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PROJECT TIME MANAGEMENT MATURITY LEVEL IN JABATAN KERJA RAYA

ALFA RIZAL BIN ZAINUDIN

A capstone project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Project Management

Faculty of Civil Engineering
Universiti Teknologi Malaysia

JANUARY 2014

I declare that this project report entitled **"Project Time Management Maturity Level in Jabatan Kerja Raya"** 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.

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To my wonderful parents, lovely wife, Nisha and my children Irdina, Daniel and Ardini, thank you for being around me and support me during the completion of my master.

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ABSTRACT

Many statements have been highlighted in the newspaper regarding delays project in Jabatan Kerja Raya (JKR). These delays occurred due to poor decision making, supervision and site management thus would affect the time management process. This study has been undertaken to identify basic critical elements toward establishment of project maturity level for time management and to establish the ladder step of Project Time Management Maturity for JKR. In effort to improve the time management process in JKR, the characters and attributes were strategized. The data was generated based from experts' interviews, questionnaires and document search to meet the aim of objective study. Results obtained from the questionnaire were gathered and analysed. The establishment of the five levels maturity characters and the attributes on each of the maturity level was developed from the study. Based on the result finding from this study, it is suggested that the management of JKR could use these Project Time Management Maturity Level to determine the strategy to improve maturity level in time management and improve the current weakness as well as to enhance the process of project time management in JKR.

ABSTRAK

Kelewatan projek di Jabatan Kerja Raya (JKR) telah banyak dibangkitkan dalam akhbar. Kelewatan ini berlaku disebabkan oleh kelemahan dalam membuat keputusan, penyeliaan dan pengurusan tapak yang akan menjejaskan proses pengurusan masa. Kajian ini dijalankan adalah untuk mengenal pasti elemen-elemen asas kritikal bagi menyediakan satu rangka yang menunjukkan peningkatan usaha untuk memperbaiki proses pengurusan masa projek yang dikenali sebagai "Project Time Management Maturity Level (PTMML)". Dengan menggunakan PTMML ini perancangan strategi boleh dibuat bagi menggembelingkan usaha untuk meningkatkan proses pengurusan masa di JKR. Bagi mencapai matlamat kajian, data telah dikumpulkan dari temu bual dengan panel pakar, soal selidik dan carian dokumen. Keputusan yang diperolehi daripada soal selidik juga telah dikumpulkan dan dianalisa. Hasil daripada kajian ini, telah terbinanya lima ciri-ciri tahap kematangan dan sifat-sifat pada setiap tahap ciri kematangan untuk PTMML. Berdasarkan hasil penemuan daripada kajian ini, dicadangkan pengurusan JKR dapat menggunakan PTMML ini untuk merancang strategi bagi membangunkan tahap kematangan dalam pengurusan masa dalam pengurusan masa projek yang dilaksanakan oleh JKR di masa hadapan.

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LIST OF ABBREVIATIONS

PMBOK	Project Management Book of Knowledge
CMM	Capability Maturity Model
SEI	Software Engineering Institute
OPM3	Organizational Project Management Maturity Model
PMI	Project Management Institute
P3M3	Program and Project Management Maturity Model
PMO	Process Model of Organization
JKR	Jabatan Kerja Raya
10MP	Tenth Malaysia Plan
PTMML	Project Time Management Maturity Level
PMM	Project Management Maturity
PRINCE2	Projects in Controlled Environments
WBS	Work Breakdown Structure
PROKOM	Cawangan Pengurusan Projek Kompleks
HOPT	Head of Project Team
HODT	Head of Design Team
SKALA	Sistem Kawal dan Lapor
CPM	Critical Path Method
SPK	Sistem Pengurusan Kualiti
SOP	Standard of Procedure
PMO	Project Management Office
JPP	Jawatankuasa Penilaian Perunding
ECKM	Enterprise Content & Knowledge Management
PO	Portfolio
KLIA	Kuala Lumpur International Airport
J-Pedia	JKR Repository

