completed work, owner Interference, mistakes and discrepancies in contract documents, unrealistic contract duration and requirement imposed had caused the delays in construction. Long et al. (2004) found that some factors like lack of communication and coordination, an improper feasibility study, lack of a capable representative, client interference that may lead to construction delays. Memon et al. (2012) identified delay in progress payment by owner, unrealistic contract duration and requirements imposed, delays in decisions making and owner interference were the factors that cause cost overrun in construction. Ayudhya (2012) found out factors that most significant of causes of delay relates to the owner were owner financial problem and delay in work approval. Marzouk and El-Rasas (2014) also identified the significant delay causes was late in revising and approving by owner. Table (1) presents more factors causing poor project delivery studies broadly.

Table 1. Summarizing the Most Factors Causing on Poor Project Delivery by Previous Studies

Categories of Factors	Description of the categorized factors	Authors
Owner related factors	- Change orders - Conflicts between joint-ownership - Delay in approving design documents - Delay in progress payments (Funding problems) - Delay in site delivery - Improper project feasibility study - Lack of capable representative - Lack of owner experience in construction projects - Lack of incentives for contractor to finish ahead of schedule - Poor communication and coordination between consultant and contractor - Slowness in decision making - Suspension of work by owner - Inadequate planning - Mode of financing & payment for completed work - Long period between design and time of bidding/tendering - Inappropriate contractual procedure - Additional work - Bureaucracy in bidding/tendering method - Selecting inappropriate contractors - Ineffective delay penalties - Owner interference	Long et al. (2004); Alwi et al. (2002); Assaf et al. (1995); Chan & Kumaraswamy (1996); Odeh & Battaineh (2002); Madsen (2011); Koushki et al. (2005); Sambasivan & Soon (2007); Mohamad (2010); Aziz (2013); Marzouk and El-Rasas (2014); Niazi & Painting (2017); Pourroustam & Ismail (2011); Kaliba et al. (2008); Doloi et al. (2010); Kikwasi (2012); Ahmed et al. (2002); Motaleb & Kishk (2010); Memon et al. (2012); Odeyinka & Yusif (1997); Kaliba et al. (2009); Lo et al. (2006); Lu et al. (2009); Ogunlana & Promkuntong (1996); Yang et al. (2010)
Contractor-related factors	- Poor communication & coordination between owner & contractor - Mistakes & discrepancies in design documents - Unclear & inadequate details in drawings - Quality assurance/control - Poor supervision & late testing - Frequent change of subcontractors	Long et al. (2004); Majid & McCaffer (1998); Odeh & Battaineh (2002); Sambasivan & Soon (2007); Fallahnejad (2014); Marzouk & El-Rasas (2014); Zagorsky (2007); Ali et al. (2010); Al-Khalil & Al-Ghafly (1999); Coulter & Kelley (1992); Liu (2010); Madsen (2011); Tumi et al.

	- Inadequate contractor experience - Inappropriate construction methods - Improper project team - Poor sight management & supervision - Unreliable subcontractors - Poor financial control on site - Inadequate site investigation - Complexity of project design - Delay in site mobilization - Delay in sub-contractor work - Delay in preparation of shop drawings & material samples - Difficulties in financing project by contractor - Ineffective project planning & scheduling - Rework for correcting unsatisfactory work or due to errors	(2009); Aziz (2013); Madsen (2011); Marzouk & El-Rasas (2013); Fallahnejad (2013); Koushki et al. (2005); Ramanathan et al. (2012); Aziz (2013); Niazi & Painting (2017); Pourroustam & Ismail (2011); Chan & Kumaraswamy (1996); Aibinu & Odeyinka (2006); Kikwasi (2012); Al-Kharashi et al. (2009); Mohamad (2010); Memon, et al. (2011); Assaf & Al-Hejji (2006); Ogunde et al. (2017); Kaliba et al. (2008); Doloi et al. (2010); Kikwasi, G.J. (2012); Ahmed et al. (2002); Motaleb & Kishk (2010); Memon et al. (2012); Odeyinka & Yusif (1997); Hussin & Omran (2009); Balamuralithara et al. (2011); Kaliba et al. (2009); Lo et al. (2006); Luu et al. (2009); Yang et al. (2010)
Consultant related factors	- Lack or inadequate experience of consultant - Quality assurance/ control, preparation & approval of drawings, - Waiting time for approval of test and inspection and contract management that contributed to the construction delay. - Lack of responsibility of consultant, - Consultant's impractical design, - Consultant's slow response, - Lack of standardization in consultant design, - Inadequate project management assistance of consultant, - Lack of consultant involvement through project life.	Ramanathan et al. (2002); Odeh and Battaineh (2002); Sambasivan & Soon (2007); Ayudhya (2012); Memon et al. (2001); Al-Kharashi et al. (2009); Aibinu & Odeyinka (2006); Mohamad (2010); Long et al. (2004); Niazi & Painting (2017); Pourroustam & Ismail (2011); Ogunde et al. (2017); Kaliba et al. (2008); Doloi et al. (2010); Kikwasi (2012); Ahmed et al. (2002); Motaleb & Kishk (2010); Memon et al. (2012); Odeyinka & Yusif (1997); Lo et al. (2006); Luu et al. (2009); Yang et al. (2010)

