

METHOD TO RESOLVE BUILDING PROJECT DELAY

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I declare that this project report entitled '*Method to Resolve Building Project Delay*' is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

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Date : JANUARY 2014

A special feeling of gratitude to my loving parents, my beloved wife *Siti Norliza Abd Manaf* and my sons *Muhammad Rayyan Ukasyah* and *Muhammad Zayyan Amsyar*, thank you for all the love and support.

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ABSTRACT

For many years, the issues of delay in Jabatan Kerja Raya (JKR) project have been phenomenal. Its impacts were so significant that it tends give bad impression on the JKR performance and reputation as government technical agency. Construction delays can be minimized once their causes are identified. The methodologies used in this study are by using literature review, interview with expert panels and distribution of questionnaires survey. Data has been collected from the JKR staff in Design and Business Sector which directly involved in building works. The results of the study shown that the top five most important factors that contributed to the causes of delays were poor site management and supervision; poor cash flow management; inadequate contractor experience; poor communication and coordination by consultant and slowness in decision making process by client. Despite a lot of effort and strategies used by JKR to overcome delays issue. However this study has been undertaken to review the effectiveness of the traditional approach in dealing with delays problem in JKR. The study also tries to propose new approach in resolving delays issues as alternative to the existing traditional way. The traditional approach in resolving delays problem in JKR include more intensive project monitoring and supervision, imposing penalty and eventually terminating the contract. However these strategies have not been very effective and the delay problem remain unresolved. As alternative measure this study has identified new contemporary management approach to complement the existing method in resolving the delay problem. The new approach gives more emphasis as using the service of more competent project manager and adaption of collaborative teamwork working environment concept. Apart from that the used of new procurement system is seen to be a viable approach. It is hope that the findings from this study will be able to provide important guidelines for JKR to reengineer the traditional approach of project delivery system.

ABSTRAK

Kebelakangan ini isu kelewatan dalam pelaksanaan projek di Jabatan Kerja Raya (JKR) menjadi amalan biasa. Kelewatan projek disiapkan mengikut jadual telah memberikan kesan negatif terhadap reputasi JKR sebagai agensi teknikal Kerajaan. Kelewatan dalam pembinaan projek dapat dikurangkan jika punca-puncanya dapat dikenalpasti. Metodologi yang digunakan dalam kajian ini adalah menggunakan kajian literatur, temuduga dengan panel pakar dan edaran borang soal selidik. Data dikumpulkan daripada kakitangan JKR yang bertugas di sektor rekabentuk dan bisnes yang terlibat secara langsung dalam kerja-kerja bangunan. Lima punca utama yang telah menyebabkan kelewatan dalam projek pembinaan di JKR adalah pengurusan dan penyeliaan tapak yang lemah; masalah kecairan aliran tunai; kontraktor yang tidak berpengalaman; masalah komunikasi dan koordinasi antara perunding dan juga kelewatan dalam proses membuat keputusan oleh pihak pelanggan. Pelbagai usaha dan strategi telah digunakan oleh JKR untuk mengatasi isu kelewatan projek. Kajian semula keberkesanan kaedah yang digunapakai melalui pendekatan tradisional dalam menangani masalah kelewatan dalam JKR diuraikan dengan terperinci. Kajian ini juga mencadangkan pendekatan baru dalam menyelesaikan isu-isu kelewatan sebagai alternatif kepada kaedah tradisional yang sedia ada. Selain itu, tiga kaedah tradisional yang digunakan didapati kurang efektif iaitu mesyuarat penyelarasan ditapak, tatacara mengenakan denda lewat jadual (LAD) dan proses penamatan kontrak. Kajian ini telah mengenal beberapa kaedah alternatif dalam menangani projek lewat iaitu mengoptimumkan bilangan pengurus projek yang kompeten, mengamalkan konsep kerja berpasukan, dan mengaplikasikan sistem perolehan alternatif. Selain itu, modifikasi terhadap kaedah alternatif dilihat sebagai pendekatan yang berdaya maju. Adalah diharapkan kajian ini akan dapat memberi garis panduan penting bagi JKR untuk menyemak semula pendekatan sedia ada dalam sistem penyampaian projek.

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LIST OF ABBREVIATIONS

ACAT	-	Acquisition Categorization
ACEM	-	Association of Consulting Engineers Malaysia
CIDB	-	Construction Industry Development Board
CKBA	-	Cawangan Kerja Bangunan Am
CKK	-	Cawangan Kerja Kesihatan
CKS	-	Cawangan Kerja Kesihatan
CPPT	-	Cawangan Pendidikan dan Pengajian Tinggi
D&B	-	Design and Build
E.O.T	-	Extension of Time
HODT	-	Head of Design Team
HOPT	-	Head of Project Team
JKR	-	Jabatan Kerja Raya
L.A.D	-	Liquated Ascertain Damages
NAFAM	-	National Asset and Facility Management
PMO	-	Project Management Office
SO	-	Suppertender Officer
SPSS	-	Statistics Package for Social Science
Q-Q Plot	-	Quartile-Quartile Plot
RII	-	Relative Important Index

CHAPTER 1

INTRODUCTION

1.1 Introduction

The inability to complete projects on time is a common problem in the construction industry and in developing countries (Ahmed. 2002). Assaf and Al-Hejji (2006), defined delay as the time overrun beyond completion date specified either in a contract or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule and consider as a common problem in construction projects. Bassioni and El-Razek (2008) identified that delay in construction project is considers as one of the most common problems causing a multitude negative effect on the project and its stakeholders. Therefore, it is essential to identify the tangible causes of delay in order to minimize and avoid them and their corresponding expenses.

This situation has been a long time, been blamed on ineffective management (Munns and Bjeirimi, 1996) and dominance of traditional construction practices. Love and Sohal (2002) claim that these practices create unnecessary waste, errors, and misapprehension amongst the project supply chain.

Delay can have a major effect on construction organizations, resulting in increased cost, lost opportunity cost, reputation damage, arbitration, litigation and, in the worst cases, the total abandonment of projects. Construction delay also directly relates to the performance of the project and the customer satisfaction level.

Research in Finland by Karna et al. (2004) found that client satisfaction level declines when the project negatively deviates from the planned schedule. Therefore, client appears to be dissatisfied when construction performance is less than what was regard as standard (Karna et al., 2004)

1.2 Problem Statement

Currently in JKR, delay is a phenomenon during the construction stage. The term delay means, construction work cannot complete within the period which stated in the contract document or part of the works run out of the planning schedule. Typically, delay is attributable to a variety of causes and reasons beyond the contractor or the client's expectations. When the unfortunate problem happens, contractor will encounter problems due to delays in completing the works.

Based on JKR project database module, SKALA (Sistem Kawal, Selia dan Lapor), there are 810 projects in the Building Sector with total cost of RM 31,087,763,136.70. From the list of the projects, 216 are under construction and 123 projects are delays, which contribute 57% of the project under construction (Table 1.1). The duration of delays is one (1) to six (6) months. From data provided by the JKR Project Monitoring Unit, it shows that 50% of the project in the Ninth Malaysia Plan supervised by JKR was complete behind schedule. Regarding these problems, JKR has acknowledged the construction delays (time overrun) and cost overruns problems as the big headache, especially with government-related funded projects.

Current approaches used by JKR in dealing with delay problem are intensive coordination meeting; approval extension of time, imposing penalty; and termination of contract are the main approaches have been used. Despite a lot of effort and strategies used by JKR to overcome delays issue. There are contemporary management approaches to complement the existing method in resolving such as value management; risk management; using new technology IBS and BIM.

Table 1.1: Report on Building Project Delay in JKR (SKALA, 2013)

No	Programme Manager Office	< 1 month	1 -2 month	More than 2 Month above					Total
				2 - 3 month	> 3 month	> 6 month	> 9 month	> 12 month	
1	Building Sector	0	0	0	0	0	0	0	0
2	CAWANGAN KERJA BANGUNAN AM (CKBA)	14	11	9	13	0	0	0	47
3	CAWANGAN KERJA KESIHATAN (CKK)	8	8	3	4	2	1	0	26
4	CAWANGAN PENDIDIKAN & PENGAJIAN TINGGI (CPPT)	13	7	4	2	0	1	0	27
5	CAWANGAN KERJA KESELAMATAN (CKS)	10	5	3	5	0	0	0	23
	Total	45	31	19	24	2	2	0	123

This study has been undertaken to identify the causes of project delay. A specific focus given on the various methods used in addressing project delay issues practise in JKR

1.3 Aims and Objective

The main aim of this study is to reviewing the effectiveness of the traditional practice of addressing the project delay issues in JKR. In order to achieve this aim, the following objectives outlined are:--

- i. To evaluate the effectiveness of the traditional approach in project delay issues.
- ii. To evaluate the potential application of contemporary approach in resolving project delay issues.
- iii. To propose the basic guidelines for on time projects delivery.

1.4 Scope and Limitations of the Study

The scope of this capstone project is limited to building projects in Building Sector, JKR only. The data was gathered through comprehensive literature review, interview with selected expert panel and through questionnaire survey process. The questionnaire survey has been designed guided by the objective to get the feedback from respondents. Questionnaire was distributed to get the accurate data from the person involved directly with building project in JKR related to Cawangan Kerja Bangunan Am (CKBA), Cawangan Pendidikan Pengajian Tinggi (CPPT), Cawangan Kerja Keselamatan (CKS) and Cawangan Kerja Kesihatan (CKK).

1.5 Significance of the Study

i. For JKR

This study proposed guidelines on time project delivery and propose the contemporary approach with the attribute of method to overcome the project delay and will be beneficial to the organization.

ii. For JKR Staff

This study will provide information's on causes of the delays in JKR projects and the effectiveness of the current practice in.JKR dealing with project delay.

1.6 Brief Research Methodology

Research methodology is a framework for the research on how a study was carried out such as the process of collecting, analyzing, and interpreting observations. Therefore, Figure 1.1 outlined the research methodology of this study.

It consists of into three phases. Phase 1: encompasses the objective, scope and the literature review. Phase 2: Preliminary interview with experts in project management, involves case studies of building project delay and related issues. Design questionnaires and conducts a questionnaire to get analytical data. Lastly, Phase 3 consists of developing guidelines for project delivery on time through validation from expert and final submission. The following *Figure 1* represents the overall proposed of the study.

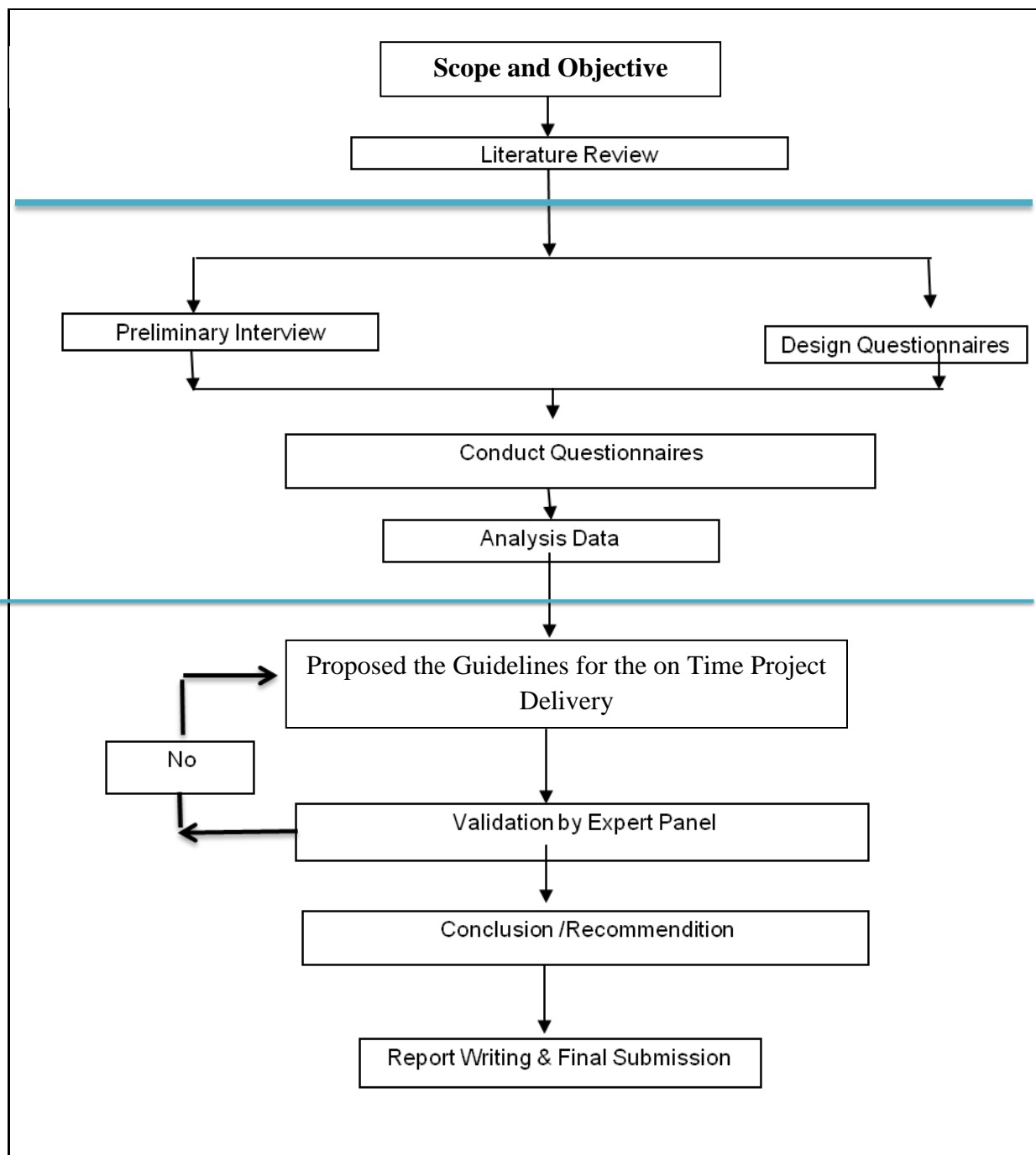


Figure 1.1: Schematic of Research Methodology

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The problem regarding the delay in the construction industry is mainly due to a global phenomenon. In Saudi Arabia, Assaf and Al-Hejji (2006) found that only 30% of the construction projects were completed within the scheduled completion dates and that the typical overrun time was between 10% and 30%. In Nigeria, Ajanlekoko (1987) observed that the performance of the construction industry in terms of time was scanty. Odeyinka and Yusif (1997) have shown that seven out of ten projects surveyed in Nigeria suffered a setback in their execution. Ogunlana and Promkuntong (1996) conducted a study on construction delays in Thailand. Al-Momani (2000) carried out a quantitative examination on construction delay in Jordan. Frimpong et al. (2003) conducted a survey to identify and evaluate the relative importance of the significant factors contributing to delay and cost overruns in Ghana groundwater construction projects. Chan and Kumaraswamy (1997), studied the delay times in the Hong Kong construction industry. They emphasized that timely release of projects within a budget and to the level of quality standard specified by the client is an index of successful project delivery. Failure to achieve targeted time, budgeted cost and specified quality will result in various unexpected unfavorable effects on the projects. In Malaysia, Abdullah et al. (2010) have also reported a 90% delay rate for projects handled by Majlis Amanah Rakyat (MARA), a government agency that plays an important role in implementing the Malaysian Government's construction policies. This problem is manifested in the

underachieving Malaysian construction industry (CIDB, 2009), with recent community project delay rates of 80% (Joshi, 2009).

Majid (2006) stated that delays can be minimized when their causes are identified. Identification of the factors that contributed to the cause of delays has been studied by numerous researchers in numerous countries. Delays usually occur when the contractor, consultant, and client jointly or severally contributed to the non-completion of the project within the original or the stipulated or agreed contract period.

Normally when the projects are delayed, they are either extended or accelerated and therefore, incur additional cost. Although the contract parties agreed upon the extra time and cost associated with delay, in many cases there were problems between the owner and contractor as to whether the contractor was entitled to claim the extra cost. Such situations, usually involved questioning the facts, causal factors and contracts for interpretation. Knowing the cause of any particular delay in a construction project would help avoiding the same. By the case, it is the responsibility of all parties to study, analyze, and identify problems and find solutions in the latest renewal of methods and strategies for planning and implementation of the project to control the delay of the project. In most of the public works done by JKR including construction project under the government, projects were awarded on a competitive basis using the traditional approach. Consultants and contractors are engaged in separate contracts.

2.2 Types of Delay

Causes of delays classified into three (3), which include excusable, non-excusable, and concurrent delay (Alkass, 1996). That purpose type of delay will determine delay damage.

2.2.1 Excusable Delays

According Theodore (2009) an excusable delay is a delay that is due to an unforeseeable event beyond the contractor's or the subcontractor's control. Normally, based on common general provisions in public agency specifications, delays resulting from the following events would be considered excusable:

- a. General labor strikes
- b. Fires
- c. Floods
- d. Acts of God
- e. Owner-directed changes
- f. Errors and omissions in the plans and specifications
- g. Differing site conditions or concealed conditions
- h. Unusually severe weather
- i. Intervention by outside agencies
- j. Lack of action by government bodies, such as building inspection

2.2.1.1 Excusable with Compensation

It is reasonably established that when a construction schedule delay occurs through no fault of the contractor, because of the actions and/or inactions of the other party to the contract (absent an enforceable no-damage-for-delay clause), the contractor will be entitled to recover damages and be granted a time extension. Compensable delay can be the result of a variety of occurrences such as:

- a. Denied access to the site,
- b. Design changes,
- c. Differing site conditions,
- d. Interference from other trades, and
- e. Non-timely delivery of owner-furnished materials.

Another contractor on the project can cause another form of compensable delay. Although the delayed contractor is only in contract with the owner, he will likely look to the owner for damages caused by other contractors whether or not

contractually the coordination/scheduling duties was delegated elsewhere. Cases in this area have resulted, however, in mixed decisions.

2.2.1.2 Excusable Delays without Compensation

Not to compensate for delays caused by third parties or circumstances beyond the control of both owners and contractors. Examples often include acts of God, anomalous weather conditions, fire, death, government actions and so on, etc. In this case, the contractor will normally get to claim an extension of time.

2.2.2 Non-Excusable Delays

According to Theodore (2009) non-excusable delays are events that are within the contractor's control or that are foreseeable. These are some examples of non-excusable delays:

- a. Late performance of sub-contractors
- b. Untimely performance by suppliers
- c. Faulty workmanship by the contractor or sub-contractors
- d. A project-specific labor strike caused by either the contractor's unwillingness to meet with labor representative or by unfair labor practices

In this last type of delay, contractor's own actions, and/or inactions have been the causes of the delay. In this event, the contractor will not have the right to recover either damages or time extensions from the owner. Furthermore, the owner will likely be able to recover delay damages from the contractor. In the absence of a liquidated damages clause, the contractor may be exposed to actual damages, which in particular instances could be financially catastrophic.

While some delays might standalone in establishing the net effects (such as an injunction that halts the work on a project in total), the overwhelming form of delay solely affects individual construction activities. Because of this, reliance on a construction schedule, which sets forth the relationships between and among the diverse activities, is important. The widespread use of the simple bar chart or Gantt chart has given way to the use of more detailed and modern network analysis scheduling techniques, such as critical path method arrow diagramming and precedence diagramming methods. Utilizing these scheduling techniques makes it possible to assess the effects of delays on individual activities and the overall construction schedule network.