WIKI	Wikipedia
SO	Superintending Officer
PD	Project Director
PM	Project Management
SPSS	Statistics Package for Social Science
RII	Relative Important Index
SD	Standard Deviation
BQ	Bill of Quantity
PDM	Precedence Diagramming Method
PEMANDU	Performance Management & Delivery Unit
MMG	Matrix Maturity Guideline
PETRONAS	Petroliam Nasional Berhad

CHAPTER 1

INTRODUCTION

1.1 Introduction.

Jabatan Kerja Raya (JKR) has been established since 1872 and has been a main project implementer of the government with professional positions for 3527 employees. JKR is responsible for the development projects and maintenance of infrastructure assets. Up until now, JKR has catered various building projects and infrastructure to nationwide. JKR has applied a lot of strategies in order to improve its delivery to the clients and the business relationship. Now with the launching of Malaysia's own Transformation Programs, JKR has contributed to 5 main areas of the nation: world class infrastructure, new industries, sustainability, an environment conducive to quality living, and world class human capital. One of the objectives of the existence of this biggest technical agency is to be a leader in project management and cater the nation`s infrastructure.

1.2 Background of Study

Jabatan Kerja Raya Malaysia (JKR) is the executing agency of government and the largest project development in the country. The organisation has managed many government projects. However, according to Judin (2008), during the 8th Malaysian Plan; the average length of delays for each project was 171 days, 78% of

these projects could not be handed over on scheduled, 229 variation orders were issued. Many other projects were contracted without sufficient information on the project brief due to time constraint to gather all necessary information required among the stakeholders.

Many statements have been highlighted in the newspaper regarding the delay of projects in JKR. Basically project delay most likely arises from poor decision-making, poor supervision and poor site management. The success of an organisation is due to the efficiency in project management. Some of the criteria for a successful project management can be defined as having achieved the project objective when it is delivered on time, within the cost, at the desired performance/technology level, utilizing the assigned resources effectively and efficiently and accepted by the customer. According to Le-Hoai and Lee (2009), time is always one of the most important criteria for successful project management and schedule delays can cause cost overrun.

Nowadays, delay as if has become a norm (culture) in JKR. Basically delay most likely arises from poor decision-making, poor supervision and poor site management. Therefore to improve the outstanding project delivery, one of the strategies is to increase the Project Management Maturity Level in order to ensure project become successful and more predictable. The study is crucial because to achieve successful long-term strategies, the maturity time management of various stages for strategic improvements needs to be established.

1.3 Aim and Objectives of the Study

The aim of this study is to develop the framework of Project Time Management Maturity Level (PTMML) for JKR. To achieve this aim, the following objectives have been determined:

i. To identify the basic critical elements towards the establishment of project time management maturity level for JKR
ii. To establish the maturity level characteristics of Project Time Management Maturity Level (PTMML) for JKR.
iii. To establish appropriate attributes for each element of PTMML.

1.4 Scope of the Study

This study focuses on time management aspect for JKR project. There is lack of Project Management Maturity (PMM) for time management in JKR. A new PTMML is developed based on the established criteria to improve the time management process.

The collected data are derived from interviews, distribution of questionnaires to respondents from JKR and document search. The development of maturity level for JKR is established based on the suitable identified criteria and attributed findings.

After obtaining the results from the data collected, information is analyzed in order to identify the basic critical elements. Next is to suggest a framework of PTMML for JKR and finally to develop suitable strategies to improve time management process in JKR.

1.5 Brief Research Methodology

The research methodology is presented by means of a flow chart for ease of understanding. This is shown in Figure 1.1. The detail description will be elaborated in Chapter 3.