Project manager related factors	- Poor leadership & ability to focus the team, - Poor risk & issue management, - Poor planning & estimation processes, - Inadequate resource, - Poor definition of roles & responsibilities & inadequate focus in QA & testing) - Bad communication, - Inadequate planning & resources, use of new or unproven method, - Ineffective quality control, - Managing multiple projects at once or multitasking resources; - Poor impact analysis, supply chain failure; - Lack of qualified resources.	Sambasivan & Soon (2007); Mohamad (2010); Marzouk & El-Rasas (2014); Madsen (2011); Ogunde et al. (2017); Niazi & Painting (2017); Pourroustam & Ismail (2011); Kaliba et al. (2008); Doloi et al. (2010); Kikwasi, G.J. (2012); Ahmed et al. (2002); Motaleb & Kishk (2010); Memon et al. (2012); Odeyinka & Yusif (1997); Hussin & Omran (2009); Lo et al. (2006); Luu et al. (2009); Yang et al. (2010)
Shortage of equipment related factors	- Equipment allocation problem - Frequent equipment breakdowns - Improper equipment - Inadequate modern equipment - Low efficiency of equipment - Shortage of equipment - Slow mobilization of equipment	Marzouk & El-Rasas (2014); Majid & McCaffer (1998); Memon el al. (2011); Odeh & Battaineh (2002); Koushki et al. (2005); Manavazhia & Adhikarib (2002); Mochal (2003); Rhee et al. (2009); Aibinu & Odeyinka (2006); Ruiz-Torres & Farzad (2006); Arditi et al. (1985); Ramanathan et al. (2012); Niazi & Painting (2017); Pourroustam & Ismail (2011); Chan and Kumaraswamy (1996); Al-Khalil & Al-Ghafly (1999); Al-Kharashi et al (2009); Chang et al. (1991); Ali et al. (2010); Sambasivan & Soon (2007); Joyce (2006)
Labour Supply/shortage of labour related factors	- Discipline problem (conflict and Absenteeism); - Low motivation & morale of labour; - Low productivity of labour; - Personal conflicts among labour; - Shortage of labour; - Slow mobilisation of labour; - Labor strikes due to revolutions; - Unqualified/inadequate; experienced labour; - Labor injuries on site;	Ramanathan et al. (2012); Ogunlana et al. (1996); Al-Khalil & Al-Ghafly (1999); Al-Kharashi et al. (2009); Majid and McCaffer (1998); Memon el al. (2011); Marzouk & El-Rasas (2014); Odeh & Bataineh (2002); Sambasivan & Soon (2007); Chan & Kumaraswamy (1996); Ahmed et al. (2002); Niazi & Painting (2017); Pourroustam & Ismail (2011); Hanim (2010); Trendle (2008); Ali et al. (2010); Toha et al. (2012)
External related factors	- Accidents during construction - Changes in government regulations and laws - Different tactics patterns for bribes - Delay in obtaining permits from municipality	Sambasivan & Soon (2007); Al-Kharashi et al. (2009); Aibinu & Odeyinka (2006); Al-Momani (2000); Mohamad (2010); Odeh and Battaineh (2002); Long et al. (2004); Niazi & Painting (2017);

	- Delay in performing final inspection & certification by the third party - Delay in providing services from utilities (water, electricity) - Global financial crisis. - Loss of time by traffic control - Price fluctuations - Problem with neighbours - Slow site clearance - Unexpected subsurface conditions (soil, water table, etc.) - Unfavorable weather conditions - Inadequate production of raw material in the country - Inappropriate government policies - Thefts done on site - Effect of social & cultural factors - Force majeure as war, revolution, strike, earthquake, etc - Corruption	Pourroustam & Ismail (2011);