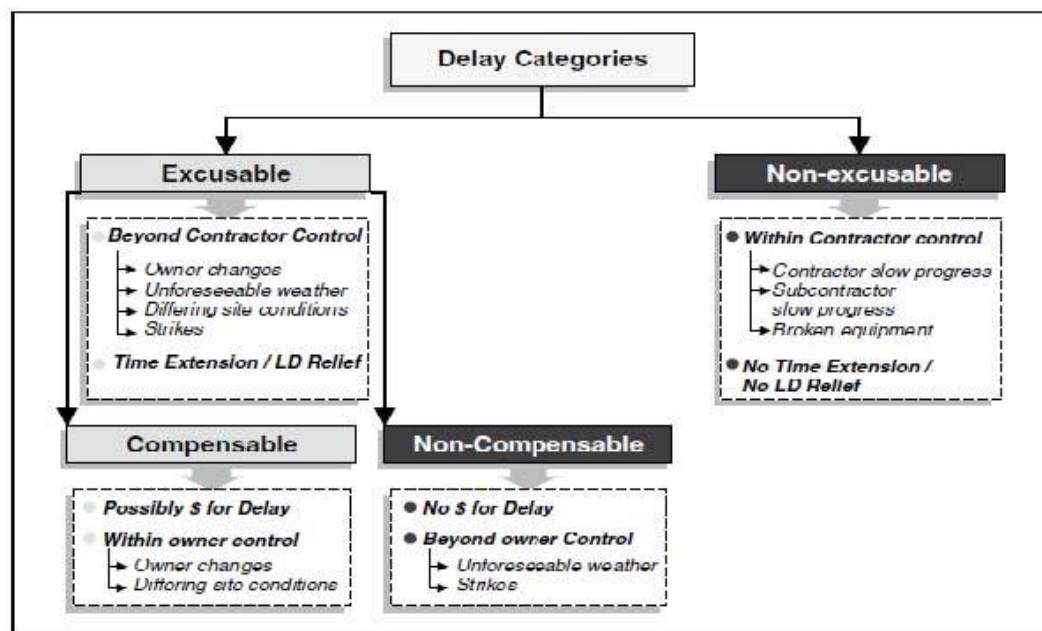


Figure 2.1: Delay Categories (Theodore, 2009)

2.2.3 Concurrent Delay

The delay is concurrent problems of the construction industry construction. This problem occurs when two or more events at the same time late in the project cannot be accomplished in time. In this situation, both the owner and the contractor are responsible for the delay. Concurrent delays typically associated with two or more excusable delay, resulting in extended time. When excusable with

compensation and non- excusable delays are concurrent, the extension can be removed, or delays may be distributed between owners and contractors.

2.3 Causes of Delay

Traditional contractual approach is still dominant in Malaysia construction sector and this may likely continue to be a trend. Malaysia construction sector comprises the clients or project owners, contractors, subcontractors, suppliers, and others key professional actors responsible for design and supervision of projects. These professionals were cross-functional teamwork. Due to this mixed variety of parties involved in projects, they often encounter difficult situations and some degree of pressures. Many of these problematic conditions are beyond control and often lead to delays or project time overrun (Odeh and Battaineh, 2002).

Researchers have studied the many causes of delay in construction industry. Lo et al. (2007) summarized some of the studies that took place from 1971 to 2007 (Table 2.1) as below.

Table 2.1: Summary of Previous Studies on the Causes of Delays in Construction Projects

No	Researchers	Country	Major Causes of Delay
1	Baldwin et al. (1971)	United States	<ul style="list-style-type: none"> i. Inclement weather ii. Shortages of labour supply iii. Subcontracting system
2	Arditi et al. (1985)	Turkey	<ul style="list-style-type: none"> i. Shortages of resources ii. Financial difficulties faced by public agencies and contractors iii. Organizational deficiencies iv. Delays in design works v. Frequent changes in orders/design vi. Considerable additional work
3	Mansfield et al. (1994)	Nigeria	<ul style="list-style-type: none"> i. Improper financial and payments arrangements ii. Poor contract management iii. Shortages of materials iv. Inaccurate cost estimates v. Fluctuations in cost
4	Semple et al. (1994)	Canada	<ul style="list-style-type: none"> i. Increases in the scope of the work ii. Inclement weather iii. Restricted access
5	Ogunlana et al. (1996)	Thailand	<ul style="list-style-type: none"> i. Shortages of materials ii. Changes of design iii. Liaison problems among the contracting parties
6	Chan and Kumaraswamy (1996)	Hong Kong	<ul style="list-style-type: none"> i. Unforeseen ground conditions ii. Poor site management and supervision iii. Slow decision making by project teams iv. Client-initiated variations
7	Al-Monami (2000)	Jordan	<ul style="list-style-type: none"> i. Poor design ii. Changes in orders/design iii. Inclement weather iv. Unforeseen site conditions v. Late deliveries

Table 2.1: Summary of Previous Studies on the Causes of Delays in Construction Projects (Cont'd)

No	Researchers	Country	Major Causes of Delay
8	Faridi and El-Sayegh (2006)	UAE	<ul style="list-style-type: none"> i. Slow preparation and approval of drawing ii. Inadequate early planning of the project iii. Slowness of owner's decision making iv. Shortage of manpower v. Poor site management and supervision vi. Low productivity of manpower
9	Assaf and Al-Hejji (2006)	Saudi Arabia	<ul style="list-style-type: none"> i. Change in orders by the owner during construction ii. Delay in progress payment iii. Ineffective planning and scheduling iv. Shortage of labor v. Difficulties in financing on the part of the contractor
10	Sambasivam et al. (2007)	Malaysia	<ul style="list-style-type: none"> i. Contractor improper planning ii. Contractor poor site management iii. Inadequate contractor experience iv. Inadequate client's finance and payments for completed works v. Problem with subcontractors vi. Shortage in material vii. Labour supply viii. Equipment availability and failure ix. Lack of communication between parties x. Mistakes during the construction stage

Many factors contributed to causes of delays in construction projects. These range from factors inherent in the technology and its management, to those resulting from the physical, social, and financial environment. There are in seven groups of causes for delay in construction project:

Table 2.2: Causes of Delay Categorized into Seven (7) Groups (Theodore, 2009)

No	Causes of Delay By	Causes of Delay
1.	Client	1. Delay in progress payments by owner 2. Delay to furnish and deliver the site 3. Change orders by owner during construction 4. Late in revising and approving design documents 5. Delay in approving shop drawing and sample materials 6. Poor communication and coordination 7. Slowness in decision making process 8. Conflicts between joint-ownership of the project 9. Suspension of work
2.	Contractor	1. Difficulties in financing project by contractor 2. Conflicts in sub-contractors schedule in execution of project 3. Rework due to errors during construction 4. Conflicts between contractor and other parties (consultant and owner) 5. Poor communication and coordination 6. Ineffective planning and scheduling of project 7. Improper construction methods implement 8. Delays in sub-contractors work 9. Inadequate contractor's work 10. Frequent change of sub-contractors 11. Poor qualification of the contractor's technical staff 12. Delays in site mobilization
3.	Consultant	1. Delay in approving major changes in the scope of work 2. Poor communication and coordination 3. Inadequate experience of consultant 4. Mistakes and discrepancies in design documents 5. Delays in producing design documents 6. Unclear and inadequate details in drawings 7. Insufficient data collection and survey before design 8. Un-use of advanced engineering design software
4.	Material	1. Shortage of construction materials in market 2. Changes in material types and specifications during construction 3. Delay in material delivery 4. Damage of sorted material while they are needed urgently 5. Delay in manufacturing special building materials 6. Late procurement of materials
5.	Equipment	1. Equipment breakdowns 2. Shortage of equipment 3. Low level of equipment-operator's skill 4. Low productivity and efficiency of equipment 5. Lack of high-technology mechanical equipment

Table 2.2: Causes of Delay Categorized into Seven (7) Groups (Theodore, 2009)
(Cont'd)

No	Causes of Delay By	Causes of Delay
6.	Labours	<ol style="list-style-type: none"> 1. Shortage of labors 2. Working permit of labors 3. Low productivity level of labors 4. Personal conflicts among labors
7.	External Factor	<ol style="list-style-type: none"> 1. Effects of subsurface conditions (e.g. soil, high water table, etc.) 2. Delay in obtaining permits from municipality 3. Hot weather effect on construction activities 4. Traffic control and restriction at job site 5. Accident during construction 6. Changes in government regulations and laws 7. Delay in providing services from utilities (such as water, electricity) 8. Delay in performing final inspection and certification by a third party

2.4 Methods of Minimizing Construction Delays

According to Nguyen (2004), studied the factors that can be applied as a method of minimizing of construction delays as follows: competent project manager; frequent progress meeting; accurate initial cost estimates; accurate initial time estimates; awarding bids to the right/experience consultant and contractor. According to Aibinu and Jagboro (2002), identified two methods to minimize or if possible eliminate time overrun were: acceleration of site activities, and contingency allowance.

According to Odeh and Battaineh (2002), they recommended to improve the delay in construction project there are a few solution such as enforce liquidated damage clauses and offering incentives for early completion; developing human resources in the construction industry through proper training and classifying of craftsman. Ahmad S.M (2002) in their study of delays in Florida has recommended streamlining the building permit approval process to minimize the delay in

construction project. Rahman (2006) recommended to mitigate the delay the contractor should increasing the productivity by working overtime hours or working by shifts, followed by asking the extension of time. If the problem was shortage of resources, they suggested rescheduling the activities within the available resources, using skilled labours and by using subcontractors. Site meeting are essential in solving the problems with the condition that it should not be too frequent.

Majid (2006), has conducted study of delays in Aceh Indonesia. He listed thirty-five methods in order to minimize construction delays as shown in the in Table 2.3.

Table 2.3: Method to Minimize Project Delay in Aceh, Indonesia

1. Competent project manager;	18. Site management and supervision;
2. Ensure adequate and available source of finance;	19. Use of proper and modern construction equipment;
3. Multidisciplinary/competent project team;	20. Proper project planning and scheduling;
4. Availability of resources;	21. Accurate initial cost estimates;
5. Commitment to projects;	22. Use of appropriate construction methods;
6. Adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors;	23. Community involvement;
7. Adopting new approaches to contracting such as Design-Build (D/B) and Construction Manager (CM) type of contract;	24. Proper emphasis on past experience;
8. Complete and accurate project feasibility study and site investigation;	25. Frequent coordination between the parties involved;
9. Acceleration of site clearance;	26. Absence of bureaucracy;
10. Comprehensive contract documentation;	27. Clear information and communication channels;
11. Frequent progress meeting;	28. Accurate initial time estimates;
12. Project management assistance;	29. Proper material procurement;
13. Use up to date technology utilization; and	30. Developing human resources in the construction industry through proper training;
14. Use of experienced subcontractors and suppliers;	31. Allocation of sufficient time and money at the design phase;
15. Complete and proper design at the right time;	32. Awarding bids to the right/experience consultant and contractor;
16. Competent personnel of consultant/designer;	33. Perform a preconstruction planning of project tasks and resources needs;
17. Competent and capable of client's representative	34. Systematic control mechanism; and
	35. Effective strategic planning.

Based on several studies of project success factors and minimizing delay in construction project, a total twenty-three methods have been identified in order to minimize construction delays as shown in Table 2.4

Table 2.4: Methods of Minimizing Construction Delays (Dayang, 2009)

No.	Methods
1.	Utilization of the latest construction technology method
2.	Frequent site meeting with all functional parties
3.	Not awarding contract based on the lowest bid
4.	Increase productivity by working overtime, shift, etc
5.	Offer incentive for early project completion
6.	Ask for extension of time
7.	Execute delayed activities by subcontractors
8.	Promote team working among project participants
9.	Developing human resources management (training, day courses, etc)
10.	Timely decision making by all functional group
11.	Proper project planning and scheduling
12.	Developing appropriate communication system linking to all functional group
13.	Early in obtaining permit and approval from relevant authority
14.	Thorough project feasibility study and site investigation
15.	Accurate initial project cost estimation
16.	Hire experience personnel for project implementation
17.	Build a systematic project control and monitoring mechanism
18.	Absence of bureaucracy
19.	Proper emphasis on past experience of project parties
20.	Accurate initial time estimation
21.	Ensure the availability of resources (finance, materials, equipment, workmen, etc)
22.	Select the competent project manager
23.	Use the appropriate construction methods

2.5 Traditional Approach Dealing with Delay in JKR Project

Basically there are several steps taken by JKR when the project delays. The steps are as follows: -

- a. Warning Letter
- b. Rescheduling
- c. Extension of Time
- d. Liquidated Damages (LAD)
- e. Termination of Contract
- f. Appoint third party

2.5.1 Warning Letter

The contractor will receive a warning letter to improve the progress of the project. The length of time is given to the contractor 14 days to submit feedback. After feedback received Project Manager will monitor the implementation of the project through regular site meeting. The contractor must show determination after a warning letter is issued to avoid the contract is terminated.

2.5.2 Rescheduling

According to Vieira *et al.* (2003), rescheduling is the change of original schedule of time in order to respond to disruption and problems, which have occurred. In the construction industry, schedules may be updated in order to monitor the time and work in construction projects (Liu and Shih, 2009). The importance of schedule updates are as mentioned by Liu and Shih (2009): (1) compare the original schedule with the actual progress of the project; (2) identify all delayed activities; (3) identify who or what is responsible for delays; and (4) forecast and modify projected work progress based on actual progress. Once the delay has been identified, JKR normally required the contractor to prepare the recovery plan. By using the rescheduling process, the JKR will determine the actual strength of the contractor to complete during the contract period. Based on the schedule update, a delayed activity was identifying and usually, rescheduling is required due to the delayed work. Thus, rescheduling is one of the effects of delay in construction projects. The contractor should prepare the Recovery Plan by using the 4M methods.

2.5.3 Extension of Time (E.O.T)

Extension of time is an event where extra time is requested in order to complete the project (USLegal, 2010). According to Odeh and Battaineh (2002), client-related delay is the major factor contributing to delays. Thus, contractors can claim suitable EOT if the cause of delay is beyond the control of the contractor and is brought about by client-related factors (Othman *et al.*, 2006). This is mentioned by Williams (2003) in his study on assessing Extension of Time delays on major

projects. Usually contractors can claim EOT due to client or owner related delays in construction projects. In JKR contractor entitled to get EOT for reasons or causes of delay which is beyond his control accordance with Clause of Contract (COC). The S.O of project only has one delegation of power based on COC to approval the EOT. The next application of the EOT must present to EOT Community at Head Quarters

2.5.4 Liquidated Damages (LAD)

According to Twyford (2007), in the construction contracts liquidated damages clauses are usually inserted to promote compliance with time provisions, in particular, completion of the work and payment on time. In regard to completion of the work, a typical clause will provide that if the work is not completed by the extended date for completion, liquidated damages, at the daily rate provided by the schedule, shall become due and payable. A similar provision is made for overdue payments under the contract. Liquidated damages clauses have the virtue of informing both parties to a contract in advance what the damages payable for an identified breach will be at the time of entering the contract. This can be equal advantage to the party who must pay the damages as it is to the party receiving the damages. The upper limit of the damages payable is fixed and a party can take this into account in the initial negotiations. It is not uncommon for a contractor who knows him or she cannot complete within the required time to add the liquidated damages equivalent of the time overrun to the tendered price.

In JKR, if the contractor fails to complete the works by the Completion Date, the SO shall issue a certificate of Non-completion. Upon the issuance of the certificate of Non-Completion the contractor shall pay or allow to the JKR a sum calculated at the rate stated as Liquidated Damages for the period from the Completion Date to the Date of Practical Completion. LAD only allow not more than 60 day after Certification Non- Compliance

2.5.5 Termination of Contract

A construction contract could terminate for cause or for convenience. Termination for cause occurs when one party stops work because of a deficiency in performance by the other party. If the contract was terminated because of a party's own poor performance, the law typically provides the terminated party with little recourse in the event of a termination for cause. A termination for convenience, by contrast, occurs when the owner stop their work for a reasons other than a deficiency in performance by the contractor. Based on a letter from Deputy Director General (Business Sector) reference no (38).dlm.JKR-KPKR:109.010/08 dated 30 July 2010, the S.O should present the project in *Jawatankuasa Projek Sakit* to get the approval for termination.

2.5.6 Appoint the Third Party (*Kontraktor Penyelamat*)

In some cases, because the main contractor was terminating, the project is abandoned. To restart it will need to appoint '*kontraktor penyiap*' or '*kontraktor penyelamat*'. Re-measurement has to be done and price increases of materials have to be impute so we find the project cost has definitely ballooned and effect the duration of time. The project is already delaying because to appoint a new contractor alone will take seven months. In JKR, normally the process of the reappoint the contractor was using the selected tender. A list of the capable contractor with the good track record was suggesting to the Ministry of Finance to continue the project.

2.6 Contemporary Approach in JKR Project to Minimize Delay

Besides that, JKR also introduce the contemporary approach to avoid projects delay and speed up delivery of the project to the client. The contemporary methods were exposed in implementation of the Rolling Plan (RP) project in Tenth Malaysia Plan (RMK10).

2.6.1 Industrialised Building System (IBS)

Industrialized Building System (IBS).is a term used in Malaysia for a technique of construction where components are manufactured in a controlled environment, either at the site or off site, placed and assembled into construction works. JKR has started to implement IBS to all the government projects for the projects with a value of more than RM10 million accordingly based on Surat Pekeliling Perbendaharaan Bil.7 Tahun 2008. Although JKR has adopted the IBS system since 2008, there are still anticipated delays in the projects. There are projects that are not complete on time, and has requested for Extension of Time (EOT). This issue has been monitored and the data was compiled from the project monitoring system used in SKALA system.

2.6.2 Building Information Modeling (BIM)

Building Information Modeling' (BIM) BIM was introduced nearly ten years ago to distinguish the information rich architectural 3D modeling from the traditional 2D drawing. Base on the current statistic, the JKR BIM Department is carrying out two pilot projects using BIM technology. One of the objectives implements BIM in JKR is to improve the delivery of projects.

2.6.3 Project Health Check (PHC)

Most projects are sick and JKR do not even realize the extent of their sickness and high percentage of projects finish behind schedule. To reduce the risk of project failing and improve quality of project, a quick independent assessment of the overall state of health of a project to be carried out to identify the strength and weakness of the project as early warning detection and develop recovery plan. Project Health Check (PHC) can be performed at any time during the project life cycle. It is highly recommended for the new project that required project management application. The implementation of the PHC based on selected projects only. Lack of qualified personnel was one of the factors this method cannot be implemented in all JKR projects.

2.6.4 Project Management Plan (PMP)

PMP is a Project Management Plan for the document provided to help project managers to implement project management based on best practices. PMP is to use a template that was developed by PROKOM, JKR where it consists of nine (9) key knowledge areas in the Project Management and integrated with Total Quality Management (TQM). PMP was designed to replace the QPLAN template in the SKALA.

2.6.5 Accredited Project Manager Program

JKR also has embarked on a qualified project manager. Project Manager Competency involves the knowledge, skills and attitudes of the Project Manager. Knowledge of project management is applied through a course management projects. However, the skills gained from practicing or practice of the knowledge gained. JKR need to increase the number of competent project manager. Competent project manager can derived the implementation of project successfully with on time project delivery, within agreed cost and high quality.

2.6.6 Risk Management

Definition of risk management is the “coordinated activities to direct and control an organization with regard to risk” (*ISO 31000:2009*). Risk management includes the processes concerned with first identifying, analyzing and evaluating the risks presented by the acquisition and/or development of the product, secondly determining cost-effective treatments for those risks and thirdly implementing the risk plan, while continuously monitoring and reviewing the plan. JKR also implement Risk Management to achieve the objective such as minimize project management by crisis, minimize surprises and problems, increase probability of project success and better handling of true cost and schedules by planning contingencies. Risk management was also been determined to be a part of the pre-condition for the implementation of projects over RM 50 million.

2.6.7 Value Management

Value management is defined as a structured, analytical and team oriented process to explicit the functional benefits of a project and to appraise needs, problems or opportunities to seek best value system determined by the client. VM implementation becomes mandatory to the Malaysian Government projects worth RM50 millions and above (Circular by Economic Planning Unit - EPU, Jabatan Perdana Menteri “Garis Panduan Pelaksanaan Pengurusan Nilai Bil. 3/2009” dated 29 December 2009). Generally, there are three (3) main interventions of VM in the Malaysian Government project life cycle. They are termed as Value Assessment (VA) at the Strategic Planning Stage, Value Engineering (VE) at the Design Stage and Value Review (VR) at the Use Stage.

2.7 Conclusion

Delay problem is the barbed question in construction business. The cause of delay in construction stage arises from innumerable factors. The dilemma cannot be solved thoroughly, if these factors are not identified and restricted or eliminated. However, the constraint of time and finance does not allow project manager to solve all influencing factors, so it is necessary to identify the method in minimize the delay. By understanding this chapter, various information regarding the causes, methods to mitigate delays and the current practice at JKR were obtained.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology is a way to provide a guideline for researcher to achieve the aim and objectives of the study. This chapter shows the chronological of research methodology and discusses the methods of conducting research in order to achieve the objectives. .