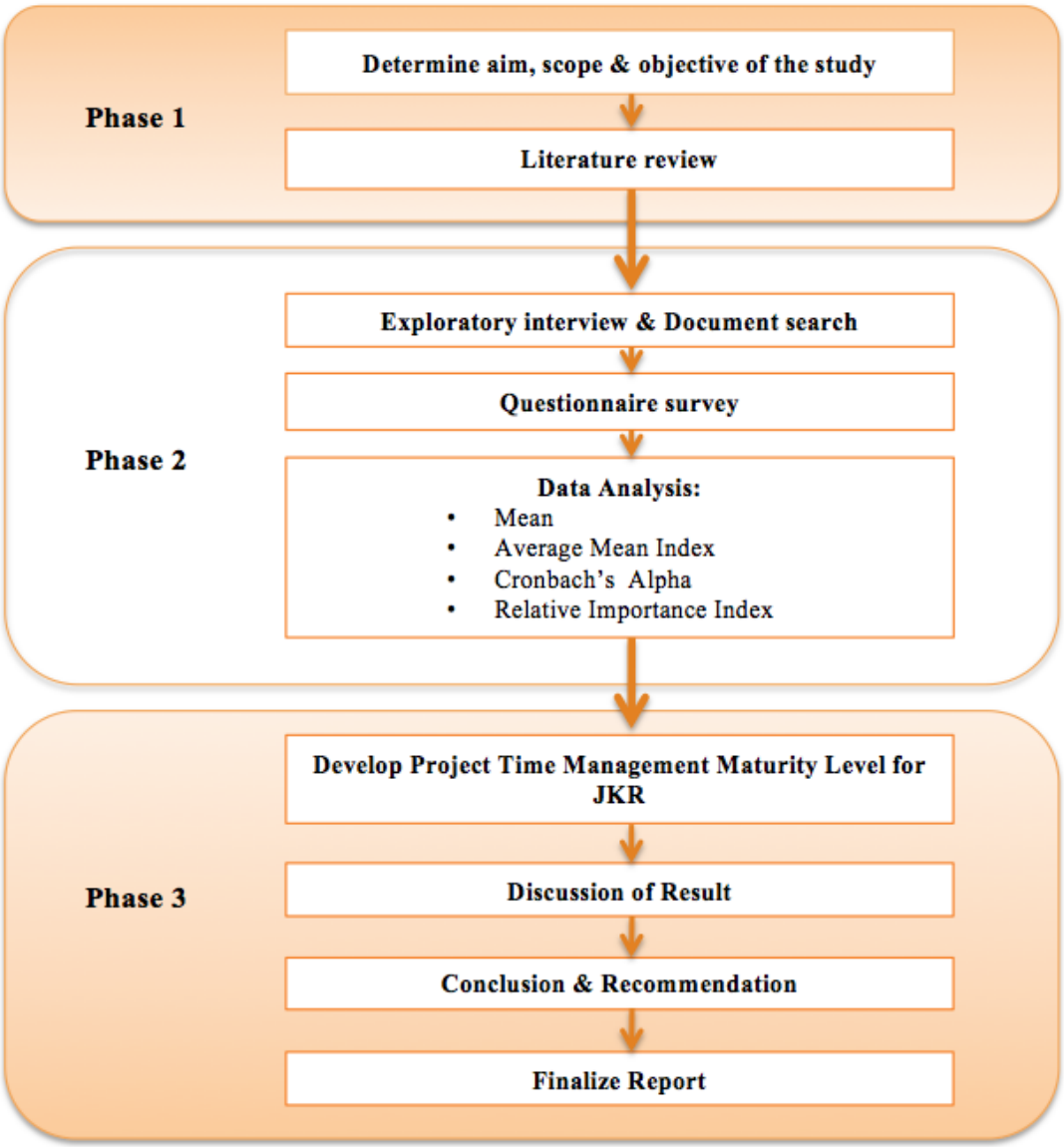

Figure 1.1: Schematic of Research Methodology

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The chapter specifically reviews on the project management maturity models and project time management for the establishment of project time management maturity level (PTMML) that is suitable for JKR.