3. RESEARCH METHOD

The questionnaire was developed to find out the perceptions of client, developers, consultants and contractors based on factors contributing to poor project delivery in the Malaysian construction industry in 2 selected states namely Kedah and Penang Stated located in the northern part of the country. The questionnaire contained three sections. First section was focused on the respondent's personal information, which includes: gender, age, position of the respondent, level of education, type of the job under organization, years of working experience and speciality, and type of the project involved. The second section concentrated on the factors contributing to causes of poor project delivery, while the last section focused on the strategies to mitigate the happening of poor project delivery. About 22 Strategies had been identified from the past studies. The questionnaires were sent out the target respondents in the year 2016, and the researchers were waited for a year to get enough returned sample size from the targeted respondents to ensure that the analysis is statistically good of a fit, since the past studies stated that larger sample size of participants, will achieve better results. A simple random sampling was chosen 320 questionnaires were distributed to contractors, project managers, developers, engineer, and consultants of these 320, only 264 useable questionnaires were completed and returned and analyzed, a yielding about 82.5% response rate. Likert scale 1-5 were used in the questionnaire to assess the factors contributing to poor project delivery and also the proposed strategies to minimize poor delivery in the construction projects in the mentioned stated from 1 (represent strongly disagree) to 5 (represent strongly agree). Statistical Package for Social Sciences (SPSS, AMOS) Version 21.0, Microsoft Excel version 2013, was used to analyze the data for this study. Finally, Relative Importance Index (RII) method was used to determine the relative importance of the various strategies to minimize the poor project delivery in the Malaysian construction industry using this Formula:

$$RII = \sum W/SA * N \qquad (1)$$

Where, W is the weighting given to each factor by the respondents ranging from 1(strongly disagree) to 5 (strongly agree), SA is the highest weight (i.e. 5 in this case), and N is the total number of respondents.

4. RESULTS ANALYSIS AND DISCUSSION

4.1 BACKGROUND OF THE RESPONDENTS

All the demographic characteristics of respondents are presented in Table (2) below. The total number of respondents was 264 whereas 229 of them were male having 86.7 %. As per age distribution of the participants, 152 (57.6 %) were those who aged between 21-30 years old, and 80 (30.3 %) of them aged between from 31-40 years old. The third category is based on Position, held by the respondents. Maximum positions occupied by the targeted respondents were mostly engineers 116 (43.9 %) while 24 of them came from those who hold project managers' positions and there were 44 have other positions. As per the frequency distribution regarding experience, only 16 are

those who had experiences in project management filed while 128 (48.5%) were those who had 1-5 years of working experiences, and 88 (33.3%) of them had 6-10 years working experiences. The last demographic factor is distribution based on the level of education. Out of 264 respondents, 132 (50%) were holding a degree level, 112 (42.4%) hold a master degree, 12 are from upper secondary, and 4 are both from lower secondary and Pre-University Level. Degree Level Respondents hold the maximum percentage; 50 % accurately.

Table 2. Socio-demographic Characteristics of the Respondents

Items	Frequency	Percent
Gender		
Male	229	86.7%
Female	35	13.3%
Age categories		
21-30 years old	152	57.6%
31-40 years old	80	30.3%
41-50 years old	24	9.1%
50 and above	8	3%
Positions		
Project Manager	24	9.1%
Architect	16	6.1%
Engineer	116	43.9%
Quantity Surveyor	64	24.2%
Others	44	16.7%
Working experience		
1-5 years	128	48.5
6-10 years	88	33.3
11-15 years	20	7.6
16-20 years	12	4.5
more than 20 years	16	6.1
Educational level		
Lower Secondary (Form 1-3)	4	1.5
Upper Secondary (Form 4-5)	12	4.5
Pre-University (Form 6)	4	1.5
Degree Level	132	50
Master Level or higher	112	42.4
Total	264	100

4.2 ANALYSIS OF THE FACTORS CONTRIBUTING TO POOR PROJECT DELIVERY (PPD)

Construct (1) shows the linkage between the first 4 explanatory factors (client, consultant, project manager and contractor) and the first dependent variable. In the first step, the mean values for all of the stated factors have been calculated through compute variable process in SPSS (AMOS, v. 21.0). After this, the correlation analysis with the individual and overall mean value of variance inflation factor (VIF) are extracted, and in the final step, the standardized regression coefficients for poor project delivery (PPD) are calculated. The value of correlation between client and consultant is 0.7960 significant at 5%, between consultant and project manager is 0.8313 significant at 5%, between contractor and project manager, is 0.7323, significant at 5 %, between Consultant and Contractor is 0.8141, significant at 5%, between project manager and client is 0.8093, significant at 5 % and finally between contractor and client is 0.7871, significant at 5%. To address the overall significance level of Correlation coefficients for each of stated factors, Variance Inflation factor VIF is presented individually. The value of VIF for client-based factors is 3.89, for consultant based factors is 4.70, for project manager related factors are 4.01 and for