3.2 General Approach of Research Design

Data collection is the most critical part since the accuracy of the data obtained will determine the success or failure of this research. The data of this research has been collected through the literature review, interview with the expert panel and survey questionnaires

3.3 Literature Review

All information regarding delays in construction project was gathered through a literature review. Literature review has been carried out to enhance the understanding of theory regarding the research problem. The materials for literature reviews are generated from books, articles, magazines, internet, journals, documents,

and other's research papers. These reading materials provided a good primary source for the research. The information, which is relevant, was used as a benchmark against primary data collected to support the research.

Document search from the JKR documents/seminar papers/speeches was also done. The speeches were from the Works Minister, the Director General, or other high-ranking officers in the public service that is related to JKR projects delay. Review papers has been made on that presented by JKR officers in various seminars or conferences, which was relate to this research area.

3.4 Interview with Expert Panel

An interview is a verbal interaction between two or more people where one person (the interviewer) implicitly directs the flow of information. It is a tool to find out what is on someone's mind, i.e. to find out from them what is on their mind, which we cannot observe. Interviews can be conducted face to face, by telephone or by email. Interviews have become a favorite method of gaining information such as the collection of data to answer a research question. In this study, the type of interview that was used is semi-structured interview. Semi structured interview It is more of qualitative to research and the data collection is not too rigid. The questions asked are normally open questions and the order is varied since a particular response will lead ones to other questions.

According to Fischer and Tatum (1997), interviews proved preferable to questionnaires as the knowledge acquisition method because they allowed direct interaction between the expert and the interviewer. Besides, a personal interview process was the best data collection technique for the type of detailed information required (O'Connor and Miller, 1993)

The interviews with expert were carried out onto 5 JKR officers. As for JKR staff, the interviews were carried out on the middle management staff. They

were at Principal Assistant Directors or Senior Construction Manager or Senior Project Managers levels. They are holding senior posts in JKR (all grades J52 above). They have at least 20 years of experience behind them. The interviews were mostly face-to-face interviews whereas one was done through the phone and one was through emails. The data collected from the interview then was analyzed and as a basis of questionnaire survey design Samples of questions are as in Table 3.1

Table 3.1: List of Interview Question

No.	Interview Question
1.	<p>a. There have several factors identified causes of delay in JKR project. Therefore, based on your experience, could you describe and explain the causes of delay in JKR project implementation.</p> <p>b. It is the delay causes similar with previous (e.g:10 years ago) and today.</p>
2..	The problems stated above, what is the current practice in JKR to solve the project delay? Rescheduling, E.OT, L.A.D, and Termination of Contract are the current practice in JKR. Do you agree?
3.	With all the method that we already implement, why it is still happening?
4.	What is the limitation that JKR facing by using this traditional approach?
5.	How about the impact of project implementation the effect of project delay in term of time overrun, cost overrun, quality and also customer satisfaction?
6.	What is the alternative approach, which practice by JKR to minimize project delay? Are we in practice using collaborative teamwork, using alternative procurement system, developing communication channel for the project team, etc?
7.	What challenges or hurdles that you faced in implementing projects at JKR now day?

Table 3.1: Interview Question (Cont'd)

No.	Interview Question
8.	What is the difference of using IBS, BIM in a project comparing the conventional method? Its new systems are more helpful, acceptable, & practical or otherwise, JKR still convenient using conventional method?
9.	Can you identify any improvements in project implementation at JKR especially in delivery project on time? ...with using new latest construction technology method like IBS, BIM, approach Project Management Plan, Project Health Check, etc
10.	How about using contemporary approach such as collaborative teamwork, using alternative procurement method, clear information, and proper line of communication channel?
11.	How to avoid delay in every stage project life cycle? Did JKR have any model for the delivery of projects on time or checklist to make sure the project is ready to take off? Refer to appendix .
12.	In your opinion, can we improve delivery project to the client with consider the triple constraint with is time, cost and quality and client satisfaction?

3.5 Questionnaire Survey

The questions were designed related to the research objectives especially on the causes of delays and proposed methods to minimize delays. Before designing the questionnaire, there a very important point that needs to be considered. The questions have to be short and precise without touching any sensitive or confidential issues as reject may be offended (Taylor S, 2005). The purpose is to facilitate the respondent's understanding. Subsequently, the questionnaires were sent to 150 respondents with the proportion of 2:1 in Business Sector and Design Sector.

Questionnaires were created based on the information gathered from interview with the expert panels and literature review. A thorough checking for the questionnaire has been made to evade any mistake and to ensure only relevant questions is included in the form.

The questionnaires were separated into four (4) main sections. The respondents were general asking about their personal and organization background in section A. Subsequently, in section B, the respondents were asked to state the fifty seven (57) delay causes, according to their local working experience in construction industry. Next, section C is about the effectiveness of the traditional approach in JKR dealing with project delay. Lastly, Section D is about the contemporary approach attribute / methods that minimize construction project delays. Respondent were required to give their opinion regarding the effectiveness of minimizing delays method.

3.5.1 Section A

Section A is to obtain the information of respondent's background as well as their organization and their experience in dealing with project management. The typical questions that was asked include the following:

- The Grade of the respondent in organization
- The department in which the respondent represents
- The experience of the respondent in years of service at JKR
- The experience of the respondent in project management
- The type of building which involved most frequent delay
- The number of project delay faced by respondent
- The actual time spent for the delayed project

3.5.2 Section B

Section B is to obtain the information on causes of delays in construction projects. There were seven categories with fifty-seven factors of delay causes identified in this structures question. This section requires the respondent to answer the frequency of occurrence as well as the severity of their project based on the delay causes given.

The questionnaire is based on Likert Scale of five ordinal measures from one (1) to five (5) according to level contributing. According to John F. (2001), Likert Scale is easier to use for respondent to express their level of opinion. For the

frequency of cause's occurrence, each scale represents the rating as shown in Table 3.2.

Table 3.2: Likert Scale Grade Section B

Feedback	Scale
Strongly Agreeable	5
Agreeable	4
Moderately Agreeable	3
Slightly Agreeable	2
Least Agreeable	1

3.5.3 Sections C

This section is evaluating the effectiveness of the traditional approach in JKR dealing with project delay. Eight (8) current practices dealing with project delay at JKR was determined. The questionnaire is mainly based on Likert's scale of five ordinal measures from one (1) to five (5) according to level of ineffectiveness. Each scale represents the following rating as shown in Table 3.3.

Table 3.3: Likert Scale Grade Section C

Feedback	Scale
Highly Ineffective	5
Ineffective	4
Moderately Ineffective	3
Low Ineffective	2
Least Ineffective	1

3.5.4 Sections D

This section is to identify the effective contemporary approach attribute and methods of minimizing construction delays. Thirty-nine methods were identified from several literature reviews, which used in the structured question. The questionnaire is mainly based on Likert's scale of five ordinal measures from one (1) to five (5) according to level of effectiveness. Each scale represents the following rating as shown in Table 3.4.

Table 3.4: Likert Scale Grade Section D

Feedback	Scale
Highly effective	5
Effective	4
Moderately Effective	3
Low Effective	2
Least Effective	1

3.5.5 Questionnaire Distribution

The respondents involved in this research were the JKR staff in business and design sector. According to Paul Cozby (2003), a large sample data can give result that is more accurate. Therefore, researcher had distributed about one hundred fifty set of the questionnaire form. The respondent is randomly selected. A questionnaire accompanied by covering letter briefly stating the objectives of the survey, was issued to the selected respondents who were later followed up by telephone. There were two main method been used for the purpose of this questionnaire distribution; via mail delivery and by hand method.

3.6 Data Analysis

Data that have been collected were analyzed separately according to the source of data. The data gathered from the interview will be analyzed by qualitative analysis which using descriptive analysis. Meanwhile, the data collected from the questionnaire survey will be analyzed by quantitative analysis by using frequency and mean score statistical analysis. The data will be analyzed using software so called Statistical Packages for Social Science (SPSS).

3.6.1 Data Analyses and/or Analysis of Information

All information collected from the exploratory interviews and data from the questionnaire survey was analysed and discussed in Chapter 4 and Chapter 5 respectively.

3.6.2 Exploratory Interviews and Documents Search

The information from the exploratory interview was an analysis using the content analysis. The main points were tabulated and the main parameters that constituted as causes of delay were listed to be used later in the questionnaire surveys. The same was applied to documents in search where any potential causes of delay was also listed and later used for the questionnaire survey.

3.6.3. Reliability Analysis: Cronbach's Coefficient Alpha

Cronbach's coefficient alpha is normally used to test for reliability of data collected. It is a commonly used technique, internal consistency analysis employed to measure the reliability of each derived factor in the factor analysis. Using SPSS reliability analysis program, the analysis was performed separately for the items of each critical factor (Antony et al, 2002). Black and Porter (1996) was cited by

Antony et al, (2002) that generally an alpha of 0.6 or higher (≥ 0.6) will be considered adequate in exploratory research.

3.6.4 Normality Tests

The Normality Test is the pre-requisite for most of the statistical analysis based on data collection and inferences statistics. The test is to determine whether a data set is well modelled by a normal distribution or not. Two methods were used to test for normality.

a) Kurtosis and Skewness Parameters

In statistics, kurtosis is a measure of the “peakedness” of the statistical distributions. Skewness is a measure of the asymmetry of the probability distribution of areal-valued random variable. The skewness value can be positive or negative, or even undefined. The values of these skewness and kurtosis must be within the range of ± 2.0 (Chua, 2006). These values were calculated using the SPSS version 18 software.

b) The histograms and Q-Q plot

From the SPSS analysis, when testing for normality, the main area of interest was the Test of Normality Table and Normal Q-Q Plots. These were the numerical and graphical methods to test for normality respectively. An informal approach to testing normality is by plotting the histogram of the collected data. The empirical distribution of the data (the histogram) should be bell-shaped and resemble the normal distribution. Normal Q-Q Plot will show a straight line if the data to be analysed are normally distributed.

3.6.5 Relative Importance Index (RII)

Relative Importance Index is the evaluation of the ranking of the questions relative to other questions in the survey. The weighting is based on the responses to the questionnaire surveys. It is governed by the formula:

$$RII = \frac{\sum \{[n1 \times 1] + [n2 \times 2] + [n3 \times 3] + [n4 \times 4] + [n5 \times 5]\}}{\sum n_i \times 5}$$

Where:

RII = Relative Importance Index

n_i = frequency of occurrence for Likert value i

1, 2, 3, 4, 5 = the Likert Scale chosen

The index value for any given factor is not more than 1. The higher the value of RII, the higher the importance of the factors compared to the others. These values were calculated using the Excel Spreadsheet and presented in Chapter 4.

3.7 Conclusion

This study was designed to examine the effectiveness of the traditional approach in JKR, proposed the cotemporary approach to minimize the delay and develop guidelines for on time project delivery. This study used a descriptive quantitative approach that finds to understand critical elements to identify the aim of study. Data was obtained by literature review, interview with expert and questionnaires.

All questionnaire go through for Normality test before distribute to all respondent. A results from Chronbach's Alpha equals to > 0.7 which refers to an excellent reliability of the entire questionnaire. So, the questionnaire was considered valid, reliable, and ready for distribution.

CHAPTER 4

DATA COLLECTION AND ANALYSIS

4.1 Introduction

This chapter presents the data analysis and discussions based on the interview with the expert panel and questionnaire survey. The collected were analyzed using the method as mentioned in Chapter Three.

4.2 Content Analysis of the Interviews with Expert Panel

: The expert panel respondents and method used was tabulated below-

Table 4.1: Method of used Interview with Expert Panels

No.	Respondents	Organization	Method Used
1..	Respondent #1	JKR	Face to face
2..	Respondent #2	JKR	Face to face
3..	Respondent #3	JKR	Telephone
4..	Respondent #4	JKR	Telephone
5..	Respondent #5	JKR	Face to face

The summary of the interviews were analyses using content analysis method as tabulated in, Table 4.2. The factors of delays issues gathered from the interviews were listed below. This is the raw factors without amendments even though some of them were repetitive.

Table 4.2: Summary of Interview Session with Expert Panels

Question	Respondent #1	Respondent #2	Respondent #3	Respondent #4	Respondent #5
Q1 a) There have been several factors identified as causes of delay in JKR project. Therefore, based on your experience, could you describe and explain the causes of delay in JKR project implementation.	Agree with 7 categories factor The respondents highlight major causes of delay is because of:- i. Poor site management. ii. Improper planning	Agree with 7 categories factor The respondents highlight major causes of delay is because of:- i. Unrealistic project time ii. Poor supervision	Agree with 7 categories factor The respondents highlight major causes of delay is because of:- i. Lack of consultant experience ii. Capabilities of contractor	Agree with 7 categories factor The respondents highlight major causes of delay is because of:- i. Building Permit ii. Competent Project Manager	Agree with 7 categories factor The respondents highlight major causes of delay is because of:- i. Less communication ii. VO iii. EOT
b) It is the delay causes similar with previous (e.g: 10 years ago) and today.	Yes	Yes	Not 100%	Yes	Yes
Q2 With the problems stated above, what is the current practice in JKR to solve the project delay? Rescheduling, EOT, L.A.D, and Termination of Contract is the current practice in JKR. Do you agree?	Agreed Add warning letter Current practice need to review especially term of termination and LAD	Agreed Add Jawatankuasa Projek Sakit. Closely monitoring	Agreed Current practice need to review	Agreed Current practice need to review	Agreed Current practice need to review. Imposed the LAD by monthly basic and include in the COC

Table 4.2: Summary of Interview Session with Expert Panels (Cont'd)

Question	Respondent #1	Respondent #2	Respondent #3	Respondent #4	Respondent #5
Q3 With all the method that we already implement, why it is still happen?	Lack of Monitoring	Lack of skills and experience	Not 100% implement the COC	SYMP	Personnel not competent
Q4 What is the limitation that JKR facing by using this traditional approach?	Only give EOT, LAD and termination	EOT- Easy to get the approval from SO	LAD not 100%. Imposed. MOF involved and give waiver to contractor	Time and cost constraint	Litigation Reputation of JKR as technical department
Q5 How about the impact of project implementation the effect of project delay in term of time overrun, cost overrun, quality and also customer satisfaction?	The most important customer satisfaction. Bad reputation	Major effect of delay to client in term of cost and time	Negative effect	Yes	The impact so big. Some of the client did not continue doing project with JKR
Q6 What is the alternative approach which practice by JKR to minimize project delay? Are we in practice using collaborative team work, using alternative procurement system, developing communication channel in project team?	Not 100 % Just pilot case for BIM and PMP	No training for the staff. All the new approach need the proper planning and must make sure all the staff know	Risk Management Plan Project Health Check Using IBS	Sistem Perolehan Alternatif BIM Scheduling Qualified Project Manager	Matrix system not functional well Need some review. Delivery project not in stipulated time that agreed with client

Table 4.2: Summary of Interview Session with Expert Panels (Cont'd)

Question	Respondent #1	Respondent #2	Respondent #3	Respondent #4	Respondent #5
Q7 What challenges or hurdles that you faced in implementing projects at JKR now day?	Too many procedure and SOP which is need to review back	Attitude of the new officer. Not competent	Delivery system need to review	Short of man power Less experienced of contractor and consultant	HODT cannot follow the time line set up by HOPT
Q8 What is the difference of using IBS, BIM in project comparing the conventional method? It's is new systems are more helpful, acceptable & practical or otherwise, JKR still convenient using conventional method?	Yes but the limitation of service provider	Yes	Not 100% successful	Shortage of time in delivery project to client	Quality improvement
Q9 Can you identify any improvements in project implementation at JKR especially in delivery project on time? ...with using new latest construction technology method like IBS, BIM, approach Project Management Plan, Project Health Check, etc	Case study NIC	Not sure because the implementation just only for the pilot project only	The current project using this approach is Naiktaraf Hospital Kuala Lumpur	Only 50% of the project was successfully because of the working culture. Only monitor for the auditing processes not as routine in workplace	Institut Kanser Negara is the best practice of Project Management. Projects complete ahead the schedule.

Table 4.2: Summary of Interview Session with Expert Panels (Cont'd)

Question	Respondent #1	Respondent #2	Respondent #3	Respondent #4	Respondent #5
Q10 How about using contemporary approach such as collaborative team work, using alternative procurement method, clear information and proper line of communication channel?	Communication with stakeholder need to be focus. Reporting and briefing the progress report to stakeholder is the best practice to avoid delays	No proper line communication because HOPT not control. New approach need training for staff	Good but need to do the pilot case to measure the effectiveness	No experience using all the method that mention	JKR must have the new line up officer to implement all the new strategy approach, reduce birokrasi, and work in cross functional teamwork
Q11 How to avoid delay in every stage project life cycle? Did JKR have any model for the delivery of project on time or checklist to make sure the project is ready to take off? Refer appendix	ACAT Gerbang Nilai Agreed with the list of activity and duration of time proposed in the guidelines	3 constraint – Land, Brief of Project and Cost Gerbang Nilai Agreed with the list of activity and duration of time proposed in the guidelines	Not sure Agreed with the list of activity and duration of time proposed in the guidelines	ISO (SPB) JKR as one of the tool. Gerbang Nilai Agreed with the list of activity and duration of time proposed in the guidelines	SKALA not register if the brief not completed. No proper work flow in delivery project accept for ISO (SPK) Agreed with the list of activity and duration of time proposed in the guidelines

Table 4.2: Summary of Interview Session with Expert Panels (Cont'd)

Question	Respondent #1	Respondent #2	Respondent #3	Respondent #4	Respondent #5
Q12 In your opinion, can we improve delivery project to the client with consider the triple constraint with is time, cost and quality and also client satisfaction?	Yes. Client are more concern on project delivery with accepted quality and time	Yes. Must follow the contact. All the specification is there. Just follow the guidelines.	To ensure JKR project team are competent. HODT & HOPT	Delivery project become the KPI. If the SO failed to achieved the KPI , the project team can be penalty and down grade.	Supporting from the top management. Blue ocean strategy with the client and other technical department in JKR project implementation

4.3 Documents Search

Documents search was done on the paper that present in the Mesyuarat Jawatankuasa Pengurusan Pemandu (JPP) JKR chair by Director General of PWD and on the speeches that were related to JKR project management. What is available below is the related paper regarding Project Delays.

In the first National Asset and Facility Management (NAFAM) Convention, Tan Sri Mohd Sidek Hassan, the Chief Secretary to the Government of Malaysia, pointed out all civil servants must ensure that the projects are implemented carefully monitored and enforce existing policies and regulations to avoid delay. Contractors who fail in their service should be eliminated from the system. (NAFAM @1, 2007). During the opening remarks of the second National Asset and Facility Management (NAFAM) Convention 2009, the Director General of JKR stressed that the criteria of project implementation is not based on the lowest cost and emphasized should also be given to the aspects of value-added to the projects and the optimum usage of resources. (NAFAM @2, 2009). At the same convention, Tan Sri Mohd Sidek Hassan, the Chief Secretary to the Government, insisted that stern action be taken to the contractors who do not implement what has been agreed in the contract. He also mentioned that we have to be fair to the contractors by expediting the payments due to them. On top of that the existing guidelines and procedures are well defined and the officers have to enforce them (NAFAM @2, 2009).

In addition there are two papers was presented at the Mesyuarat Jawatankuasa Pengurusan Pemandu (JPP) Bil. 20/2013 dan Mesyuarat Jurutera Daerah Bil. 4/2013 involves issues related to the project delays. This paper describes the performance of the physical progress of current JKR projects and also describes the trends that have been identified for the project to be late / sick. Measures to overcome problems later projects were also discussed and refined by the members. The two papers were-

- i. Laporan Khas Projek Lewat > 2 bulan & Projek Sakit
Mesyuarat Jawatankuasa Pemandu Pengurusan (JPP) Bil. 20/2013
(1 October 2013)

- ii. Cadangan Pelan Tindakan Projek Sakit JKR -
Mesyuarat Jurutera Daerah Bil.4/2013 (18 November 2013)

Tan Sri Dato Setia Haji Ambrin bin Buang, Auditor General National Audit Department in his speech entitled Enhancing JKR Performance – An Audit Perspective, in JKR Senior Officers Conference in Terengganu (JKR SOC, 27-29 May 2013)stressed that the problems in managing JKR project could be minimized if all the officers involved have good attitude, skills and knowledge and high integrity values. He also pointed out that weaknesses in the audit reports of these projects are usually very delayed , or significantly increased project costs and the project faces many and serious defects which are due to the following factors Site supervision or poor site supervision and the other is poor contract administration, lack in project monitoring, and human errors. He also highlight about learnt lessons of value management, which is currently a standard procedure for planning government project. Value management is crucial for maximize value for money for important criteria such as site, project scope, design, maintenance etc. to reduce the cost and reduce the risk of troubled projects.