2.2 Project Management

Project management maturity level is the process of managing and utilizing tools that are shown normally in stages of maturity level. Project management maturity is an important element for strategic planning, as it provides a methodology and road map to determine and compress the gap in resources and quality (Kerzner, 2005). The step of maturity indicates that there might be a development and improvement from one level of capability to a higher one. According to Graham Williams (2009), the maturity levels enable organisations to identify the process improvement pathway along which they may decide to move. This process should be seen as a long-term strategic commitment rather than a quick fix for immediate tactical problems.

According Kerzner (2006), a project can be considered to be any series of activities and task that has a specific objective to be completed within certain

specifications, have defined start and end dates, have funding limit, consume human and non-human resources and multifunctional.

Project management is the application of knowledge, skill, tools and techniques to project activities to meet the project requirements (PMBOK *Guide*, 2013). According to Kerzner (2006), project management involves project planning and project monitoring. Successful project management can be defined as having achieved the project objective; within time, cost, at the desired performance/technology level, while utilizing the assigned resources effectively and efficiently, finally the project is accepted by the customer.

According to PMBOK *Guide* (2013), project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. The five-process group of project management are initiating, planning, executing, monitoring and controlling and closing. The definition of project management by Kerzner (2006) is the planning, organizing, directing and controlling of company resources for relatively short-term objective that has been established to complete specific goals and objectives.

The Project Management framework is divided into five-process group, as defined in the Project Management Body of Knowledge (PMBOK *Guide*, 2013). Each phase has associated activities.

Initiating Process: Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.

Planning Process: Those processes are required to establish the scope of the project, refine the objectives and define the course of action required attaining the objectives that the project was undertaken to achieve.

Executing Process: Those processes performed to complete the work defined in the project management plan to satisfy the project specifications.

Monitoring and Controlling Process: Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required and initiate the corresponding changes.

Closing Process: Those processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Project Management is a system, which needs a systematic process. This process has been organized into nine knowledge areas as described in Table 2.1. One of the knowledge areas, which is Project Time Management will be the main focused criteria towards the establishment of project maturity level for JKR.

Table 2.1: Project Management Knowledge Area (Source: PMBOK *Guide,* 2013)

Project Management Knowledge Area (PMBOK *Guide,* 2013)
1. Project Integration Management
2. Project Scope Management
3. Project Time Management
4. Project Cost Management
5. Project Quality Management
6. Project Human Resource Management
7. Project Communications Management
8. Project Risk Management
9. Project Procurement Management

2.3 Project Management Maturity Model

Maturity model is a common method of determining the current level of project management capability and maturity. There are several project management maturity models available to assess the maturity of an organisation. Examples are

Project Management Maturity by Kerzner, Capability Maturity Model Institute (CMMI) and PRINCE2. According to Paulk et al. (1993), this model became the foundation for Carnegie Mellon University, developed by the Software Engineering Institute (SEI). Others include the Organisational Project Management Maturity Model (OPM3) developed by Project Management Institute (PMI) and the Portfolio, Program and Project Management Maturity Model (P3M3) owned by the Office of Government Commerce (OGC). The Process Model of Organisation (PMO) is another model, used to detect bottlenecks that prevent the organisation to achieve its objectives (Wognum et al. 1996).

The Project Management Institutes: A Guide to the Project Management Body of Knowledge (PMBOK *Guide*) is an excellent point of reference for starting a project on management capability. There are samples of best practices information outlined in the document. There are models that can be utilized to assist organisation in performing strategic planning for project management and achieving maturity and excellence in a reasonable period of time. Maturity models typically include a sequence of levels (or stages) that form an anticipated, desired or logical path from an initial state to maturity level represents its capabilities as regards as specific class of objects an application domain (Rosemann, M and de Bruinn, T, 2005). According to Kuznets (1965), the basic purpose of maturity models is to outline the stage of maturation paths. This includes the characteristics of each stage and the logical relationship between them. Maturity models are used to assess as is situations, to guide improvement initiatives, and to control progress (Iversen *et al.* 1999). According to Maximilian (2012), a maturity model serves a descriptive purpose if it can be applied for, as is assessment. It serves a prescriptive purpose if it indicates how to identify desirable future maturity levels and if it provides guidance on how to implement according to improvement measures. According to de Bruin *et al*. (2005), maturity models can be structured hierarchically into multiple layers referring to different levels of granularity of maturation. Each of the five levels represents a different degree of maturity in project management.