Contractor related Factors is 3.52. These values are in the acceptable region of VIF (<5) so it seems overall moderate level of correlation among the key explanatory variables of the study. The Mean VIF for all the factors is also showing the moderate level (4.03<5). After the correlation matrix, the value of standardized coefficients after adjusting the standard Error is presented. The value of first coefficient is -0.01062 indicating a negative change in Poor Project Delivery (PPD) by client based factors. It means clients based factors are negatively affecting adversely the delivery of the project. But this impact is insignificant as *t* and *p*-values are not significant. The findings for the second independent variable; consultant factors also have a negative impact on project delivery as value of the coefficient is -0.0044 which indicates when consultant related factors go up by 1, project delivery goes down by -0.0044. This impact is negative but insignificant (*p*-value > 0.05). The findings for the 3rd independent variables; project manager factors have also revealed a positive but insignificant impact on PPD and finally not in favor for accepting the argument that project manager factors have a significant impact on PPD. The value of the coefficient for 4th independent variables; Contractor factors have also demonstrated negative but insignificant impact on PPD. As per the stated findings, the first construct is not acceptable for final inference.

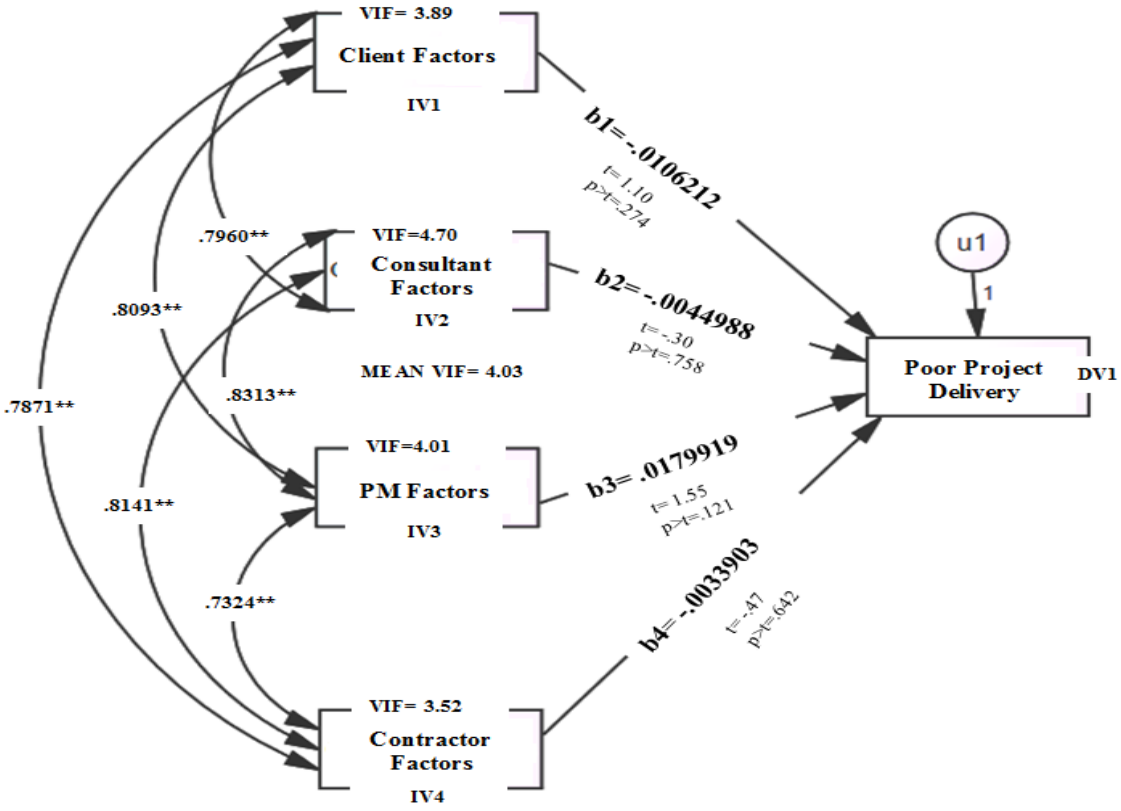

Figure 1. Construct 1 (the 1st 4 Explanatory Factors and the 1st Dependent Variable)

Construct 2 depicts the outcomes for the 1st dependent variable of PPD and 2nd four explanatory variables (material, equipment, labour and other factors) of the study. With same procedure as adopted for the construct 1, correlation coefficients, VIF and Mean VIF and finally the Standardized estimates after adjusting the S.E, findings are presented. The correlation between material and equipment factors is 0.6269, significant at 5 percent, between material and labour is 0.5947, significant at 5 %, between material and other factors are 0.4385, between equipment and labour factors, is 0.5593, between equipment and other factors is 0.5875, significant at 5%. The value of VIF for material factors is 1.96, for equipment factors is 2.11, for labour factors 1.83 for Other factors is 1.67, stating that there is a moderate level of correlation and no problematic level of correlation (Mean VIF= 1.88<5). The standardized value coefficient for equipment factors is demonstrating the negative impact on PPD, (b1=-0.0278). This impact is negative but insignificant at p and t statistics are not in the acceptable region. The standardized coefficient for equipment factor is 0.010 explaining positive but insignificant impacts on PPD. The 7th indicator for