4.3.1 Gerbang Nilai (Gateway)

Gateway is an adaption of the United Kingdom's Office of Government Commerce (OGC) Gateway Review Process to improve the delivery of major projects (Gershon, 1999). Concepts of Gateway Review were to help Government deliver best value from its spending. Key decision points in their lifecycle to provide assurance that they can progress successfully to the next stage. Gateway is being introduced in 10th Malaysia Plan. In ensuring the success of the whole project undertaken by JKR, Gerbang Nilai review shall be imposes to all projects above RM5 Million.

Based on the factor the guidelines unfold in the following sequence:-

- i. Gateway 1 - Planning stages
- ii. Gateway 2 - Design stages

- iii. Gateway 3 - Procurement stages
- iv. Gateway 4 - Construction

4.3.2 Estimation of Time in Project Implementation

Based on the Letter from the Director General PWD to Director General Of Economic Planning Unit (EPU), Prime Minister Department dated 25 September 2013, JKR already set up the time frame for project delivery in the Pre-Contract phase which include Planning, Design and Procurement. The summary for time estimation Pre-Contract in JKR project as shows in Table 4.3 below:-

Table 4.3: Estimation Time in Pre-Contract Phase

Phase	Planning	Design	Procurement	Total
Conventional In House	113 days	178 days	70 days	361 days
Conventional Consultant	107 days	178 days	70 days	355 days
Design & Build	167 days	80 days	90 days	237 days

For construction phase the duration of project were based on cost, scope of works and the complexity of the project and scope of work. While for the handing over stage project will hand over to the client normally three (3) months after the Certificate of Practical Completion (CPC) was issues. The summary for time estimation Construction stage in JKR project as shows in Table 4.4 below

Table 4.4: Estimation Time in Construction Phase

Type of Project	Cost < RM 500,000	Cost between RM 500,000 to RM 5 Million	Cost > RM 5 Million
Building	15 month	24 month	36 month
Road & Infrastructure	9 month	24 month	36 month
Project Complex	Duration based on time agreeable with the Client		

4.4 General Background of Questionnaire Survey Respondents

This section will discuss and analyze the first part of the questionnaire which consists of seven questions that focus on the general information about the JKR staff. The general information about the JKR staff include grade, years of service, years in project management, department, type of the most building delays, number of executed projects delay faced and actual time spend for the delayed project.

There is a one hundred fifty (115) set of survey questionnaire was distributed to the targeted respondent in order to achieve the objective. The total numbers of questionnaire distribution and responses have been analyzing and shown in table 4.5 and table 4.6 below.

Table 4.5: Distribution of Questionnaire Based on Sector

Organization	Total Distributed	Total Return	Respond Rate
JKR (Business Sector)	100	83	83%
JKR (Design Sector)	50	36	72%
Total	150	119	77.5 %

Table 4.6: Distribution of Questionnaire Base on Organization–

Organization	Frequency	Percentage	Cumulative Percentage
Project Management Office (PMO)	8	6.7	6.7
Cawangan Kejuruteraan Elektrik (CKE)	5	4.2	10.9
Cawangan Pangakalan Udara & Maritim (CPUM)	4	3.4	14.3
Cawangan Kejuruteraan Mekanikal (CKM)	3	2.5	16.8
Cawangan Arkitek (CA)	5	4.2	21.0
Cawangan Alam Sekitar & Tenaga (CAST)	1	0.8	21.8
Cawangan Kontrak & Ukur Bahan (CKUB)	2	1.7	23.5
Cawangan Kejuruteraan Senggara (Ck Senggara)	2	1.7	25.2
JKR Kedah	1	0.8	26.1
JKR Selangor	1	0.8	26.9
Cawangan Kerja Bangunan Am (CKBA)	22	18.5	45.4
Cawangan Pendidikan & Pengajian Tinggi (CPPT)	7	5.9	51.3
Cawangan Kerja Kesihatan (CKK)	10	8.4	59.7
Cawangan Kerja Keselamatan (CKS)	2	1.7	61.3
Cawangan Pengurusan Korporat (CPK)	9	7.6	68.9
Cawangan Kejuruteraan Jalan & Geoteknik (CKJG)	8	6.7	75.6
Cawangan Pengurusan Projek Kompleks (PROKOM)	7	5.9	81.5
Cawangan Kejuruteraan Awam & Struktur and Jambatan (CKASJ)	10	8.4	89.9
Design 2	1	0.8	90.8
District	1	0.8	91.6
JKR Woksyop Persekutuan	1	0.8	92.4
KADER	1	0.8	93.3
Kem.Perumahan Kerajaan Tempatan	1	0.8	94.1
Kementerian Luar Negeri	1	0.8	95.0
KKR	1	0.8	95.8
MINDEF	1	0.8	96.6
PAKAR	1	0.8	97.5
State	1	0.8	98.3
Unit JKR KESEDAR	1	0.8	99.2
Unit Penyelidikan 6	1	0.8	100.0
Total	119	100.0	

4.4.1 Grade

This question refers to the grade of respondents in JKR organization. Figure 4.1 shown that 70 or 58.8% of the respondents are the officer grade 41/44, 38 or 31.9% of the respondents are officer grade 48/52 and 11 or 9.2% of the respondents are officer grade 54. It can be concluded that officer grade 41/44 is the most respondent who participate in this survey. Thus, the respondents are eligible person to giving this research's data.

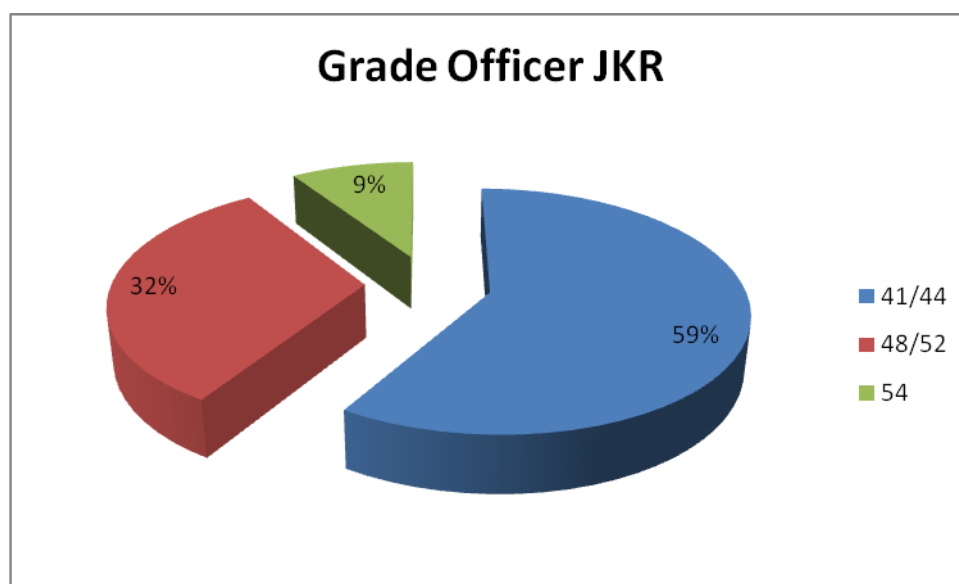


Figure 4.1: Grade of Respondents in Organisation

4.4.2 Years of Experience

The years of experience is divided into four categories include less than 5 years of experience, 6 to 10 years of experience, 11 to 15 years of experience, 16 to 20 years of experience and more than 21 years of experience. The results from figure 4.2 shows that 27.7% of the respondents with less than 5 years' of experience, 38.7% of the respondents with 6-10 years' of experience, 11.8% of the respondents with 11-15 years' of experience, 6.7% of the respondents with 16 -20 years' of experience and 6.7% of the respondents with more than 20 years' of experience



Figure 4.2: Years of Experienced

The experience possess by the respondents may helps in providing a better understanding of this matter and in better position in giving much precise answer required to the questionnaires form. However, it would be better if the percentage of respondents whose experiences are 15 years or more can be increased. In fact, these ratios reflect the current phenomenon of local industry, that is a large amount of young practitioners have been graduated in current years to meet the vast human demand, and they have got high positions in their organizations. Figure 4.3 shows years of the experience in project management by the respondents. 60.5% of the respondents with less than 5 years' of experience, 21.0% of the respondents with 6 - 10 years' of experience, 7.6% of the respondents with 16-20 years' of experience and 11.0% of the respondents with more than 20 years' of experience in project management.

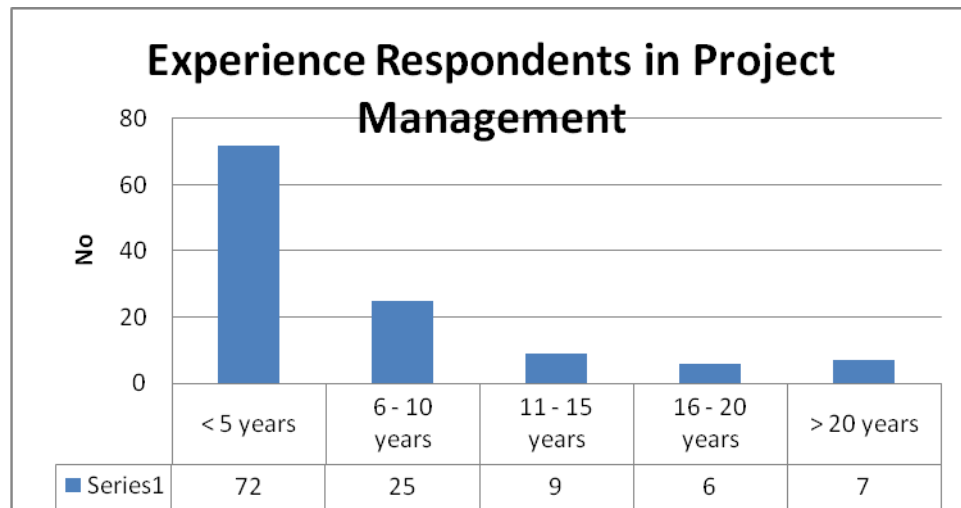


Figure 4.3: Years of Experienced in Project Management

4.4.3 Types of Building Projects Frequently Delays in JKR

The types of building is divided into 5 categories include school, office, public facilities, hospital and others. The results from Figure 4.4 shows that 39 or 32.8% of the respondents choose hospital as the type of frequently delays, 29 or 24.4% of the respondents choose office building, 27 or 22.7% of the respondents choose school project, 15 or 12.6% of the respondents choose public facilities project and 9 or 7.6% of respondents choose others project such as road and bridge.

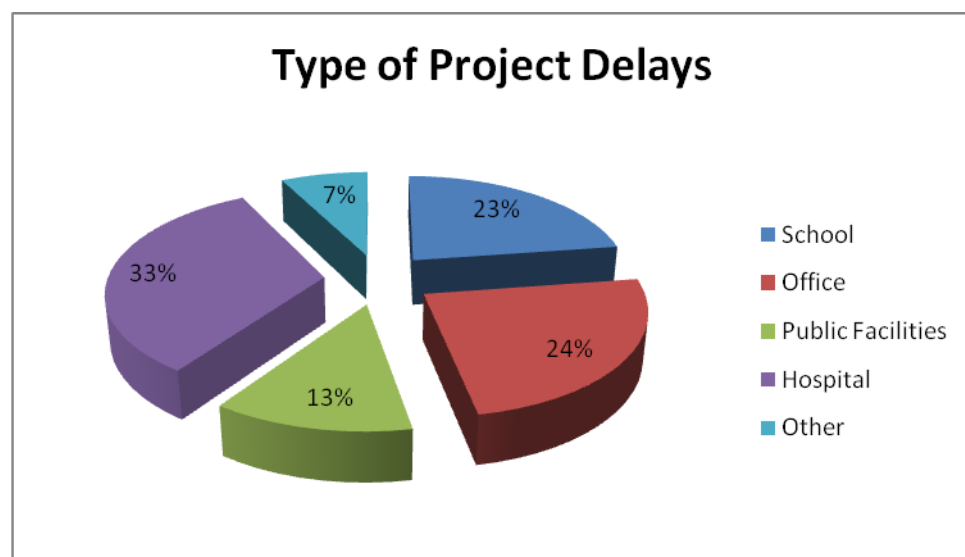


Figure 4.4: Type of Building Frequently Delay

4.4.4 Numbers of Project Delay

This question refers to the number of executed projects delay which the respondent participated. The classification of the number of projects includes 1 to 3 projects, between 4 to 6 projects, from 7 to 9 projects, between 10 to 12, and more than 13 projects. The results indicate that 47.9% of the respondents with 1-3 projects delay, 34.5% of the respondents with 4-6 projects delay, 6.7% of the respondents with 7-9 projects delay, 0.8% of the respondents with 10-12 projects delay and 10.1% of the respondents with more than 12 projects delay. This is important to ensure they are well qualified to offer reliable opinions on the questionnaire according to results from figure 4.5.

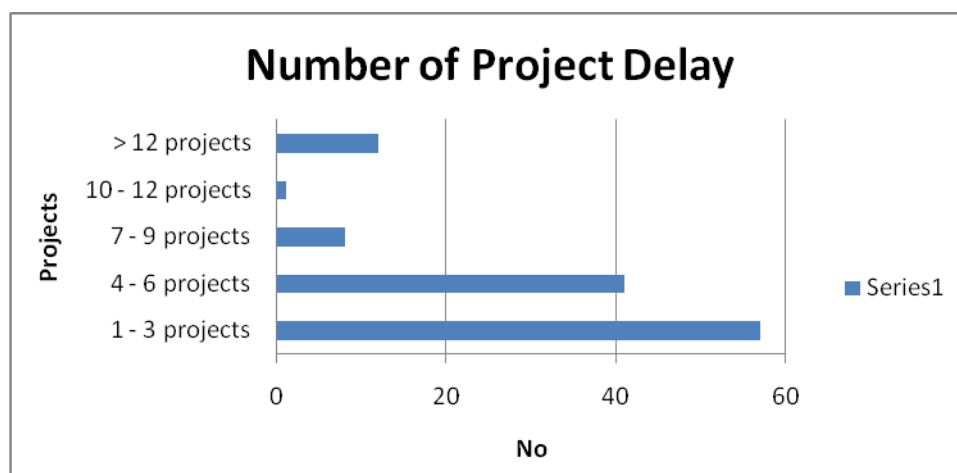


Figure 4.5: Numbers of Executed Project Delay

4.4.5 Time Overrun

This question refers to the actual time taken by respondents to resolve the project delay based on their experience. Any delay in the project can lead to time overruns. Whatever the reason, the mistakes can have impact on the progress of the project. Figure 4.6 shows that 56.3% of the respondents spend more than 6 month, 34.5% of the respondents spend 3-6 month and 9.2% of the respondents spend less than 3 month to overcome the project delays. This time can consider an additional time required to complete the project. The experience possess by the respondents may helps in providing a better understanding of this matter and in better position in giving much precise answer required to the questionnaires form.

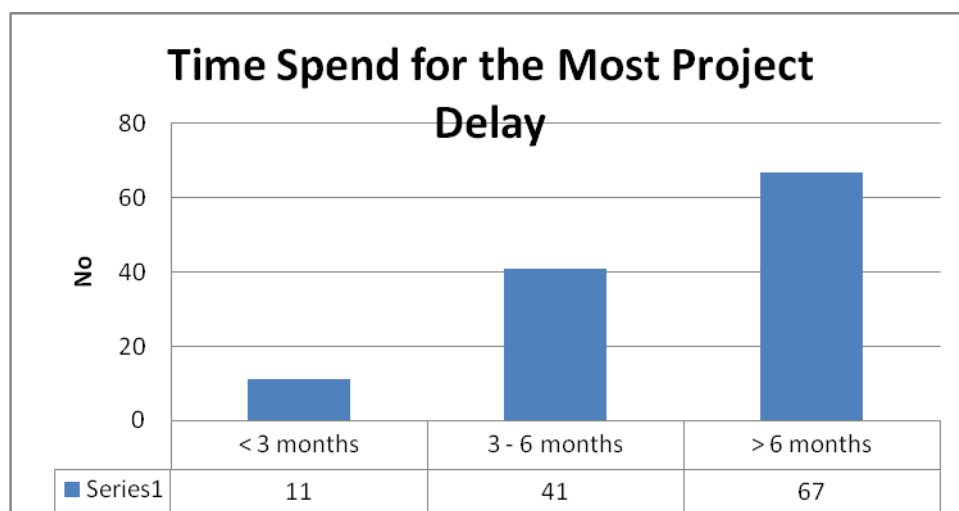


Figure 4.6: Time Overrun

4.5 Testing on the Research Data

4.5.1 Reliability Analysis: Cronbach's Coefficient Alpha

Cronbach-Alpha is one of the most commonly used for reliability analysis test in statistical analysis. To be reliable as the rules of thumb about Cronbach-Alpha coefficient size, the p value must at least 0.7 or better. Normally value of 0.7 or higher of Cronbach-Alpha value will be considered acceptable in most social science research situations. If the value is less than 0.6, some of the items would be dropped from the questionnaire.

From the analysis, the Cronbach's Alpha for all categories as shown in Table 4.6. Since all value was higher than 0.6, there was no necessity to review the questionnaire.

Table 4.6: Cronbach's Alpha Value for Each Category in the Questionnaire

Reliability Statistics	Cronbach's Alpha	Remarks
Client Related	0.815	Section B
Contractor Related	0.857	Section B
Consultant Related	0.906	Section B
Material Related	0.873	Section B
Equipment Related	0.936	Section B
Labour Related	0.845	Section B
External Factor	0.839	Section B
Traditional Approach by JKR	0.776	Section C
Scope Management	0.817	Section D
Time Management	0.911	Section D
Cost Management	0.796	Section D
Quality Management	0.856	Section D
Communication Management	0.825	Section D
Human Resources Management	0.925	Section D
Risk Management	0.743	Section D
Procurement Management	0.801	Section D
Integration Management	0.862	Section D

4.5.2 Normality Test

For this study Normality test is performed by determining skewness and kurtosis for all variables. All categories are well distributed. Histogram and Q-Q Plot for the variables tested are shown at **Appendix A**.

4.5.3 Kurtosis and skewness Parameter

As may be seen in Table 4.7, all variables are normally distributed as the skewness and kurtosis values are within the range of ± 2.0 (Chua, 2006).

Table 4.7: Result of Skewness and Kurtosis Values

Categories	CLIENT RELATED	CONTRACTOR RELATED	CONSULTANT RELATED	MATERIAL RELATED	EQUIPMENT RELATED	LABOUR RELATED	EXTERNAL FACTOR	TRADITIONAL APPROACH JKR	SCOPE MANAGEMENT	TIME MANAGEMENT	COST MANAGEMENT	QUALITY MANAGEMENT	COMMUNICATION MANAGEMENT	HUMAN RESOURCES MANAGEMENT	RISK MANAGEMENT	PROCUREMENT MANAGEMENT	INTERGRATION MANAGEMENT
Skewness	-0.331	-0.680	-0.324	-0.370	-0.294	-0.558	-0.423	0.095	-0.156	-0.803	-0.272	-0.516	-1.002	-1.389	-0.635	-1.091	-1.162
Kurtosis	-0.164	-0.333	-0.203	0.325	-0.108	0.243	0.216	-0.141	-1.157	-0.824	-1.134	-0.675	0.256	1.148	-0.377	0.490	0.524

4.5.4 Section B – Factor That Contribute to Delays of JKR Project

In this section respondent was giving 57 questions about the factors that contributed to delay of JKR project. The question was divided into seven groups. The groups were Client Related (BA), Contractor Related (BB), Consultant Related (BC), Material Related (BD), Equipment Related (BE), Labour Related (BF), and External Factor (BG).