A greater Project Management Maturity (PMM) will give more positive impact on an organisation's overall project performance. However, there is no optimum level of maturity that is appropriate for every organisation (Wheatley, 2007).

Below are examples of Project Management Maturity Level from various resources as described in Table 2.2.

Table 2.2: Examples of Maturity Project Management Level

	KERZNER	PRINCE2	CMMI
Level 1	**Common Language:** At this stage, the organisation realised the importance of project management and have a good understanding of project management in easy to understand terms.	**Awareness process:** The organisation is able to recognize, for example, projects. But has little structured approach to dealing with them.	**Initial:** Organisations are characterised by a tendency to over commit, abandon their processes in a time of crisis, and be unable to repeat their successes.
Level 2	**Common Processes:** The same process: At this point, the process needs to be refined and successful habits of the project model can be applied to other models. At this stage of project management principles can be applied and used to support the methodology and methods utilized by other companies.	**Repeatable process:** Using projects as an example, there may be areas that are beginning to use standard approaches to projects but there is no consistency of approach across the organisation.	**Managed:** The statuses of the work products are visible to management at defined points (e.g., at major milestones, at the completion of major tasks). Commitments are established among relevant stakeholders and are revised as needed. Work products are appropriately controlled. The work products and services satisfy their

Table 2.2: Examples of Maturity Project Management Level (Cont.)

	KERZNER	PRINCE2	CMMI
			specified process descriptions, standards, and procedures.
Level 3	**Singular Methodology:** In this level, the organisation recognizes the synergistic effect of combining all corporate methodologies into a singular methodology, which is the center of project management. Process control with a single methodology is easier than with multiple methodologies.	**Defined process:** There will be a consistent set of standards being utilized by all projects, for example, across the organisation with clear process ownership.	**Defined:** The organisation further improves its processes that are related to the maturity level 2 process areas. Generic practices associated with generic goal 3 that were not addressed at maturity level 2 are applied to achieve maturity level 3.
Level 4	**Benchmarking:** This level contains the recognition that process improvement is necessary to maintain a competitive advantage. Benchmarking must be done continuously. The company must identify what the benchmarks are and what to do with the benchmark.	**Managed process:** The organisation monitors and measures its process efficiency, with active interventions to improve the way it delivers based largely on evidence or performance based information. The organisation will be focusing on optimization of its quantitatively managed	**Quantitatively Managed:** The organisation and projects to establish quantitative objectives for quality and process performance and use them as criteria in managing projects. Quantitative objectives are based on the needs of the customer, end users, organisation, and process implementers.

Table 2.2: Examples of Maturity Project Management Level (Cont.)

	KERZNER	PRINCE2	CMMI
		processes to take into account changing business needs and external factors. It will be anticipating future capacity demands and capability requirements to meet the delivery challenge, e.g. through portfolio analysis.	Quality and process performance is understood in statistical terms and is managed throughout the life of projects.
Level 5	**Continuous Improvement:** In this level, the organisation will evaluate the information obtained through benchmarking and to decide whether or not this information will enhance the singular methodology.	**Optimized process:** The organisation will be focusing on optimization of its quantitatively managed processes to take into account changing business needs and external factors. It will be anticipating future capacity demands and capability requirements to meet the delivery challenge, e.g. through portfolio analysis.	**Optimizing:** An organisation continually improves its processes based on a quantitative understanding of its business objectives and performance needs. The organisation uses a quantitative approach to understand the variation inherent in the process and the causes of process outcomes.