PPD is Labor Factors which explains that unit change in it has a negative but insignificant impact on PPD. The last indicator includes all those factors other than the above stated (material, client, labour, consultant, constructor, equipment, project manager) named; other factors have a negative and significant impact on PPD as coefficient is -0.04331 indicating a delay in project delivery. For other factors findings are acceptable for research hypothesis (*p*-value <0.05). For the final statistical inference, construct 2 is also not acceptable.

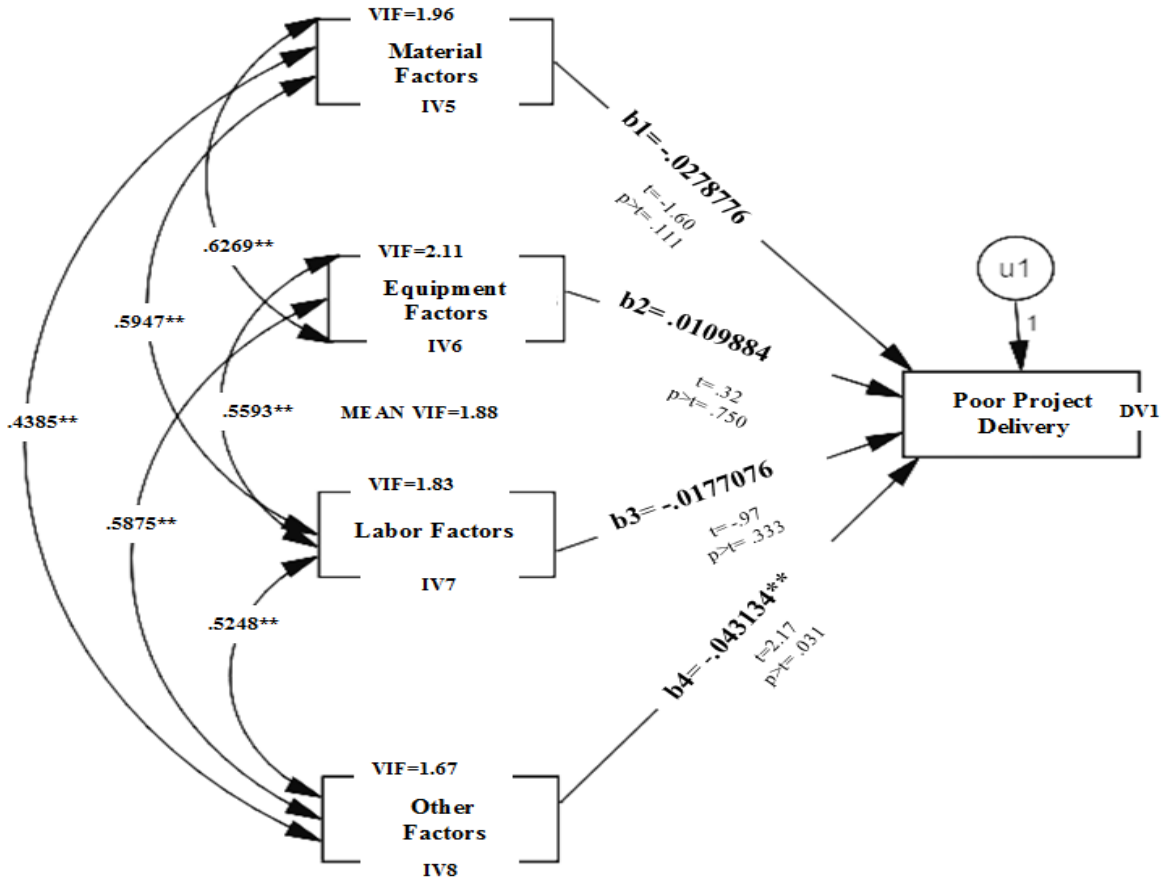

Figure 2. Construct 2 (the 2nd 4 Explanatory Factors and the 1st Dependent Variable)