The data were first analysed on the reliability of the factors using Cronbach's Alpha. Results were shown in Table 4.8 for all the factors in Section B. Results of Cronbach's Alpha for Section B was acceptable as it ranged from 0.6400 to 0.773. Range of Cronbach's Alpha value from the analysis was within the acceptable category.

Table 4.8 : Cronbach's Alpha Value for Section B

Code	Categories	Mean	Relative Index
BA	Client Related	3.484	0.697
BB	Contractor Related	3.8655	0.773
BC	Consultant Related	3.8471	0.768
BD	Material Related	3.4776	0.696
BE	Equipment Related	3.19998	0.64
BF	Labour Related	3.7626	0.7525
BG	External Factor	3.3349	0.6669

These factors were ranked in each group based on Relative Importance Index (RII). The following is a brief description of these factors in each group.

4.5.4.1 Factors of Client Related Delays

In Table 4.9 show the results of survey analysis of factors of client related delay. Factors to causes of delays were ranked based on Relative Important Index. The results were acceptable as it ranged from 0.607 to 0.82. Slowness in decision making was contributing the most of the client related delays. All the factor in the client related was contribute to the delay in JKR projects.

Table 4.9: Ranking Relative Importance Index for Client Related

Code	Client Related	Mean	Relative Index
BA2	Slowness in decision making process	4.1008	0.82
BA4	Change order	3.9328	0.787
BA1	Client Interference	3.6639	0.733
BA10	Not full fill JKR requirements in terms of project site, scope and cost	3.5126	0.703
BA9	The land is not free from dispute	3.4706	0.694
BA3	Contract modification	3.4202	0.684
BA8	Unrealistic contract duration	3.4034	0.681
BA5	Client cannot provide enough fund	3.2437	0.649
BA6	Uncooperative client	3.0588	0.612
BA7	Late payment	3.0336	0.607
Average		3.4840	0.697

4.5.4.2 Factor of Contractor Related Delays

In Table 4.10 show the results of survey analysis of factors of contractor related delay. Factors to causes of delays were ranked based on Relative Important Index. The results were acceptable as it ranged from 0.692 to 0.859. Poor site management and supervision was contributing the most of the contractor related delays. All the factor in the contractor related was contribute to the delay in JKR projects.

Table 4.10: Ranking Relative Importance Index for Contractor Related

Code	Contractor Related	Mean	Relative Index
BB1	Poor site management and supervision	4.2941	0.859
BB2	Financial difficulties - Poor cash flow management	4.2353	0.847
BB4	Inadequate contractor experience	4.1513	0.83
BB5	Conflicts in sub-contractor schedule in execution of project	3.958	0.792
BB7	Conflicts between contractor ,others parties (consultant & client) and also partners (shareholder)	3.958	0.792
BB10	Delay in sub-contractors work	3.8824	0.776
BB6	Rework due to errors during construction	3.7731	0.755
BB3	Unsuitable construction materials and improper construction method implement	3.6134	0.723
BB11	Frequent change of sub-contractors	3.605	0.721
BB13	Inappropriate or poor criteria for selection of subcontractor	3.5882	0.718
BB12	Delay in site mobilization	3.4622	0.692
Average		3.8655	0.773

4.5.4.3 Factors of Consultant Related Delays

In Table 4.11 show the results of survey analysis of factors of consultant related delay. Factors to causes of delays were ranked based on Relative Important Index. The results were acceptable as it ranged from 0.667 to 0.824. Poor communication and coordination was contributing the most of the consultant related delays. All the factor in the consultant related was contribute to the delay in JKR projects.

Table 4.11: Ranking Relative Importance Index for Consultant Related

Code	Consultant Related	Mean	Relative Index
BC2	Poor communication and coordination	4.1176	0.824
BC8	Poor monitoring and control of progress of work	4.0504	0.81
BC4	Mistakes and discrepancies in design documents	4.0084	0.802
BC3	Inadequate experience of consultant	3.992	0.78
BC5	Delay in producing design documents	3.8487	0.77
BC6	Unclear and inadequate details in drawings	3.8403	0.768
BC1	Delay in approving major changes in the scope of work	3.8067	0.761
BC7	Insufficient data collection and survey before design	3.7395	0.748
BC10	Late issue of instruction	3.7311	0.746
BC9	Late valuation work	3.3361	0.667
Average		3.8471	0.768

4.5.4.4 Factor of Material Related Delays

In Table 4.12 show the results of survey analysis of factors of material related delay. Factors to causes of delays were ranked based on Relative Important Index. The results were acceptable as it ranged from 0.645 to 0.745. Noncompliance of material to specification was contributing the most of the client related delays. All the factor in the material related was contribute to the delay in JKR projects.

Table 4.12: Ranking Relative Importance Index for Material Related

Code	Material Related	Mean	Relative Index
BD6	Noncompliance of material to specification	3.7227	0.745
BD5	Late procurement of material	3.6134	0.723
BD2	Changes in material and specification during construction	3.521	0.704
BD3	Delay in material delivery	3.5042	0.701
BD4	Damage of sorted material while they are needed urgently	3.2773	0.655
BD1	Shortage of construction materials in markets	3.2269	0.645
Average		3.4776	0.696

4.5.4.5 Factors of Equipment Related Delays

In Table 4.13 show the results of survey analysis of factors of equipment related delay. Factors to causes of delays were ranked based on Relative Important Index. The results were acceptable as it ranged from 0.618 to 0.655 Shortage of equipment was contributing the most of the client related delays. All the factor in the equipment related was contribute to the delay in JKR projects.

Table 4.13: Ranking Relative Importance Index for Equipment Related

Code	Equipment Related	Mean	Relative Index
BE2	Shortage of equipment	3.2773	0.655
BE5	Lack of high-technology mechanical equipment	3.2689	0.654
BE4	Low productivity and efficiency of equipment	3.2437	0.649
BE3	Low level of equipment	3.1176	0.624
BE1	Equipments breakdown	3.0924	0.618
Average		3.19998	0.640

4.5.4.6 Factor of Labour Related Delays

In Table 4.14 show the results of survey analysis of factors of labour related delay. Factors to causes of delays were ranked based on Relative Important Index. The results were acceptable as it ranged from 0.666 to 0.798. Shortage of manpower was contributing the most of the labour related delays. All the factor in the labour related was contribute to the delay in JKR projects.

Table 4.14: Ranking Relative Importance Index for Labour Factor

Code	Labour Related	Mean	Relative Index
BF4	Shortage of manpower	3.9916	0.798
BF2	Lack of skilled labour	3.9664	0.793
BF3	Low productivity level of labour	3.7647	0.753
BF1	Working permit of labours	3.3277	0.666
Average		3.7626	0.7525

4.5.4.7 Factor of External Related Delays

In Table 4.15 show the results of survey analysis of factors of external factor related delay. Factors to causes of delays were ranked based on Relative Important Index. Accident during the construction and traffic control and restriction at job site was the factor not acceptable which the RII 0.548 and 0.578

Table 4.15: Ranking Relative Importance Index for External Factor

Code	External Factor	Mean	Relative Index
BG1	Delay in obtaining permits from municipality	3.7647	0.753
BG2	Slow process of Building Permit	3.6555	0.731
BG3	Delay in providing services from utilities (such as water, electricity)	3.8908	0.778
BG4	Changes in Government regulations and laws	3.0672	0.613
BG5	Accident during construction	2.7395	0.548
BG6	Traffic control and restriction at job site	2.8908	0.578
BG7	Price fluctuation	3.3361	0.667
Average		3.3349	0.6669

4.5.5 Section C – Traditional Approach by JKR Dealing with Project Delays

In this section respondent were given 8 questions about action taken by JKR dealing with project delays. The questions were ranked in based on RII as shown in Table 4.16 below.

Table 4.16: Ranking Relative Importance Index for Traditional Approach in JKR

Code	Traditional Approach by JKR	Mean	Relative Index
C3	Coordination meetings on a weekly basis to monitor the progress of work on site by S.O. closely (Weekly and Monthly report)	4.0756	0.815
C6	If the contractor fails to complete the works by the Completion Date, the contractor shall pay or allow to the JKR a sum calculated at the rate stated as Liquidated Ascertained Damages (L.A.D)	4.0504	0.81
C7	Termination based on Clause of Contract (COC).	4.0336	0.807
C8	Appoint Third Party / New Contractor to Continue the balance of work (Kontraktor Penyelamat)	3.9328	0.787
C5	Contractor ask for Extension of Time (E.O.T) for reasons or causes of delay which is beyond his control accordance with Clause of Contract	3.7143	0.743
C2	Contractor prepare the Recovery Plan / Rescheduling work programme by using the 4M method (Machineries, Material, Money and Manpower)	3.6387	0.728
C1	S.O will issues the Warning Letter (Surat Amaran Kemungkiran) for contractor to increase the productivity of works.	3.4706	0.694
C4	Head of Project Team (HOPT) will prepare the report of project delays and present in Jawatankuasa Projek Sakit JKR.	3.3697	0.674
Average		3.7857	0.757

4.5.6 Section D – Proposed Contemporary Approach to JKR Dealing with Project Delays

In this section respondent were given 39 questions about the method to resolve delay. The questions were divided into nine main factors based on PMBOK. The factors were Scope Management, Time Management, Cost

Management, Quality Management, Communication Management, Human Resources Management, Risk Management, Procurement Management and Integration Management. Data were analyzed using SPSS software and MS Excel.

Results were shown in Table 4.17 for all the factors in Section B. From the table below, all the attribute of method minimize delays can be used in JKR to avoid the project delays accept for attribute in scope management which is the RII value less than < 0.6 .

Table 4.17 : Cronbach's Alpha Value for Section D

Code	Category	Mean	Relative Index
DA	Scope Management	2.9630	0.593
DB	Time Management	3.4398	0.688
DC	Cost Management	3.0340	0.607
DD	Quality Management	3.2020	0.641
DE	Communication Management	3.5836	0.717
DF	Human Resources Management	3.9426	0.788
DG	Risk Management	3.6481	0.732
DG	Procurement Management	3.6432	0.729
DI	Integration Management	3.6927	0.739

Ranking of the questions were conducted based on relative importance index (RII) using the formula mentioned in Chapter 3. The questions were ranked in descending format base on RII as shown in Table below.

Table 4.18: Ranking Relative Importance Index for Scope Management

Code	Scope Management	Mean	Relative Index
DA2	Complete and accurate project feasibility study and site investigation to all projects done by JKR	3.395	0.679
DA5	Implement Project Management Plan (PMP) to all JKR projects	3.1261	0.625
DA4	Utilization of the latest construction technology method by using Building Information System (BIM)	2.8992	0.58
DA1	Implement Value Management & Value Engineering Lab to determine scope of work in Planning & Design Stage	2.8235	0.565
DA3	Utilization of the latest construction technology method by using Industrialized Building System (IBS)	2.5714	0.514
Average		2.9630	0.593

Table 4.19: Ranking Relative Importance Index for Time Management

Code	Time Management	Mean	Relative Index
DB1	Proper project planning and scheduling using appropriate scheduling method such as Primavera or MS Project	3.521	0.704
DB2	Execute delayed activities by subcontractors. Work breakdown Structure (WBS) as a tool to determine duration for every task	3.4874	0.697
DB3	Accurate initial time estimation by establish methodology for estimation process	3.3109	0.662
Average		3.4398	0.688

Table 4.20: Ranking Relative Importance Index for Cost Management

Code	Cost Management	Mean	Relative Index
DC1	Accurate initial cost estimates. Enough of information necessary for estimation and adequate timeframe to perform estimates	3.3025	0.661
DC4	Enforce Liquidated damages clauses on monthly basic based on Work Programmed as milestone to achieve and offering incentives for early completion	3.2564	0.65
DC3	Allow Contingency Cost in the Contract Sum	3.0603	0.612
DC2	Payment processed by the Client. JKR only prepared and endorsed the JKR 66 Certificate. No warrant allocation	2.5169	0.504
Average		3.0340	0.607

Table 4.21: Ranking Relative Importance Index for Quality Management

Code	Quality Management	Mean	Relative Index
DD5	Site meeting and technical meeting as one of the tool for monitoring the project	3.6837	0.738
DD3	Frequent coordination between the parties involved to avoid dispute between stakeholder	3.5299	0.708
DD2	Build a systematic project control and monitoring mechanism	3.4017	0.679
DD1	Frequent progress meeting with all stakeholder to monitor the progress of work	3.2101	0.642
DD4	Implement Project Health Check (PHC) to all JKR projects	2.7931	0.56
DD6	Implement SERQUAL Analysis to evaluate Customer satisfaction in meeting project schedule, quality and cost	2.5932	0.519
Average		3.2020	0.641

Table 4.22: Ranking Relative Importance Index for Communication Management

Code	Communication Management	Mean	Relative Index
DE3	Clear information and communication channels in roles and responsible of all stakeholder.	3.9237	0.785
DE2	Collaborative teamwork in construction with effective site management and supervision.	3.8051	0.761
DE1	Developing appropriate communication system linking to all functional group using new technology- social network etc	3.4615	0.691
DE4	Community involvement to reduce the absence of bureaucracy to avoid complaints from publics	3.144	0.629
Average		3.5836	0.717

Table 4.23: Ranking Relative Importance Index for Human Resources Management

Code	Human Resources Management	Mean	Relative Index
DF1	Select the competent project manager	4.0504	0.81
DF2	Hire experience personnel for project implementation	3.8898	0.778
DF3	Apply collaborative teamwork environment application with multidisciplinary /competent project team and promotion team working among project participants	3.9916	0.798
DF4	Competent personnel of consultant/designer to complete and proper design at the right time	3.9407	0.788
DF5	Developing human resources in the construction industry through proper training and classifying of craftsman	3.8403	0.768
Average		3.9426	0.788

Table 4.24: Ranking Relative Importance Index for Risk Management

Code	Risk Management	Mean	Relative Index
DG1	Early in obtaining permit and approval from relevant authority	3.724	0.746
DG2	Implement Risk Management Plan (RMP)	3.6287	0.731
DG4	Cross functional collaborative teamwork is an effective way for collectively dealing with threats (risk) to the project environment.	3.5915	0.718
DG3	The effectiveness of risk management will be increase if the project manager see risk as an opportunity	3.1849	0.637
Average		3.6481	0.732

Table 4.25: Ranking Relative Importance Index for Procurement Management

Code	Procurement Management	Mean	Relative Index
DH3	Comprehensive contract documentation	3.8403	0.768
DH2	Not awarding contract based on the lowest bid	3.7983	0.76
DH1	Adopting a new approach to contract award procedure by giving less weight to prices and more weight to prices and more weight to the capabilities and past performance of contractor	3.7815	0.756
DH4	Adopting a new approach to contracting such as Cost Plus contract, alternative procurement system, FIDIC type of contract	3.1525	0.63
Average		3.6432	0.729

Table 4.26: Ranking Relative Importance Index for Integration Management

Code	Integration Management	Mean	Relative Index
DI3	Ensure the availability of resources (finance, materials, equipments, workmen, etc)	3.8632	0.773
DI1	Proper emphasis on past experience of project parties	3.6639	0.733
DI4	Integrate Risk Management Plan and Work Programme(CPM)	3.6555	0.731
DI2	Offer incentive for early project completion	3.5882	0.718
	Average	3.6927	0.739

From the 39 attributes of method to minimize the delay, six (6) of the method was not acceptance because the $RII < 0.6$. The factors are Utilization of the latest construction technology method by using Building Information System (BIM); Implement Value Management & Value Engineering Lab to determine scope of work in Planning & Design Stage; Utilization of the latest construction technology method by using Industrialized Building System (IBS); Payment processed by the Client. JKR only prepared and endorsed the JKR 66 Certificate; Implement Project Health Check (PHC) to all JKR projects and Implement SERQUAL Analysis to evaluate Customer satisfaction in meeting project schedule, quality and cost

Project delays have been a topic of concern in the construction industry. Delays can be minimized only when their causes are identified. Knowing the cause of any particular delay in a construction project would help avoiding the effects. Table 4.27 shows ranking of the top fifteen effective methods of minimizing construction delay for JKR projects. These methods were ranked based on the relative importance index as mention in Chapter 3.

Table 4.27: Ranking of the Top Fifteen Attributes of Method Minimizing Delays

Code	Proposed Method	Mean	Relative Index	Rank
DF1	Select the competent project manager	4.0504	0.81	1
DF3	Apply collaborative teamwork environment application with multidisciplinary /competent project team and promotion team working among project participants	3.9916	0.798	2
DF4	Competent personnel of consultant/designer to complete and proper design at the right time	3.9407	0.788	3
DE3	Clear information and communication channels in roles and responsible of all stakeholder.	3.9237	0.785	4
DF2	Hire experience personnel for project implementation	3.8898	0.778	5
DI3	Ensure the availability of resources (finance, materials, equipments, workmen, etc)	3.8632	0.773	6
DF5	Developing human resources in the construction industry through proper training and classifying of craftsman	3.8403	0.768	7
DH3	Comprehensive contract documentation	3.8403	0.768	8
DE2	Collaborative teamwork in construction with effective site management and supervision.	3.8051	0.761	9
DH2	Not awarding contract based on the lowest bid	3.7983	0.76	10
DH1	Adopting a new approach to contract award procedure by giving less weight to prices and more weight to prices and more weight to the capabilities and past performance of contractor	3.7815	0.756	11
DG1	Early in obtaining permit and approval from relevant authority	3.724	0.746	12
DD5	Site meeting and technical meeting as one of the tool for monitoring the project	3.6837	0.738	13
DI1	Proper emphasis on past experience of project parties	3.6639	0.733	14
DG2	Implement Risk Management Plan (RMP)	3.6587	0.731	15

4.6 Conclusion

By conducting analysis and discussion in this chapter, various findings and results are obtained. The pre-defined objective is achieved by focusing to answer the research question during the analysis and discussion. The major delays groups and significant causes of delays were identified and ranked. From total 57 causes of delay, five top most significant causes have been identified. The methods in minimizing projects delay also establish.

This chapter has reported the results of the interview and questionnaire survey conducted on the project delays in JKR. For ease to understand, the results from the analysis were presented in tables and figure. The analysis was done by Cronbach Alfa Reliability Test, and, Normality Test. For the identification of causes of delay, effectiveness of the current practice in JKR and method in minimizing projects delays, a relative importance index (RII) and mean method is used.

Thus, the following chapter, which is the final chapter, will comprise of conclusion, and recommendation for this study, and recommendation for further research on this topic. Problems that exist during the study and the limitation will also be described in the following chapter.

CHAPTER 5

DICSUSSION OF RESULTS

5.1 Introduction

This chapter consists of the discussion on the data collected and analyzed in Chapter 4. The data that has been tabulated further discussed and compared with the objective of the study. Every objective that has been identified at the beginning of this research will be compared with the data that has been collected.

5.2 Factors That Contribute to Delays in JKR Projects

Based on the ranking, the five most important causes of the JKR project delay as perceived by respondents has summarized in Table 5.1.

Based on the analysis conducted on RII it was found that the contractor capabilities were the main factor to be focused on in order for JKR to determine the project delay issues. Besides that poor communication and lack of coordination among consultant also contribute to project delay in JKR. Client also one of the factors for project delays because the client takes long time to give the approval. JKR must take seriously in this three stakeholder issues to avoid project delays.

Table 5.1: Ranking of Relative Importance Index (RII) for Top Five Causes of Project Delay

Code	External Factor	Mean	Relative Index	Rank
BB1	Poor site management and supervision	4.2941	0.859	1
BB2	Financial difficulties - Poor cash flow management	4.2353	0.847	2
BB4	Inadequate contractor experience	4.1513	0.83	3
BC2	Poor communication and coordination	4.1176	0.824	4
BA2	Slowness in decision making process	4.1008	0.82	5

Therefore JKR must check the resources and capabilities before awarding the contractor and should consider the following factors:-

- a. Shortage and low productivity of labor: enough number of labors should be assigned and be motivated to improve productivity;
- b. Financial and cash flow problems: contractor should manage his financial resources and plan cash flow by utilizing progress payment;
- c. Site management and supervision: administrative and technical staff should be assigning as soon as the project was an awarded to arrange to achieve completion within specified time with the required quality, and estimated cost.
- d. Contractor experience: an adequate contractor experience is very crucial in executing work efficiently and forecasting the potential problems that may arise during construction work. As a cost cutting measure, many contractors prefer to hire young and inexperienced staff especially technical staffs as these junior staffs accept less pay. This inexperienced staffs has limited ability and need more guidance in carrying out the job.