2.4 Background of Jabatan Kerja Raya Maturity Model

Jabatan Kerja Raya (JKR) has launched its Strategic Framework 2012-2015 in October 2011. This Strategic Framework is based on five strategic themes which represent JKR`s transformation agenda with targeted result. The outstanding project delivery has clearly stated that;

- JKR need to demonstrate excellence in delivering projects as per customers' expectations

- Project Management (PM) is a core business of JKR. To exceed customer expectation, JKR must ensure all projects are well executed, i.e. delivered with high quality, within the estimated cost and ahead or as per scheduled.

- It is then imperative for JKR to increase the PM Maturity Level in order to make project success more predictable.

- Enhancement in PM environments is paramount to increase PM maturity level. JKR must ensure PM Best Practices are instilled in all projects.

2.5 Jabatan Kerja Raya Project Management Maturity Model

The Project Management Maturity Model consists of five levels namely and the brief descriptions of the project management maturity levels are as follows:

Level 1 - Personalised

The project management practices, processes and procedures is based on heroic traits of the project manager and in ad-hoc state where no established practices and standards

Level 2 - Widespread

There is a basic project management standard, practices and procedures, which are widely used but is not standard on all projects i.e. not up to organisational standards

Level 3 - Disciplined

The project management practices are executed based on organizational Project Management standard practices, processes and procedures. All projects abide by the project management standards practices, processes and procedures.

Level 4 - Managed

Project management standard, practices, procedures are integrated with program/portfolio management and other corporate system such as strategic planning, risk management and project office. Efficiency and effectiveness metrics utilisation in decision-making

Level 5 - Diligence

Project Management practices promote and focus on continual improvement, sustainability and innovation.