Construct 3 explains the findings for 2nd dependent variable of PPD and first 4 explanatory variables of the study. The correlation coefficient for client and consultant related factors is 0.7960, for client and project manager factors is 0.8093, for client and contractor related factors 0.7871 for consultant and project manager is 0.8313, for project manager and contractor related factors is 0.7324. All these coefficients are statistically significant explaining the existence of correlation among these explanatory variables. Individual Value of VIF for Client factors is 3.89, for consultant related factors is 4.70 for project manager related factors is 4.01, for contractor factor is 3.52. The value of mean VIF; 4.03 inferences that there is a moderate level of correlation, so no need to drop any of the explanatory factors in this Construct. The coefficient for Client Factor is -0.0056 indicates a negative impact on PPD (the 2nd dependent variable). This impact is significant at 5% level of significance as *p*-value is significant at 1% and t-statistics is also as per the standard value (2.66>1.96). For the first indicator of the 2nd dependent variable: PPD research hypothesis is accepted, and overall significance and negative findings are achieved. The outcomes for the 2nd independent variable; consultant related factors in construct 3 explains a negative and significant change of -0.0282 in the 2nd dependent variable; PPD. *P*-value and t-statistics are within the acceptable region, and both have shown the significance of the Standardized Coefficient. The outcomes for the third factor in construct 3 have presented negative but insignificant findings (p-value 0.70, t-statistics<1.96). The fourth factor is contractor which is demonstrating that unit change in the value of contractor factors causing a negative change of -0.0217 in the value of PPD. The marginal in PPD through contractor factor is significant as p-value is significant at 5%, and t-statistics is also >1.96. The overall findings of the construct 3 explain that out of 4, three explanatory factors (client, consultant and contractor) are the significant reasons for the poor project delivery.

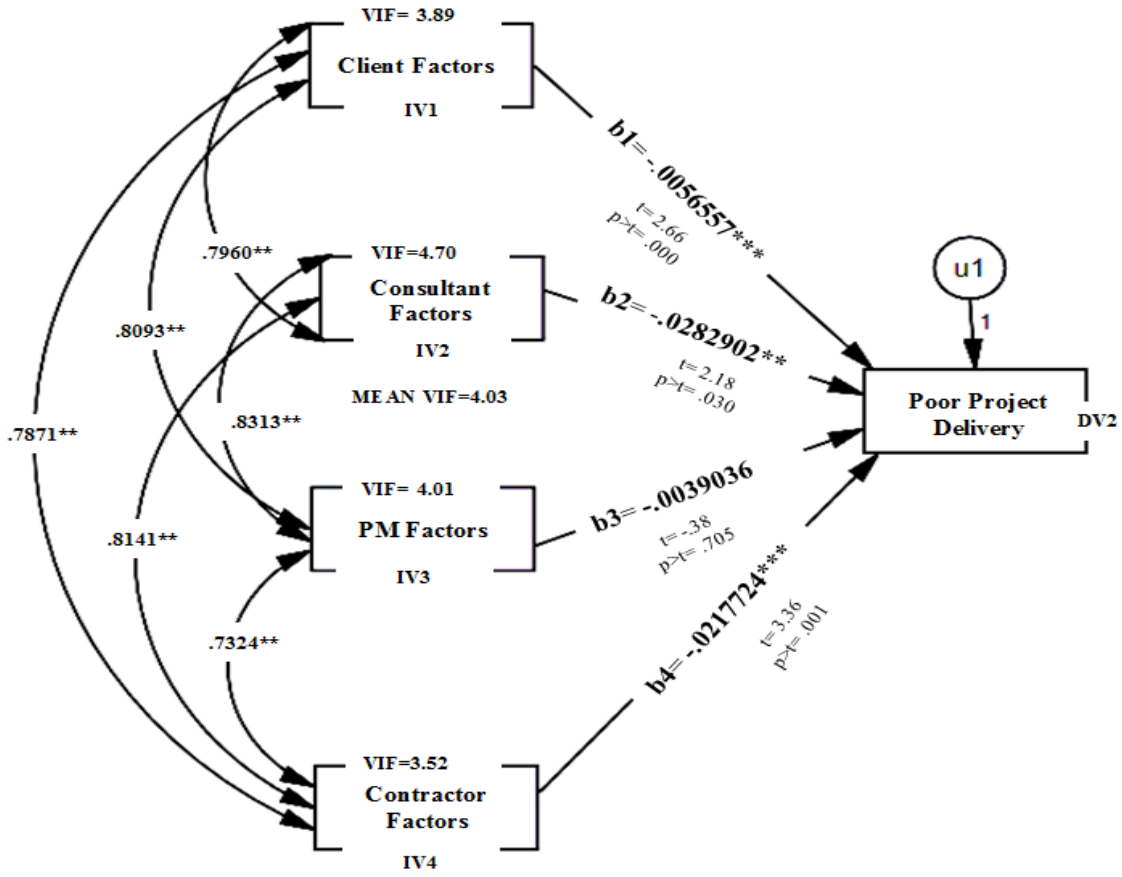

Figure 3. Construct 3 (the 1st 4 Explanatory Factors and the 1st Dependent Variable)

In the 4th construct, the findings for the second dependent variable; PPD and remaining four explanatory factors are presented. The value of correlation coefficient between material, equipment, labour and other related factors are 0.6269, 5947, 5875 and 0.4385 respectively all these coefficients are significant at 5%. The individual variance inflation factor (VIF) for material, equipment, labour and other related factors is 1.92, 2.11, 1.83 and 1.67. The mean VIF in construct 4 explains that there is a problem for the correlation coefficients so, standardized coefficients can be extracted by considering them all. Among the four explanatory factors of the construct, only first factor has explained a significant negative impact on the 2nd dependent variable; PPD after increasing the level of significance up to 10 %. Remaining all coefficients have explained insignificant impact on PPD.