The smooth management at the site plays important role for the successful of the project. The failure in managing and attending the daily routine and problems at the project site contribute to the delay significantly. Most contractors do not have strong financial background to keep the work in progress. They would normally rely on the advance money and progress payment to ensure that their study on site will continue. The contractors' inability to plan can be attributed to contractor's inexperience. Consultant also plays the important roles especially in communication and coordination with other parties to avoid delays. Client need to know their roles and responsibilities and take immediate action for any approval that needs decision-making

From previous study mentioned above shown that the factors contributed to delay in JKR project almost same with what were resulted from this study. This was supported by Sambasivan M (2007) and Abd. Majid and McCaffer (1997) were agreeable.

5.3 Traditional Approach in JKR Dealing with Project Delay Issue

From the analysis conducted through a questionnaire on Section C, three (3) factors were determined very ineffectiveness of current practice in JKR when dealing with project delays. Table 5.2 shown top three based ineffective traditional JKR practice dealing with delays..

Table 5.2: Ranking of Relative Importance Index (RII) for Top Three Traditional Approach Dealing with Delays in JKR

Code	Traditional Approach by JKR	Mean	Relative Index	Rank
C3	Coordination meetings on a weekly basis to monitor the progress of work on site by S.O. closely (Weekly and Monthly report)	4.0756	0.815	1
C6	If the contractor fails to complete the works by the Completion Date, the contractor shall pay or allow to the JKR a sum calculated at the rate stated as Liquidated Ascertained Damages (L.A.D)	4.0504	0.81	2
C7	Termination based on Clause of Contract (COC).	4.0336	0.807	3

Coordination meeting on a weekly basis is the high level of the ineffectiveness for JKR respondents. The weekly meeting is very important, all problems will be resolve on that meeting and relation division have limited time to return the request for information of for Agreement from Government. In coordination meeting Project Manager should using planning and scheduling as the tools for the monitoring of project. Planning and scheduling are continuing processes during construction, match with the resources, and time to develop the work to avoid cost overrun and disputes.

By practice, weekly coordination meeting can avoid poor site management problem. A project manager is the leader in a construction project in the sense that he is required to manage all the works on site from monitoring progress of construction works to managing all the administrative work in the project. It is of utmost importance for the project manager to manage the work and project team effectively. Hence poor site management from the project manager will affect the whole team and the progress of works, resulting in the eventual outcome of project delay. This view is supported by studies conducted Aibinu and Odenyika

(2006) who concluded that poor site management is one of the factors that contribute to delay in construction projects.

From this analysis, it was establish that almost 81% of JKR staff agreed implementation of Liquidated Ascertained Damages (L.A.D) to contractor for JKR Projects was ineffective to minimize project delays. If the contractor fails to complete the works by the Completion Date, the SO shall issue a certificate of Non-completion. Upon the issue of the certificate of Non-Completion, the contractor shall pay or allow to the JKR a sum calculated at the rate stated as Liquidated Damages for the period from the Completion Date to the Date of Practical Completion. LAD only allow not more than 60 day after Certification Non- Compliance date. This result was supported by Odeh and Battaineh (2002).

Results from the analysis show that termination contractor based on Clause of the Contract (COC) also the ineffective current practice in JKR to minimize project delays. Termination of contact based on letter from Deputy Director General (Business Sector) reference no (38).dlm.JKR-KPKR:109.010/08 dated 30 July 2010. Only one warning letter will issue. After monitoring the progress and S.O not satisfy with the progress of work, Notis untuk Tujuan Penamatan Pengambilan Kerja Kontraktor will issue and follow by termination of contract.

Based on Clause 43 PWD 203A standard form of contract, contractor's obligations upon it becoming reasonably apparent that the progress of work is delayed, forthwith give written notice of delay to the S.O. Constantly use his best endeavor to prevent delays. This result was supported by Yates and Epstein (2006).

This result also supported and proved by the expert panel from the interview session. All of them was concluded the current practice by JKR need to

be reviewing and improving. JKR need to emphasis in planning and scheduling to avoid the project delay using Ms Project as one of the tool. Prepare the recovery plan using method of schedule compression. This analysis was supported by the document search. Based on JKR projects database module (SKALA), it's shown that 57% of the JKR projects under construction were delayed.

5.4 Attributes of Method in Minimizing Project Delay in JKR

From the analysis conducted through a questionnaire on Section D, fifteen (15) effective attributes of methods minimizing construction delays were ranked based on the relative importance index. Table 5.3 shown top fifteen attributes of methods minimize project delay

Table 5.3: Ranking of Relative Importance Index (RII) for Fifteen Effective Attributes of Method Minimizing Project Delays

Code	Proposed Method	Mean	Relative Index	Rank
DF1	Select the competent project manager	4.0504	0.81	1
DF3	Apply collaborative teamwork environment application with multidisciplinary /competent project team and promotion team working among project participants	3.9916	0.798	2
DF4	Competent personnel of consultant/designer to complete and proper design at the right time	3.9407	0.788	3
DE3	Clear information and communication channels in roles and responsible of all stakeholder.	3.9237	0.785	4

Table 5.3: Ranking of Relative Importance Index (RII) for Fifteen Effective Attributes of Method Minimizing Project Delays (Cont'd)

Code	Proposed Method	Mean	Relative Index	Rank
DF2	Hire experience personnel for project implementation	3.8898	0.778	5
DI3	Ensure the availability of resources (finance, materials, equipments, workmen, etc)	3.8632	0.773	6
DF5	Developing human resources in the construction industry through proper training and classifying of craftsman	3.8403	0.768	7
DH3	Comprehensive contract documentation	3.8403	0.768	8
DE2	Collaborative teamwork in construction with effective site management and supervision.	3.8051	0.761	9
DH2	Not awarding contract based on the lowest bid	3.7983	0.76	10
DH1	Adopting a new approach to contract award procedure by giving less weight to prices and more weight to prices and more weight to the capabilities and past performance of contractor	3.7815	0.756	11
DG1	Early in obtaining permit and approval from relevant authority	3.724	0.746	12
DD5	Site meeting and technical meeting as one of the tool for monitoring the project	3.6837	0.738	13
DI1	Proper emphasis on past experience of project parties	3.6639	0.733	14
DG2	Implement Risk Management Plan (RMP)	3.6587	0.731	15

5.4.1 Project Manager

During pre-construction stage, JKR should employ a knowledgeable project manager to organize a good project team member to progress the work. Besides that the project team member should always discussing with the problem having the site progress. Leadership is a crucial aspect in project management.

There are three different kinds of competencies required in leadership; leadership competencies such as the ability to lead change; functional competencies such as technical and human resources management skills and personal skills such as high achievement motivation and persistence. Therefore a competent project manager possesses not only technical and managerial skills but also good leadership to do “the right thing right” and search suitable and intangible assets in today’s knowledge –based economy

5.4.2 Collaborative Teamwork

Collaborative teamwork is the best practice to avoid the delays which all the team member share the lesson learned and experience methods on solving site issues. As a reward if the team member achieves the target and objective, they should give more advantage and priority as a token of appreciation. On the other hand, contractor should be employs some employee with experience such as quantity surveyor. So that during the time or cost estimate they can add on some unforeseen event to avoid the cost and time overrun.

In a project team, each individual responsibilities and rights must be clearly defined. JKR must set up the clear project Development Process Flowchart by using ISO as a working culture and Standard Operation Procedure (SOP) that is compulsory to follow. The working culture should be improved gradually aiming at building proper working atmosphere. All the project team must try to self-improvement skills. Set the interest of works to the highest. They must recognize delay problems that will lead to large losses as well as benefits of the project completion on time.

5.4.3 Designer

All the JKR staff must have the competency to be a designer. JKR must monitor the design consultant's works of every period, if any changes happen, design consultant must be accelerate in next period for catch up schedule. Exchange information dissemination and unified design concept from the start to avoid the disagreement. Furthermore, JKR should be hiring some experience consultant. It is because once they facing problem, they can refer previous project to solve the project immediately. So the project can process with smoothly.

5.4.4 Communication Channel

. One of the important factors was clear information and communication channels, the clear communication are essential when managing activities. Communication is the passing on of ideas and information; therefore, site supervisor must ensure that their workers are able to understand his command before start any site activities.

5.4.5 Human Resources

In Human Resources Management, JKR should organize training the project construction management group in order for the staff to know how to use the process to accomplish project and contract condition. JKR must build an ideology for all the JKR Staff so that they can recognize delay problems that will lead to large losses as well as benefits of the project completion on time especially in JKR reputation to client. Simultaneously JKR top management should establish a fair reward and punishment policy that has to be strictly applied. That is finance, resources, efforts and leadership should always be available throughout the project's life. They ensure that construction projects run smoothly.

5.4.6 Monitoring and Control

Site meeting and technical meeting is one of the best practices to avoid projects delay. During site meeting, the Project Manager should understand and apply the technique of critical path analysis. This is not hard to neither understand nor apply, particularly as these days, there are excellent software management tools freely available to help identify and apply the use of critical path to a given project. The scheduling should be one of the agenda in the site meeting and must present lively to determine the task and critical path. The critical path schedule of activities shows clearly those tasks that if they were to slip, that this delay will have the same effect on the project end-date and/or key milestones. These are called critical activities. Critical path will also identify those activities whose duration can extend by some amount or that their start and end dates can slip – without creating any delay to the project end-date. The corollary of this is of tremendous importance, since it allows the project manager to focus on putting their best people and priority on critical tasks, while assigning resources that are still developing those skills for example, on non-critical activities.

This result was agreed by Sambasivan and Soon (2007) , Aibini and Jagboro (2002). And Majid, (2006).

5.5 Proposed Guideline for on Time Project Delivery

This part of the study intend to provide a structural systematic process which professional in the JKR can adopt in realizing projects timely completion. The most significantly factor in achieving this aim is to a clear guidelines for work process. It implies that the construction stage is crucial to the delivery of projects and that whatever transpires in the construction stage affects the project delivery time. Therefore, the construction stage is the main focus. It is important

to note that client briefing and quality of design have an impact on the speed of construction. The list of activity in every stage that needs to be focused is shown in table below. The information established for this table are generated from the interview with expert panel and literiew review as shown in **Appendix C.-**

Table 5.4: Inception Activity

Inception Activities	
1.	Defining the scope and background of project .
2.	Identifying business drivers that lead the project and define the strategic direction
3.	Developing the business cases that define the problem/need to be address by the project and the reason for project launching.
4.	Creating a list of project goals and objectives that contribute to solving the problem.
5.	Analyzing options or alternatives to the project.
6.	Justifying the project through performing feasibility analysis.
7.	Identifying constraints and assumptions.
8.	Identifying constraints and assumptions.
9.	Defining scope, including boundaries, deliverables and requirements
10.	Developing product acceptance criteria.
11.	Analyzing stakeholders and their expectations and involvement level.
12.	Designing an organizational chart that identifies roles and responsibilities of stakeholders.
13.	Writing a proposal document that summarizes the project and provide the relevant information for all stakeholders.
14.	Getting approval of the proposed project and starting the planning process.

Table 5.5: Planning Activity

Planning Activities	
1.	Reviewing lessons learned from previous projects (if any) to gain valued expertise and knowledge for present project.
2.	Selecting and interviewing the best candidates to the project team.
3.	Creating a team composition chart that includes roles and names of peoples involved in the implementation process.
4.	Writing a staffing plan that explains how to manage the team and collaborative activities.
5.	Designing a change management plan that explores a mechanism of defining, approving and implementing project changes and updates.
6.	Making an issue management plan to define how to document and manage issues.
7.	Defining quality assurance and control activities that identify how to keep the project and its results relevant to project requirements.
8.	Developing the project schedule that defines time required for implementing the project, along with activity durations and milestones.
9.	Establishing contractual relationships with suppliers and procurers.
10.	Designing a training plan that explores methods and techniques of staff training and development.
11.	Developing cost estimates that define how much funding will be required to perform the project and complete its goals and objectives.
12.	Making a risk management plan that specifies processes and tools for analyzing and managing threats and uncertainties.
13.	Developing a communications management plan that explains how communications between stakeholders should be established and managed.
14.	Designing a project management plan that defines key activities for managing the project and its content.

Table 5.6: Implementation Activity

Implementation Activities.	
1.	Conducting status meetings to review current status of the project.
2.	Conducting status meetings to review current status of the project .
3.	Providing training to personnel if necessary.
4.	Leading and guiding the project team.
5.	Managing changes and updates.
6.	Logging issues and developing solutions for handling logged issues.
7.	Managing identified risks.
8.	Communicating with the team and other stakeholders to get their feedback and keep the project up-to-date.
9.	Managing deliveries and procurement.
10.	Controlling and assuring project quality.
11.	Using reporting as a mechanism of tracking the implementation process.
12.	Reviewing status of project deliverables to ensure they are produced according to acceptance criteria.
13.	Monitoring staff performance to ensure project work is performed according to the plan.

Table 5.7: Inception Activity

Closure Activities.	
1.	Performing a post implementation review to confirm the project has reached its goals and objectives and that deliverables are produced.
2.	Conducting lessons learned exercises to document successful experience and practice of the project.
3.	Transferring project personnel to other projects, or releasing them.
4.	Closing financial operations and transactions.
5.	Handing over the project product to the customer.
6.	Getting the customer's approval that meets the customer satisfaction.

5.5.1 Workflow Process and Duration of Activity

Based on interview with the JKR expert panels, an implementation guideline acquired the project on schedule. These guidelines become effective accordance with the time frame proposed.

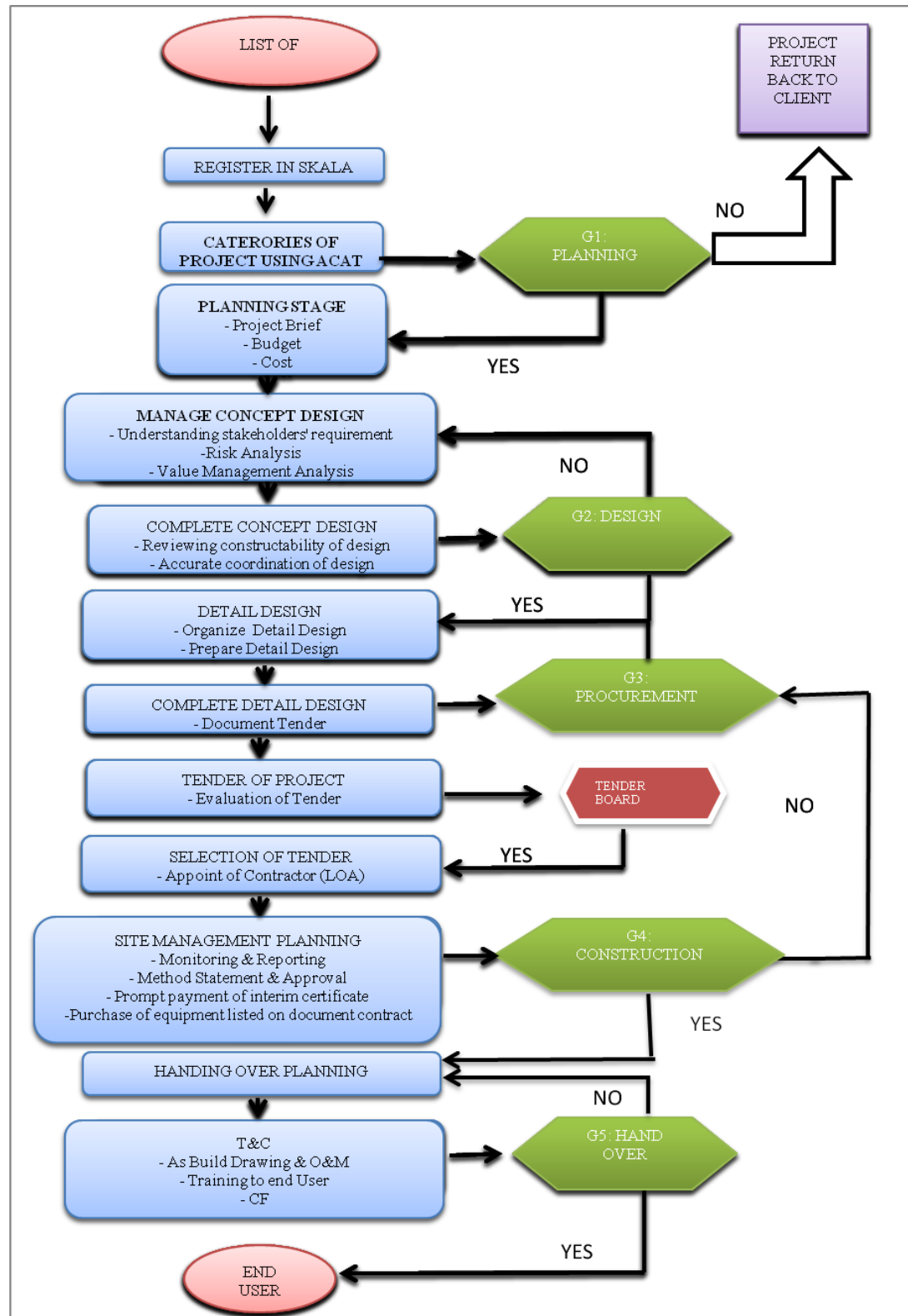


Figure 5.1: Flowchart of Project Implementation in JKR

Based on the Gerbang Nilai (2009), this study proposed the continuous improvement for the flowchart of project implementation in JKR. The processes consist of five stages. The stages and the interventions at each stage are:

a. G1 :Planning Stage

- i. Project Brief
- ii. Budget
- iii. Land

b. G2 :Design Stage

- i. Concept Design – well defined functionality of design;
- ii. Clear understanding of client and other stakeholders requirements;
- iii. Risk analysis;
- iv. Value management analysis (project cost more than RM50 Million)
- v. Detail Design- accurate coordination design;
- vi. Document Tender

c. G3: Procurement Stage

- i. Ascertaining contractor Project Quality Plan, OSH Plan etc
- ii. Ascertaining past records of contractor-experience
- iii. Ascertaining the financial capability of contractor
- iv. Inclusion of work schedule in tender document by contractor
- v. Inclusion of Human Resource, plant & equipment schedule in tender document
- vi. Evaluation of tender by Head of Design Team based on ratio agreeable.

d. G4: Construction Stage

- i. Contractor prepare Site Management Plan;
- ii. Method Statement submitted for approval from HODT before work done by contractor;
- iii. Contractor and consultant checking quality of materials supplied as they arrive on site and carrying out relevant test;
- iv. Contractor monitoring of subcontractor work.
- v. Weekly/monthly meeting with the project manager/ subcontractor / key staff;
- vi. Proper planning and scheduling of work based on sequence of works;
- vii. Prompt issuance of instructions and payments;
- viii. Purchase of equipment listed on document contract;
- ix. Prepared the Handing Over Plan

e. G5: Handing Over

- i. Testing and Commissioning for all the system
- ii. As Built Drawing & Manual Operation
- iii. Certificate of Fitness (CF) from Local Authority
- iv. Training session for the end user
- v. Checklist Building Accepting Criteria from Building Facility Department JKR

The list of activity in every stage that needs to be focused is shown in table below. The information established for this table are generated from the interview with expert panel as shown in **Appendix D**. The activity and duration proposed as per shown in Table 5.8.