Figure 2.1 shows the current Project Management Maturity Model in JKR

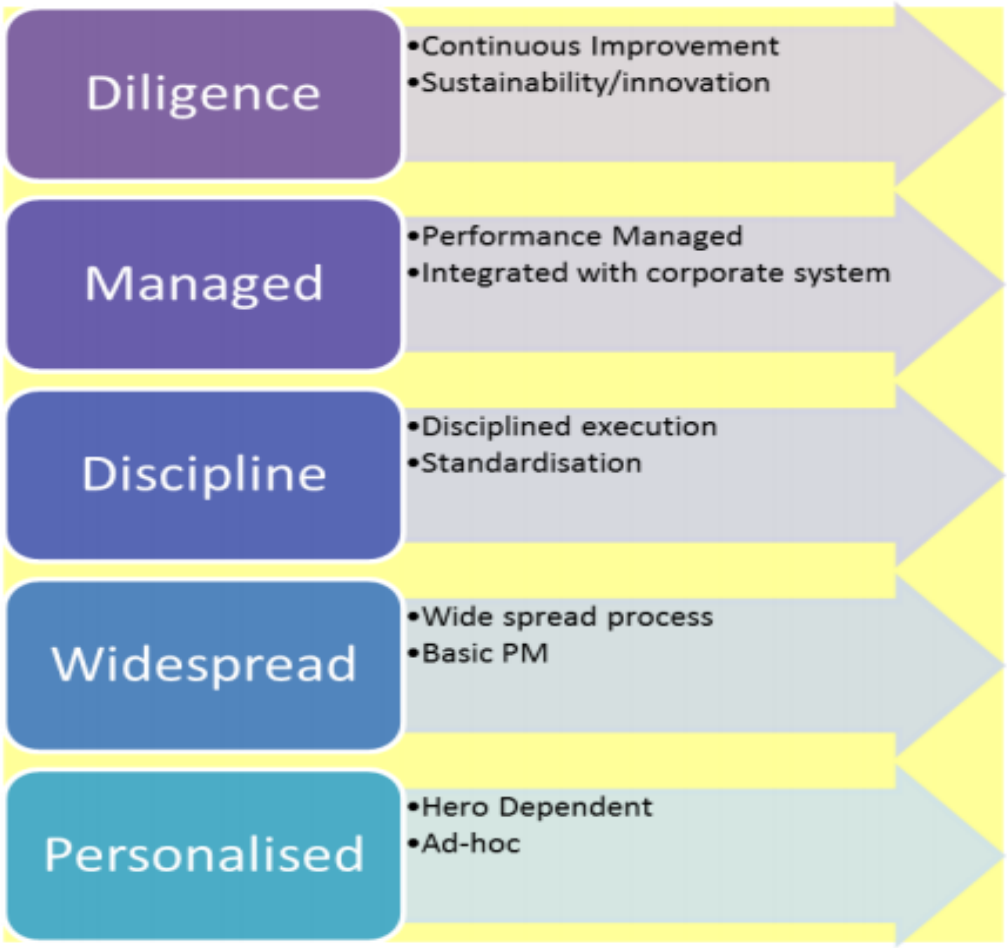

Figure 2.1: Generic characteristic of the level of Project Management Maturity JKR (Source: Strategic Framework JKR 2012-2015)

2.6 Attributes for Maturity Level

Attributes are embedded within the particular process in the maturity level. According to Graham William (2009), specific attributes relate only to a particular process at a given maturity level, and include planning, information, management, and training and development. The PRINCE2 Maturity Model uses the same structure as the P3M3 from which it is derived, using a five-level maturity framework to characterise the levels of organisational maturity (Graham William, 2009).

2.7 Project Time Management

According to PMBOK *Guide* (2013), project time management includes the processes required to manage completion of the project timely. Time Management is the process required to ensure timely completion of the project, Harold Kerzner (2006). The overview function of project time management is divided into seven (7) activities. The knowledge area has a number of component processes including plan schedule management, activity definition, sequencing, resource estimating, duration estimating, schedule development, and schedule control. Definition and sequencing include describe what is intended to be done and in what order or sequence. Estimating is the determination of the duration required to perform each activity of the resources constraints. The final deliverable from the scheduling process is the estimated time target to complete the whole project on time and within budget. Figure 2.2 shows the Project Time Management Activity in the Project Management process.