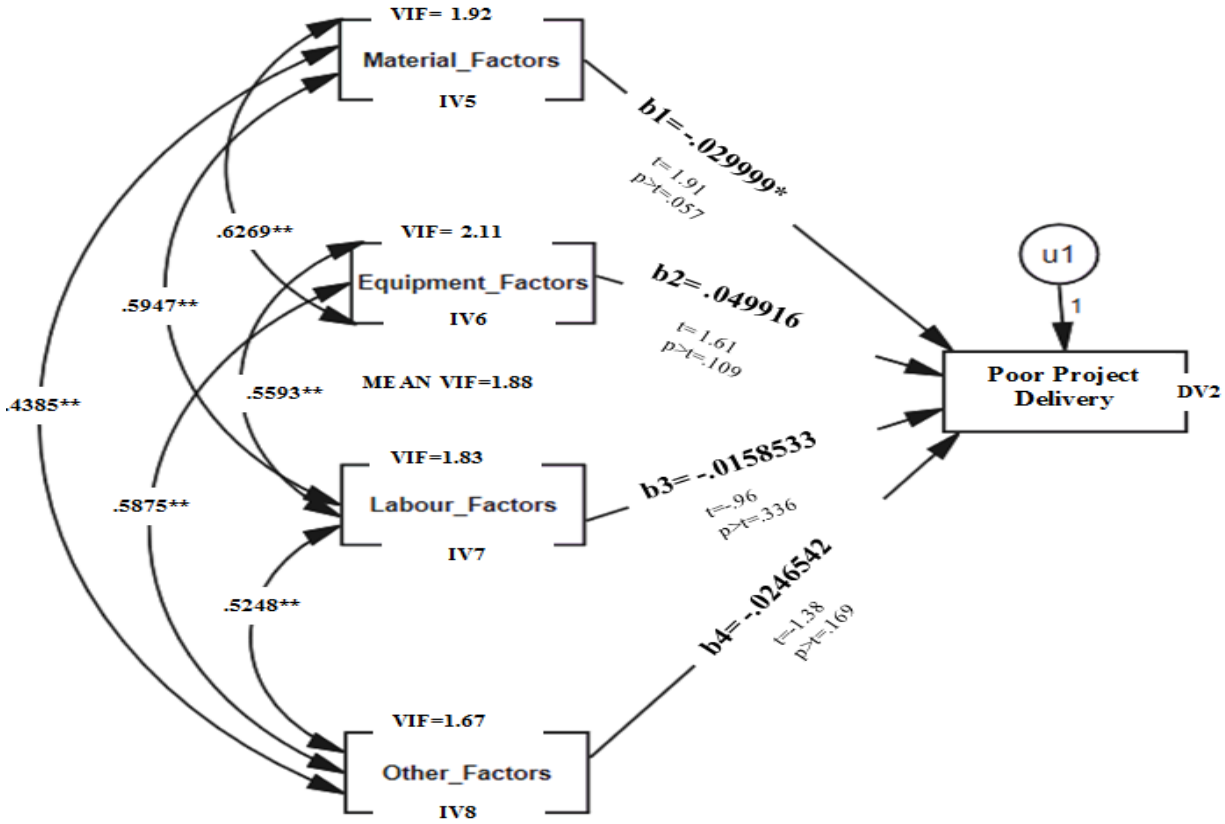

Figure 4. Construct 4 (2nd 4 explanatory factors and the 2nd Dependent Variable)

As per the conclusion of above stated analysis, construct 3 is acceptable because out of 4 explanatory factors, 3 have significant impacts on poor project delivery (PPD). To check the overall goodness of fit for construct 3, following hypotheses are developed.

Ho: Values of all the coefficients in construct 3 are zero

Or

Construct 3 is statistically not good fit for the decision making

H1: Values of all the coefficients in construct 3 are different from Zero

Or

Construct 3 is statistically good fit for the decision making

F (4, 259) = 3.05

Prob > F = 0.0177***

The findings for the *F*-statistics for construct 3 is significant at 5 % level, defining enough evidence to accept that values of all the coefficients are different from zero or finally construct 3 is statistically good fit for the decision making.