Table 5.8: Activity and Duration Purpose for on Time Project Delivery

No	Task	Duration
1.0	PRE PLANNING	26 DAYS
1.1	Overview and Early Planning	10 days
1.2	Received list of Project from Economic Planing Unit (EPU), JPM	2 days
1.3	Clarification of Project based on Location, Cost, Ministry/Agency & ACAT	2 days
1.4	Analysis and Distributed to implementer (JKR /Agency)	3 days
1.5	Set the Strategy of Implementation	1 day
1.6	Distributed to Busines Sector / Design Sector	7 days
1.7	Coordination Meeting with Director of Sector Unit (SBU)	1 days
2.0	REGISTER PROJECT IN SKALA	9 DAYS
2.1	Determine the Project Team and Appoint Head of Project Team (HOPT)	1 day
2.2	Finalize the stategy of implementation and download in SKALA	2 days
2.3	Register the project title by Head of Project Office (HPO)	5 days
2.4	Updated the latest list of project to EPU	1 day
3.0	PLANNING	87 DAYS
3.1	Received Brief Project, Land and Badjet (Gate Way 1)	20 days
3.2	Appoint Head of Project Team	1 day
3.3	Review Project Brief	10 days
3.4	Arrange the Site Visit	2 days
3.5	Review and Fullfill the requirement by the local authority	20 days
3.6	Land Surveying	20 days
3.7	Prepare Report / Site Anlysis/Design Brief / Risk Management Plan / Project Management Plan	20 days
3.8	Soil Investigation	40 days
3.9	Finalize Project Brief, Site and Cost	7 days
4.0	DESIGN	178 DAYS
4.1	CONCEPT DESIGN	65 days
4.1.1	Prepare Concept Design	20 days
4.1.2	Prepare Early Estimate Cost	5 days
4.1.3	Review Concept Design	10 days
4.1.4	Value Engineering & Gate Way 2	10 days
4.1.5	Client Approval	20 days
4.2	PRELIMINARY DESIGN	50 days
4.2.1	Prepare Preliminary design & specification	20 days
4.2.2	Prepare Drawing 100 scale	20 days
4.2.3	Development Order	30 days

Table 5.8: Activity and Duration Purpose for on Time Project Delivery (Cont'd)

4.3	DETAIL DESIGN	93 days
4.3.1	Prepare detail design	60 days
4.3.2	Coordination drawing between all displin	20 days
4.3.3	Value Engineering 2 & Gate Way 2	10 days
4.3.4	Amendment Detail Design	10 days
4.3.5	Approval of Building Plan	20 days
5.0	PROCUREMENT	70 DAYS
5.1	Prepare Tender Document / Gateway 3	15 days
5.2	Advertising of Tender	20 days
5.3	Evaluation of Tender	15 days
5.4	Tender Board Meeting	10 days
5.5	Prepare As Tender Detail Abstract (ATDA) & Get Approval from the Client	10 days
5.6	Letter of Award	5 days
6.0	CONSTRUCTION	36 Month
6.1	Preliminary Item	36 month
6.2	Civil Works	6 month
6.3	Structure Works	12 month
6.4	Architect Works	18 month
6.5	Mechanical Works	18 month
6.6	Electrical Works	18 month
6.7	External Works	12 month
6.8	Provisional Item	12 month
	*All the activity depends on the contract duration and scope of work	
7.0	HANDING OVER	60 days
7.1	Installation of TNB transformer, etc & Energizing of TNB Sub Station	30 days
7.2	Testing & Commissioning	7 days
7.3	As Build Drawing & Operation and Maintenance Manual	30 days
7.4	Cleaning up	14 days
7.5	Hand Over	1 day

5.6 Conclusion

By conducting analysis and discussion in this chapter, various findings and results are obtained. Thus the following chapter will comprise of conclusion and recommendation for this study, and recommendation for further research on this topic.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter concludes the study and briefly describes the conclusion for each objective. Finally, suggestions to JKR and proposal for further study are presented.

6.2 Conclusions

The study on delay in JKR project was carried out because delay will cause the project were late delivered to the client and would gave bad reputation to JKR as technical department in Malaysia. JKR must identify the major causes of delays. Factor that contributes to delay in JKR project which has been identified in this study was agreed upon by the general population of the respondents. Seven groups of the causes which is client related, contractor related, consultant related, material related, equipment related, labour related and external factor related are acceptable with the RII from 0.6400 to 0.773. All the factor was contribute to the causes of delay in JKR projects which the RII more than 0.6

exclude 2 causes in the external factor which is accident during construction and traffic control at site. In order to overcome the problem of delay in JKR project, these group causes has to be looked into and rectified during early of planning of the project cycle.

6.2.1 Objective 1: To Evaluate the Effectiveness of the Traditional Approach in Addressing Project Delay Issue

From the eight (8) current practices at JKR dealing with project delays, all of the method was ineffective anymore to avoid delay. Likert Scale chosen from respondents was 4 and 5 with is ineffective and highly ineffective. The RII was in the range 0.674 to 0.815. Top three (3) RII based on the ranking were Coordination meetings on a weekly basis to monitor the progress of work on site by S.O. closely (Weekly and Monthly report) (RII=0.815), Liquidated Ascertained Damages (L.A.D) (RII=0.810) and termination based on Clause of Contract (RII= 0.807). The trend of completed project shows that delayed project was increasingly by year. This shows that JKR had to take tremendous action in order to eliminate or reduced the delay focused on effective coordination meeting based on weekly and monthly basic as the important tolls in project monitoring and controlling. The work programmed compulsory must be present by the project manager during the site meeting to project the productivity of work and cash flow. Clause of Contract regarding the extension of time and termination must be review from time to time. In order to reduce the extension of time (EOT) in JKR the factor of time, cost, location of project and scope of works should be taking into account during project initiated.

6.2.2 Objective II: To Evaluate the Potential Application of Contemporary Approach in Resolving Project Delay Issue

In order to minimize JKR project delay, a total of thirty nine attributes of methods minimizing delay were identified. Some of the attributes of this method have been used by JKR during implementation of the project such as risk management; value management; IBS; etc. The most effective methods proposed by respondents include: competent project manager; collaborative teamwork/competent project team and promotion team working; Competent personnel of consultant/designer; Clear information and communication channels; and hire experience personnel. 6 from 39 attributes of method minimizing delay were not acceptable by respondents include utilization IBS and BIM, value management; payment directly from the client; site meeting and technical meeting as one of the tool for monitoring project and conduct SERQUAL analysis. Quick attention and prompt action will get the project back on track as close to original deadline as possible. Once realize project is a delay, organize a team meeting. Inform everyone working on the project about the delay, including details such as factor contributing to the holdup and how far it has the project back.

6.2.3 Objective III: To Proposed the Guideline for on time Project Delivery

From the interview with the expert panel, this study proposed guidelines with the duration of time as a tool to monitor and controlling every stage of project life cycle. This guideline was inspiration from the JKR workflow process in implementation of the project. The research findings enabled the identification of the factors that are problematic and require attention. In order to achieve the purpose guideline, which is the improvement of the delivery of construction projects, the processes commence with a description of the stages involved in the realizations of the project. The activity in every stage of the project was determined with the suggested duration of time. The results shown in **Table 5.8**.

6.3 Recommendation to JKR

From this study, some recommendations are given as follows:-

- i. Contractor related delays have contributed a large part for significant causes of delay. The result of the study indicated that financing projects is one of the major sources of project delays. Therefore, contractor selection stage must receive more serious consideration. It is essential to choose a contractor with strong financial background. Apart from that, the selected contractor must have sufficient experience, technical capability, and sufficient manpower to execute the works. A mechanism that closely stipulates feasibility study contractor selection must have to strictly apply. Any red tape during the tender bidding should be removed to improve the local construction industry.
- ii. Poor site management is one of the most significant causes in causing the JKR project. This factor is responding to the issues that arise at the site and causes negative impact on the overall work progress. This requires a competent and experience personnel. Where possible, project managers need to have experience and qualifications in project or construction management so that they can effectively utilize well the project management tools that are available (project planning and scheduling tools).
- iii. Adequate finance is the hub around the everything else revolves. Everybody and everything connected with construction is adversely affected by lack of sufficient cash flow. JKR must give special attention to the financial standing of the contractor. Make sure that the contractors to be

considered for future projects can prove that they are financially sound and have a strong backing from financial institution.

- iv. JKR need to check and validate the track record of the contractors. The recommendations from authority body such as CIDB are an added advantage.
- v. Adopting a new approach to contract award procedure by giving less weight to prices and high weight to the capabilities and past performance contract.
- vi. Adopting the new alternative procurement such as relational contracting (RC), serial contracting and earned value management, contract plus and allow contingency cost in contract sum.
- vii. Apply Collaborative teamwork. Due to the dynamic nature of project environments, it is inevitable that conflicts among the project team will arise. All project participants should recognise that conflicts are inevitable and actually can be beneficial if resolved in an appropriate manner. Therefore the conflict management is a need to produce a good working environment.
- viii. Client must take quick decision regarding any matter arise during the project execution. Low speed of decision is due to incompetent person who handle the project from the side of client. Sufficient number of professionals from JKR should be provided in client part. Hence this can avert the slowness of decision making made by client.

- ix. The consultant plays a very important role in Design-Related Delays because they are in charge of the design process in conjunction with the owner of the project. Coordination and communication channel between all the consultant are one of the tools for monitoring the performance.
- x. Planning and scheduling as the main tools to monitor the progress of works. During site meeting the contractor should presented the work programmed lively. If realize that there is a delay, contractor should prepared the Recovery Plan using the schedule compression.

6.4 Recommendations for Further Study

It is recommended that further study be carried out by expand to the respondents from other parties such us contractor, consultant and client to get their feedback according to delay issues. It provides the trend and obtain the more significant causes contributed to delays. Detailed studies can be done to evaluate the involvement and effect of a specific party or resources of construction project to the time overrun in JKR projects. A research can be carried out to investigate the effect of financing and cash flow problems on delay in JKR projects. Further study on the performance of the project and customer satisfaction level can be carried out to investigate the effect of reputation damage to JKR as technical department on delays in project implementation.

6.5 Summary

For many years, the issue of delay in JKR projects has been phenomenal. Its impacts are so significant that it tends to decelerate the implementation of projects under the Tenth Malaysia Year Plan. The aim of the study is accomplished as all the three objectives are met. It is the researchers hope that the study conducted will be beneficial to the JKR department to overcome the problem.

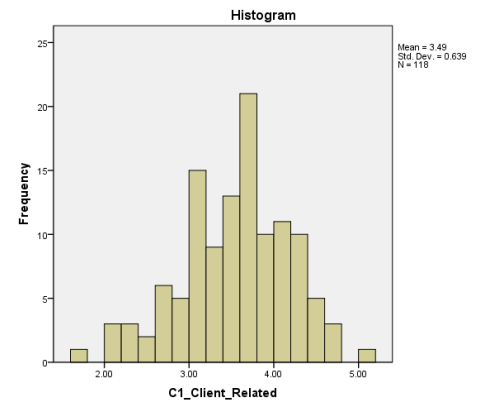
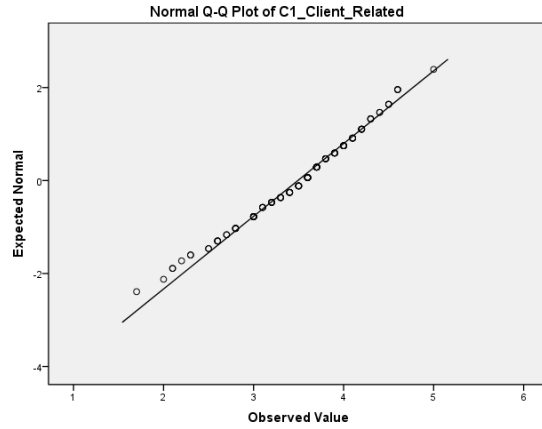
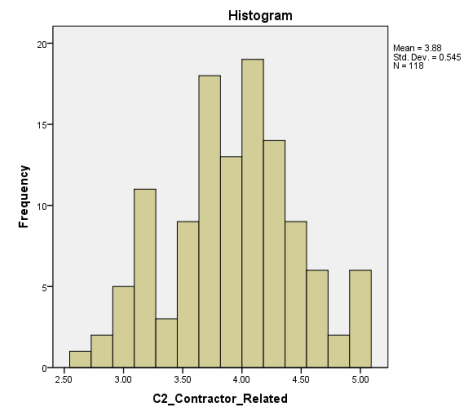
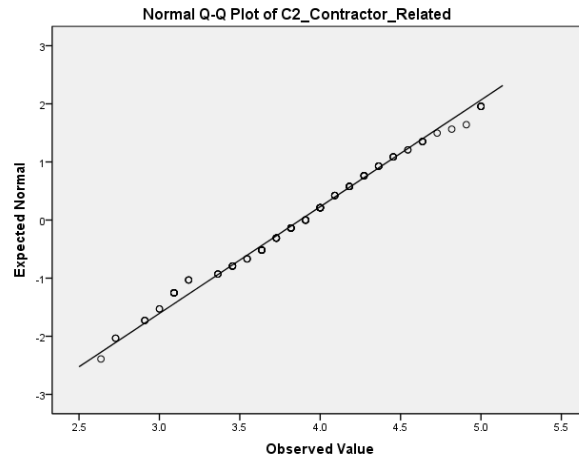
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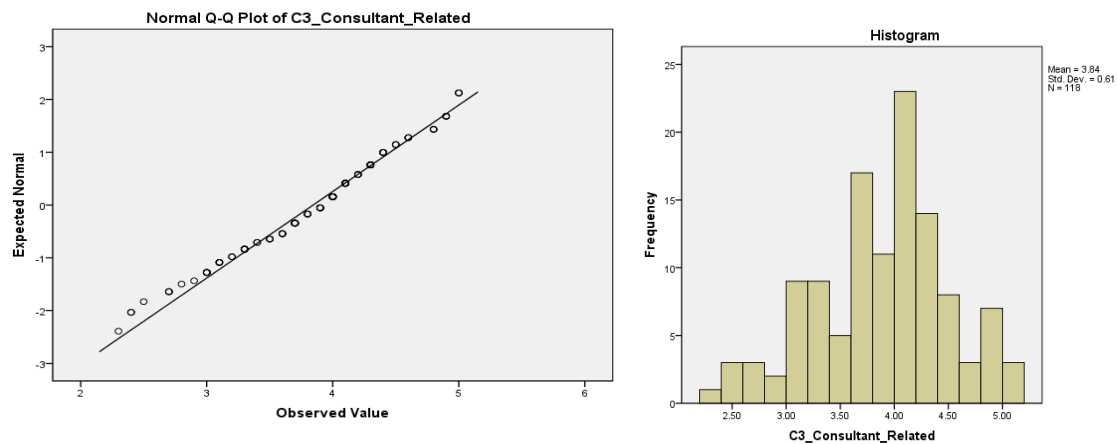
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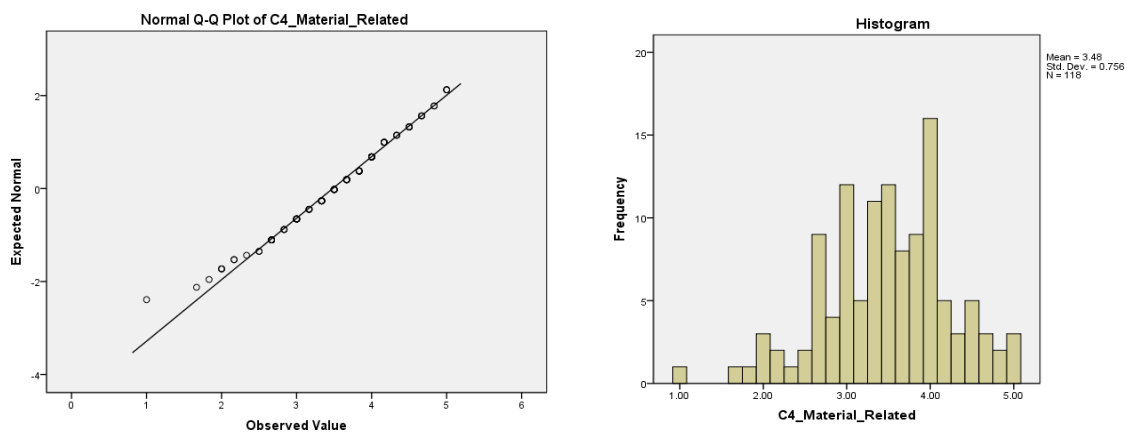
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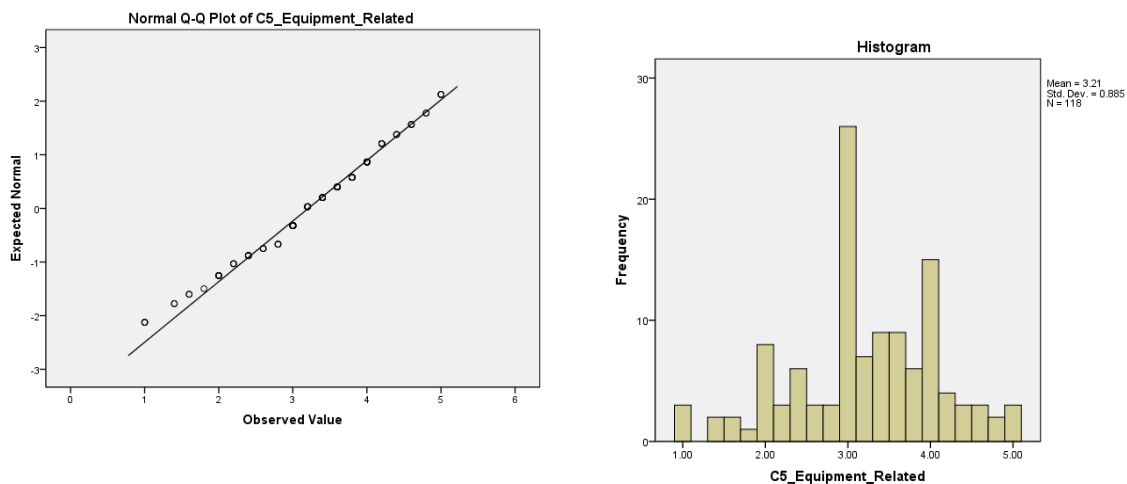
Appendix: A**Normality Test: Histograms and Q-Q Plots****Distribution of Respondents: Client Related Category****Distribution of Respondents: Contractor Related Category**



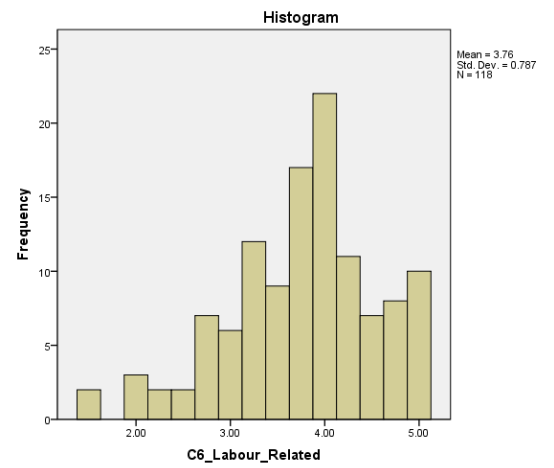
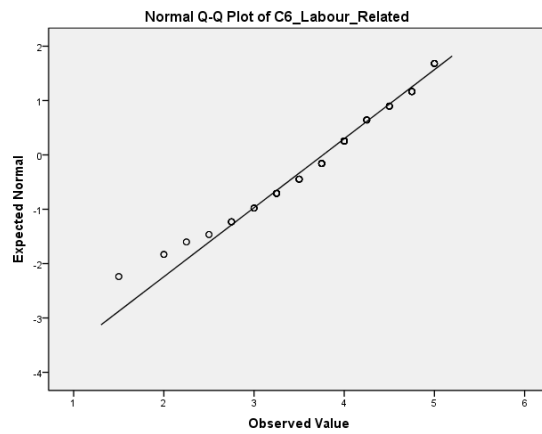
Distribution of Respondents: **Consultant Related Category**



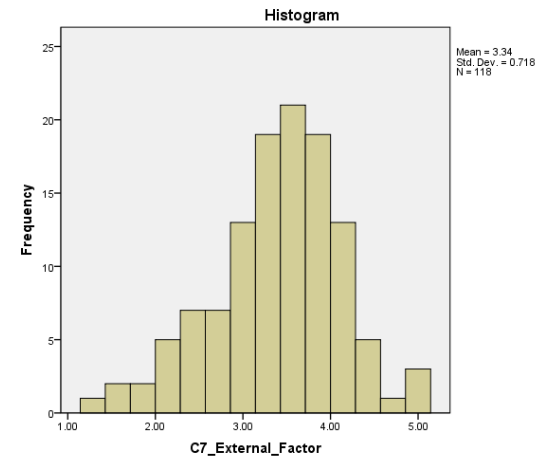
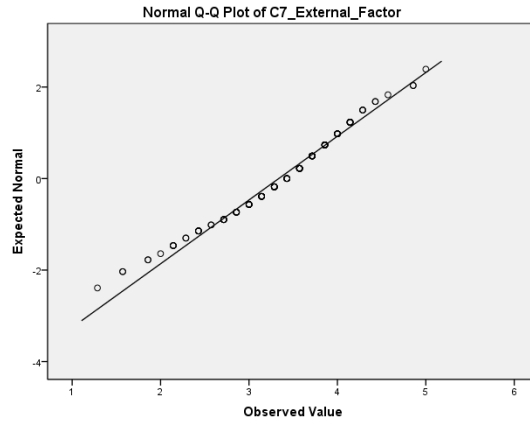
Distribution of Respondents: **Material Related Category**



Distribution of Respondents: **Equipment Related Category**



Distribution of Respondents: **Labour Related Category**



Distribution of Respondents: **External Factor Category**



Appendix: B



Dear Sir/Ms,

**RESEARCH ON METHOD TO RESOLVE BUILDING PROJECT
DELAY (JKR - UTM joint-venture programme)**

At present I am a final year student of the Master in Project Management, Universiti Teknologi Malaysia (UTM), a joint-venture programme between JKR-UTM. I am undertaking a research on **METHOD TO RESOLVE BUILDING PROJECT DELAY** to fulfil the requirements for the award of Master Project Management.