4.4 STRATEGIES TO MINIMIZE THE OCCURRENCE TO POOR PROJECT DELIVERY

The major factors cause to poor project delivery in construction had been identified in the previous section. This section attempts to propose some strategies that can be used to minimize the occurrence of poor project delivery. As shown in Table (3), there are 22 strategies that used to minimize the occurrence of poor project delivery. The ranking of each strategy is ranked according to relative important index (RII). The most effective ways to minimize the occurrence of poor project delivery were 'properly planning the project' and speed up the decision-making process with RII=0.98 as chosen by the respondents. A similar finding was reached by Tumi et al. (2009) who mentioned that strategy of properly planning the project was ranked number two in their study. This is also supported by the findings of Nguyen et al. (2004) who stated that the proper planning in the project is playing an important role to determine the success in delivering project. In general, having a good planning will definitely help

in avoiding many problems and risks that might arise at the construction site. Concerning the other strategy of 'speed up the decision-making processes, a conducted research Sambasivan and Soon (2007) agreed that the strategies like speed up the decision-making process would help in minimize the occurrence of project delay which also considers as poor project delivery. Other scholars' findings like (Madsen, 2011; Chan and Kumaraswamy, 1996; Odeh and Battaineh, 2002; Alwi et al., 2002; Assaf et al., 1995) had found out that slow decision-making will always cause delays in delivery a construction project. Fast and good decision-making ability should be acquired by the client, contractor and consultant to deliver a project successfully. Thus, a strategy like speed up the decision-making process is needed to manage the project and avoid delay on the schedule effectively.

The second-ranked strategy was 'Make good scheduling programmed' (RII = 0.87) In a study of Tumi et al. (2009) indicated that good scheduling programme can be used to allocate and to level the needed resource to various activities. It can ensure a good and smooth of work progress in the project while the third-ranked strategy was "Improving communication between parties" with RII=0.86. Nguyen et al. (2004) had also identified that clear information and communication channels are one of the project success factors in a large construction project. Memon et al. (2012) identified lack of communication between parties as factors that are affecting cost overrun in a construction project. Assaf and Al-Hejji (2006) said that poor communication and coordination will affect the construction progress. Sambasivan and Soon (2007) also stated that miscommunication between parties can cause a mistake to the project during the construction stage. Besides that, insufficient communication also can cause a mistake in ordering the material (Ali et al., 2010). Since there are lots of delays relate to lack of communication, thus improving communication between parties is one of the major strategies in minimises occurrence to poor project delivery. Other important strategies were identified and ranked in order as shown in Table (3).

Table 3. Results of Strategies to Minimize the Occurrence of PPD

Factors	RII	Rank
Proper planning for the project	0.89	1
Improving communication between parties	0.86	3
Adding or removing resources	0.75	9
Resolving problematic technical issues	0.82	6
Replacing the project manager	0.68	13
Bringing in a consultant to manage recovery	0.68	13
Increasing the budget	0.69	12
Speed up of subsequent site activities	0.84	5
Contingency allowance	0.78	8
Partnership arrangement	0.68	13
Make risk management	0.72	11
Make value management	0.73	10
Ensure proper payment from client	0.81	7
Prepare insurance claims	0.73	10
Make good scheduling programmed	0.87	2
Client representative for project	0.72	11
Clear contract and bill of quantities	0.85	4
Compute the amount of financial damages	0.75	9
Make sure that payments for the completed work are paid on time	0.84	5
Reduce owner interference	0.72	11
Speed up the decision-making process	0.89	1
Avoid unrealistic contract duration and requirements	0.82	6

5. CONCLUSION

The findings demonstrate that the value of correlation between client and consultant, between consultant and project manager, between contractor and project manager, between consultant and contractor, between the project manager and client and finally between contractor and client all were significant at 5%. The findings for the *F*-statistics for construct 3 was significant at 5% level, defining enough evidence to accept that values of all the coefficients are different from zero or finally Construct 3 was statistically good fit for the decision making. The results of the study had also demonstrated that "a proper planning for the project", "speeding up the decision-making process", "make good scheduling programmed", "clear contract and bill of quantities", and "speeding up of subsequent site

activities" were found amongst the top-ranked strategies that could help in minimising the poor delivery of construction project in Malaysia. One of the limitations of the study is that the covered area was only two states which are Kedah and Penang in the northern part of Malaysia of 4 states (Perlis. Kedah, Penang and Perak). Thus, the findings of the study are limited in that they are restricted to only two states, thereby limiting the extent to which the findings can be generalized to other cohorts with covering the whole states in Malaysia to come out with one suitable model or framework to minimize or avoid PPD in the Malaysian construction industry.

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