The objectives of undertaking this research are as follows:-

- i. To evaluate the effectiveness of the traditional approach in project delay issue.
- ii. To evaluate the potential application of contemporary approach in resolving project delay issue.
- iii. To develop guideline for project on time delivery.

I would be very grateful if you would have some time to complete the questionnaire attached. All data compiled are solely for academic purposes only. All your answers will be treated as CONFIDENTIAL. Your cooperation is much appreciated. If you have any questions do not hesitate to contact me at 012-2440944 / 03-26107114 or ZamriMD@jkr.gov.my or mzm4644@yahoo.com.my.

Detail of Researcher

Name	:	MOHD ZAMRI BIN MOHAMUD
Course	:	Master of Project Management (MAZ)
Department	:	Secretariat Department, Corporate Affairs Branch
Email	:	ZamriMD@jkr.gov.my
Contact	:	012-2440944 / 03-26107114
Supervisor	:	ASSOC. PROF. DR MOHAMAD IBRAHIM BIN MOHAMAD
Faculty	:	Civil Engineering (FKA)

**THANK YOU VERY MUCH FOR YOUR KIND COOPERATION AND
TIME**

SECTION A : GENERAL INFORMATION

1. Grade :

41/44	
-------	--

48/52	
-------	--

54	
----	--

2. Years of Service :

≤ 5 years	
----------------	--

6 - 10 years	
--------------	--

11 – 15 years	
---------------	--

16 - 20 years	
---------------	--

≥ 21 years	
-----------------	--

3. Years in Project Management :

≤ 5 years	
----------------	--

6 - 10 years	
--------------	--

11 – 15 years	
---------------	--

16 - 20 years	
---------------	--

≥ 21 years	
-----------------	--

4. Department :

	Department	
1	Project Management Office (PMO)	
2	Cawangan Kerja Bangunan Am (CKBA)	
3	Cawangan Pendidikan & Pengajian Tinggi (CPPT)	
4	Cawangan Kerja Kesihatan (CKK)	
5	Cawangan Kerja Keselamatan (CKS)	
6	Others :.....(please specify)	

5. State the type of building which involved the most frequent for delays

School		Office		Public Facilities		Hospital		Other	
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6. State the number of project delays which is faced by respondent

1-3 projects		4-6 projects		7-9 projects		10-12 projects		>13 projects	
--------------	--	--------------	--	--------------	--	----------------	--	--------------	--

7. State the actual time spend for the most delayed project

3 < months		3 - 6 months		>6 Month	
------------	--	--------------	--	----------	--

SECTION B: CAUSES OF DELAYS

The following statement represent factors that contribute to delay of JKR Projects based on causes of delay categorized into seven (7) groups.

For each option, please circle to show your level of agreement based on the Likert scale given below.

1	2	3	4	5
Least Agreeable	Slightly agreeable	Moderately agreeable	Agreeable	Strongly Agreeable

No	Categories 1: CLIENT RELATED	1	2	3	4	5
BA1	Client Interference					
BA2	Slowness in decision making process					
BA3	Contract modification					
BA4	Change order					
BA5	Client cannot provide enough fund					
BA6	Uncooperative client					
BA7	Late payment					
BA8	Unrealistic contract duration					
BA9	The land is not free from dispute					
BA10	Not full fill JKR requirements in terms of project site, project scope and cost.					

No	Categories 2: CONTRACTOR RELATED	1	2	3	4	5
BB1	Poor site management and supervision					
BB2	Financial difficulties – Poor Cash Flow Management					
BB3	Unsuitable construction materials and improper construction method implement					
BB4	Inadequate contractor experience					
BB5	Conflicts in sub-contractor schedule in execution of project					
BB6	Rework due to errors during construction					
BB7	Conflicts between contractor and others parties (consultant and client) and also					

	partners (shareholders)					
BB8	Poor communication and coordination					
BB9	Ineffective planning and scheduling of project					
BB10	Delay in sub-contractors work					
BB11	Delay in site mobilization					
BB12	Inappropriate or poor criteria for selection of sub-contractor					

No	Categories 3: CONSULTANT RELATED	1	2	3	4	5
BC1	Delay in approving major changes in the scope of work					
BC2	Poor communication and coordination					
BC3	Inadequate experience of consultant					
BC4	Mistakes and discrepancies in design documents					
BC5	Delay in producing design documents					
BC6	Unclear and inadequate details in drawings					
BC7	Insufficient data collection and survey before design					
BC8	Poor monitoring and control of progress of work					
BC9	Late valuation work					
BC10	Late issue of instruction					
No	Categories 4: MATERIAL RELATED	1	2	3	4	5
BD1	Shortage of construction materials in markets					
BD2	Changes in material and specification during construction					
BD3	Delay in material delivery					
BD4	Damage of sorted material while they are needed urgently					
BD5	Late procurement of material					

BD6	Noncompliance of material to specification					
-----	--	--	--	--	--	--

No	Categories 5: EQUIPMENT RELATED	1	2	3	4	5
BE1	Equipments breakdown					
BE2	Shortage of equipment					
BE3	Low level of equipment					
BE4	Low productivity and efficiency of equipment					
BE5	Lack of high-technology mechanical equipment					

No	Categories 6: LABOUR RELATED	1	2	3	4	5
BF1	Working permit of labours					
BF2	Lack of skilled labour					
BF3	Low productivity level of labour					
BF4	Shortage of manpower					
BF5	Labour injuries / accident in site					
BF6	Personal conflicts among labours					

No	Categories 7: EXTERNAL FACTOR	1	2	3	4	5
BG1	Delay in obtaining permits from municipality					
BG2	Slow process of Building Permit					
BG3	Delay in providing services from utilities (such as water, electricity)					
BG4	Changes in Government regulations and laws					
BG5	Accident during construction					
BG6	Traffic control and restriction at job site					
BG7	Price fluctuation					

SECTION C: TRADITIONAL APPROACH BY JKR DEALING WITH PROJECT DELAY

The following statement represents the current practice in JKR when dealing with projects delays.

Please answer the effectiveness of the current practice according to this scale.

1	2	3	4	5
Least Ineffective	Low Ineffective	Moderately Ineffective	Ineffective	Highly Ineffective

	Traditional Approach by JKR	1	2	3	4	5
C1	S.O issues the Warning Letter (Surat Amaran Kemungkiran) for contractor to increase the productivity of works					
C2	Contractor prepare the Recovery Plan / Rescheduling Work Programme by using the 4M method (Machineries, Material, Money and Manpower)					
C3	Coordination meetings on a weekly basis to monitor the progress of work on site by S.O. (Weekly and Monthly report)					
C4	Head of Project Team (HOPT) will prepare the report project delays and present in Jawatankuasa Projek Sakit JKR.					
C5	Contractor ask for Extension of Time (E.O.T) for reasons or causes of delay which is beyond his control accordance with Clause of Contract					
C6	If the contractor fails to complete the works by the Completion Date, the contractor shall pay or allow to the JKR a sum calculated at the rate stated as Liquidated Ascertained Damages (L.A.D)					
C7	Termination based on Clause of Contract (COC).					
C8	Appoint Third Party / New Contractor to Continue the balance of work (Kontraktor Penyelamat)					

SECTION D: PROPOSED CONTEMPORARY APPROACH TO JKR DEALING WITH PROJECT DELAY

The following statement represents the proposed method to avoid project delays in JKR.

How did the effectiveness of the following methods can minimise delays?

Please answer the effectiveness of the proposed method according to this scale.

1	2	3	4	5
Least Effective	Low Effective	Moderately Effective	Effective	Highly Effective

	CATEGORY A : SCOPE MANAGEMENT	1	2	3	4	5
DA1	Implement Value Management & Value Engineering Lab to determine scope of work in Planning & Design Stage					
DA2	Complete and accurate project feasibility study and site investigation to all projects done by JKR					
DA3	Utilization of the latest construction technology method - Industrialized Building System (IBS)					
DA4	Utilization of the latest construction technology method - Building Information Modeling (BIM)					
DA5	Implement Project Management Plan (PMP) to all JKR Project.					

	CATEGORY B : TIME MANAGEMENT	1	2	3	4	5
DB1	Proper project planning and scheduling using appropriate scheduling method such as Primavera or MS Project					
DB2	Execute delayed activities by subcontractors. Work Breakdown Structure (WBS) as a tool to determine duration for every task					
DB3	Accurate initial time estimation by establish methodology for estimation process					

	CATEGORY C : COST MANAGEMENT	1	2	3	4	5
DC1	Accurate initial cost estimates. Enough of information necessary for estimation and adequate					

	timeframe to perform estimates					
DC2	Payment processed by the Client. JKR only prepared and endorsed the JKR 66 Certificate. No warrant allocation					
DC3	Allow Contingency Cost in the Contract Sum					
DC4	Enforce Liquidated damages clauses on monthly basic based on Work Programmed as milestone to achieve and offering incentives for early completion					

	CATEGORY D : QUALITY MANAGEMENT	1	2	3	4	5
DD1	Frequent progress meeting with all stakeholder to monitor the progress of work					
DD2	Build a systematic project control and monitoring mechanism					
DD3	Frequent coordination between the parties involved to avoid dispute between stakeholder					
DD4	Implement Project Health Check (PHC) to all JKR projects					
DD5	Site meeting and technical meeting as one of the tool for monitoring the project					
DD6	Implement SERQUAL Analysis to evaluate Customer satisfaction in meeting project schedule, quality and cost					

	CATEGORY E : COMMUNICATION MANAGEMENT	1	2	3	4	5
DE1	Developing appropriate communication system linking to all functional group using new technology- social network etc					
DE2	Collaborative teamwork in construction with effective site management and supervision.					
DE3	Clear information and communication channels in roles and responsible of all stakeholder.					
DE4	Community involvement to reduce the absence of bureaucracy to avoid complaints from publics					
DE5	Developing appropriate communication system linking to all functional group					

	CATEGORY F : HUMAN RESOURCES MANAGEMENT	1	2	3	4	5
DF1	Select the competent project manager					

DF2	Hire experience personnel for project implementation					
DF3	Apply collaborative teamwork environment application with Multidisciplinary / competent project team and Promotion team working among project participants					
DF4	Competent personnel of consultant/designer to complete and proper design at the right time					
DF5	Developing human resources in the construction industry through proper training and classifying of craftsman.					

	CATEGORY G : RISK MANAGEMENT	1	2	3	4	5
DG1	Early in obtaining permit and approval from relevant authority					
DG2	Implement Risk Management Plan (RMP)					
DG3	The effectiveness of risk management will be increase if the project manager see risk as an opportunity					
DG4	Cross functional collaborative teamwork is an effective way for collectively dealing with threats (risk) to the project environment.					

	CATEGORY H : PROCUREMENT MANAGEMENT	1	2	3	4	5
DH1	Adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractor					
DH2	Not awarding contract based on the lowest bid					
DH3	Comprehensive contract documentation					
DH4	Adopting a new approach to contracting such as Cost Plus Contract, GC/Works, Prime Contracting Agreement and FIDIC type of contract					

	CATEGORY I : INTERGRATION MANAGEMENT	1	2	3	4	5
DI1	Proper emphasis on past experience of project parties					

DI2	Offer incentive for early project completion					
DI3	Ensure the availability of resources (finance, materials, equipments, workmen, etc)					
DI4	Integrate Risk Management Plan and Work Programme(CPM)					

Thank you for completing this questionnaire

APPENDIX C

Interview with Expert Panel on Activity in Project Life Cycle

The following statement represent guidelines activity in the project life cycle

For each option, please circle to show your level of agreement based on scale given below.

1	2	3	4
Least Agreeable	Slightly agreeable	Agreeable	Strongly Agreeable

		Respondents				
Inception Activities		#1	#2	#3	#4	#5
1.	Defining the scope and background of project.	3	4	4	4	3
2.	Identifying business drivers that lead the project and define the strategic direction	4	4	4	4	4
3.	Developing the business cases that define the problem/need to be address by the project and the reason for project launching.	4	3	4	4	4
4.	Creating a list of project goals and objectives that contribute to solving the problem.	4	4	4	4	4
5.	Analyzing options or alternatives to the project.	4	3	3	3	4
6.	Justifying the project through performing feasibility analysis.	3	3	3	4	4
7.	Identifying constraints and assumptions.	4	4	3	3	3
8.	Identifying constraints and assumptions.	4	3	3	3	4
9.	Defining scope, including boundaries, deliverables and requirements	4	4	4	4	4
10.	Developing product acceptance criteria.	3	3	3	3	3
11.	Analyzing stakeholders and their expectations and involvement level.	3	4	4	4	4
12.	Designing an organizational chart that identifies roles and responsibilities of stakeholders.	4	4	4	4	4
13.	Writing a proposal document that summarizes the project and provide the relevant information for all stakeholders.	4	4	4	4	4
14.	Getting approval of the proposed project and starting the planning process.	4	4	3	3	3
Planning Activities						
1.	Reviewing lessons learned from previous projects (if any) to gain valued expertise and knowledge for present project.	4	3	3	3	4
2.	Selecting and interviewing the best candidates to the project team.	3	3	3	4	4
3.	Creating a team composition chart that includes roles and names of peoples involved in the implementation process.	4	4	3	3	3
4.	Writing a staffing plan that explains how to manage the team and collaborative activities.	4	3	3	3	4
5.	Designing a change management plan that explores a mechanism of defining, approving and implementing project changes and updates.	4	4	4	4	4
6.	Making an issue management plan to define how to document and manage issues.	3	3	3	3	3
7.	Defining quality assurance and control activities that identify how to keep the project and its results relevant to project requirements.	3	4	4	4	4

8.	Developing the project schedule that defines time required for implementing the project, along with activity durations and milestones.	4	4	4	4	4
9.	Establishing contractual relationships with suppliers and procurers.	3	3	3	3	4
10.	Designing a training plan that explores methods and techniques of staff training and development.	4	4	4	4	4
11.	Developing cost estimates that define how much funding will be required to perform the project and complete its goals and objectives.	4	4	3	3	4
12.	Making a risk management plan that specifies processes and tools for analyzing and managing threats and uncertainties.	3	4	4	4	3
13.	Developing a communications management plan that explains how communications between stakeholders should be established and managed.	4	4	4	4	4
14.	Designing a project management plan that defines key activities for managing the project and its content.	4	3	4	4	4
Implementation Activities.						
1.	Conducting status meetings to review current status of the project.	4	4	4	4	4
2.	Conducting status meetings to review current status of the project.	4	4	4	4	4
3.	Providing training to personnel if necessary.	4	4	4	4	4
4.	Leading and guiding the project team.	4	4	4	4	4
5.	Managing changes and updates.	4	4	3	3	3
6.	Logging issues and developing solutions for handling logged issues.	4	3	3	3	4
7.	Managing identified risks.	4	4	4	4	4
8.	Communicating with the team and other stakeholders to get their feedback and keep the project up-to-date.	3	3	3	3	3
9.	Managing deliveries and procurement.	3	4	4	4	4
10.	Controlling and assuring project quality.	4	4	4	4	4
11.	Using reporting as a mechanism of tracking the implementation process.	4	4	4	4	4
12.	Reviewing status of project deliverables to ensure they are produced according to acceptance criteria.	3	3	3	3	3
13.	Monitoring staff performance to ensure project work is performed according to the plan.	4	4	4	4	4
Closure Activities.						
1.	Performing a post implementation review to confirm the project has reached its goals and objectives and that deliverables are produced.	4	4	4	4	4
2.	Conducting lessons learned exercises to document successful experience and practice of the project.	4	4	4	4	4
3.	Transferring project personnel to other projects, or releasing them.	4	4	3	3	3
4.	Closing financial operations and transactions.	4	3	3	3	4
5.	Handing over the project product to the customer.	4	4	4	4	4
6.	Getting the customer's approval that meets the customer satisfaction.	4	4	4	4	4

Appendix: D**Interview with Expert Panel on Duration of Activity****PROPOSED GUIDELINES FOR ON TIME PROJECT DELIVERY**

The workflow consists of five stages, here after referred to as intervention category

No	Task	Yes	No	Duration
1.0	PRE PLANNING			
1.1	Overview and Early Planning			
1.2	Received list of Project from Economic Planing Unit (EPU), JPM			
1.3	Clarification of Project based on Location, Cost, Ministry/Agency & ACAT			
1.4	Analysis and Distributed to implementer (JKR /Agency)			
1.5	Set the Strategy of Implementation			
1.6	Distributed to Busines Sector / Design Sector			
1.7	Coordination Meeting with Director of Sector Unit (SBU)			
2.0	REGISTER PROJECT IN SKALA	Yes	No	Duration
2.1	Determine the Project Team and Appoint Head of Project Team (HOPT)			
2.2	Finalize the stategy of implementation and download in SKALA			
2.3	Register the project title by Head of Project Office (HPO)			
2.4	Updated the latest list of project to EPU			
3.0	PLANNING	Yes	No	Duration
3.1	Received Brief Project, Land and Badjet (Gate Way 1)			
3.2	Appoint Head of Project Team			
3.3	Review Project Brief			
3.4	Arrange the Site Visit			
3.5	Review and Fullfill the requirement by the local authority			
3.6	Land Surveying			
3.7	Prepare Report / Site Anlysis/Design Brief / Risk Management Plan / Project Management Plan			
3.8	Soil Investigation			
3.9	Finalize Project Brief, Site and Cost			

4.0	DESIGN	Yes	No	Duration
4.1	CONCEPT DESIGN			
4.1.1	Prepare Concept Design			
4.1.2	Prepare Early Estimate Cost			
4.1.3	Review Concept Design			
4.1.4	Value Engineering & Gate Way 2			
4.1.5	Client Approval			
4.2	PRELIMINARY DESIGN			
4.2.1	Prepare Preliminary design & specification			
4.2.2	Prepare Drawing 100 scale			
4.2.3	Development Order			
4.3	DETAIL DESIGN	Yes	No	Duration
4.3.1	Prepare detail design			
4.3.2	Coordination drawing between all displin			
4.3.3	Value Engineering 2 & Gate Way 2			
4.3.4	Amendment Detail Design			
4.3.5	Approval of Building Plan			
5.0	PROCUREMENT			
5.1	Prepare Tender Document / Gateway 3			
5.2	Advertising of Tender			
5.3	Evaluation of Tender			
5.4	Tender Board Meeting			
5.5	Prepare As Tender Detail Abstract (ATDA) & Get Approval from the Client			
5.6	Letter of Award			
6.0	CONSTRUCTION	Yes	No	Duration
6.1	Preliminary Item			
6.2	Civil Works			
6.3	Structure Works			
6.4	Architect Works			

6.5	Mechanical Works			
6.6	Electrical Works			
6.7	External Works			
6.8	Provisional Item			
	*All the activity depends on the contract duration and scope of work			
7.0	HANDING OVER	Yes	No	Duration
7.1	Installation of TNB transformer, etc & Energizing of TNB Sub Station			
7.2	Testing & Commissioning			