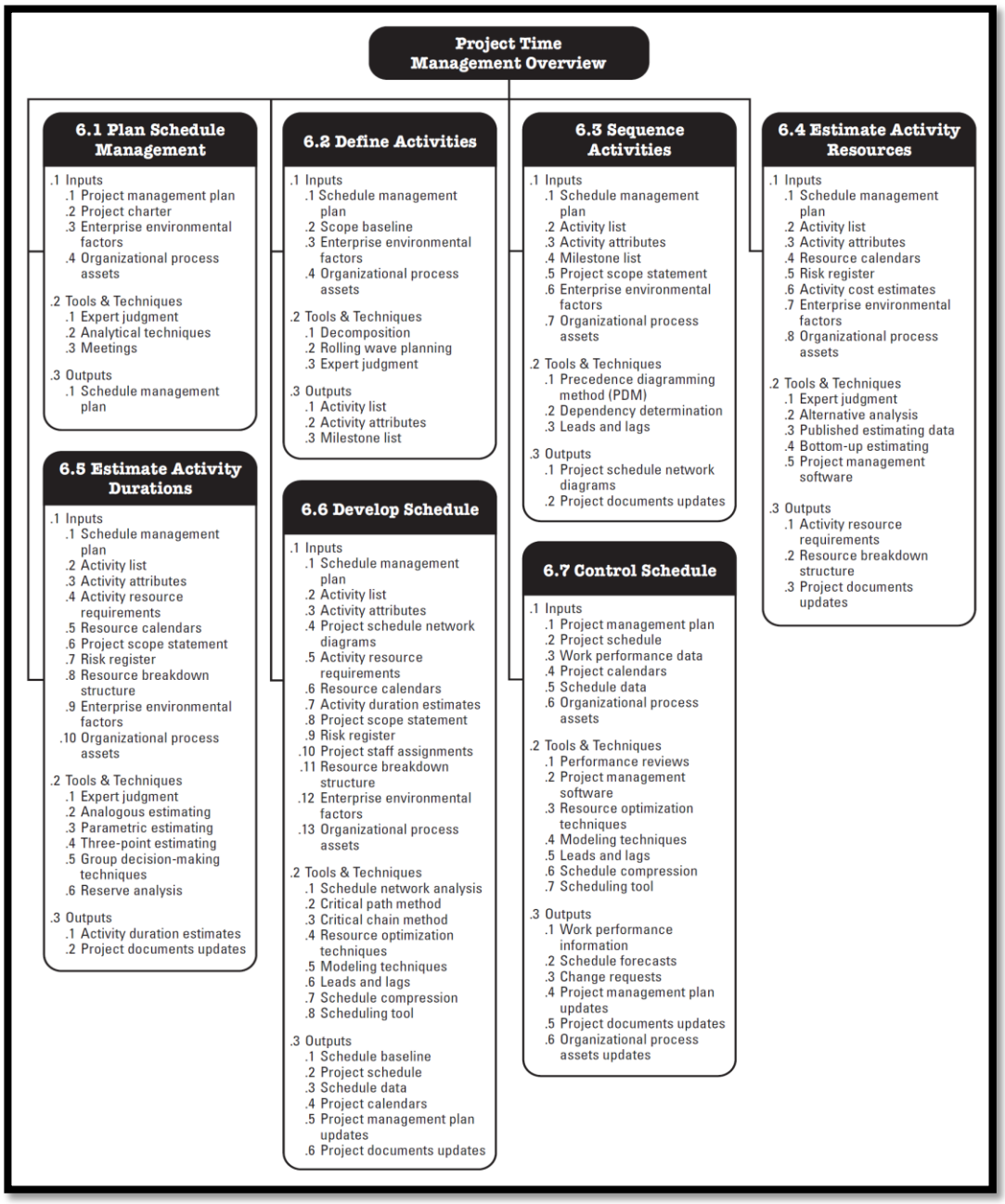

Figure 2.2: Time Management Activity (Source: PMBOK *Guide*, 2013)

2.7.1 Plan Schedule Management

Plan Schedule Management is defined as the process of setting up policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule. The process provides ways on how the project schedule will be managed throughout the project.

2.7.2 Activity Definition

According Crawford (2007), activities definition involves identifying and documenting project activities that must be accomplished to produce work task identified in the work breakdown structures (WBS). The kinds of activities are outlined in the WBS. Simultaneously to understand and relate the inter-dependencies among its activities, and type of resources that should be assigned to activities. Any such activity definition can be done relatively in a project-scheduling tool such as using MS Project that will help to support the remaining task of time management. Not necessary at this stage to have the full members to be present.

2.7.3 Sequence Activities

Sequence activities are the process of recognizing and identifying relationships among the project activities. The benefit of this process is that it helps to find the path logical sequence of work to obtain the greatest efficiency given all project constraints.

2.7.4 Activities Resource Estimating

Estimating schedule activity resources involves determining the kind of resources (material, equipment or persons) and the numbers of quantities to be used, and when each resource will be available to perform project activities.

2.7.5 Activities Duration Estimating

Estimating activity durations is the process of estimating the number of work periods needed to complete each activity with estimated resources. It helps to identify when each resource will be available to perform project activities. The benefit of this process is to ensure the amount of time for activity to be completed. The process will be the main input into the Develop Schedule process estimating its duration will require resource types, information on activity scope of work, estimated resource quantities, and resource calendars.

In order to complete the activity, the process requires that the amount of work effort required to complete the activity is estimated and to consider the amount of resources to complete the activity. Project management software for scheduling can be generated using a project calendar system usually identified by the resources that require specific work periods. In addition to monitoring sequencing logic, the activities will be performed according to the project calendar and the appropriate resource calendars.

2.7.6 Schedule Development

Schedule development is the process of analysing activity sequences, resource requirements, durations, and schedule constraints to create the project schedule. By entering the activities, durations, and resources into the system, the system will generate a schedule with planned dates for completing project activities. Developing a satisfactory project schedule is often a tedious process. It requires the planned start and finishes dates for project activities and milestones. Schedule development may require the review and revision of duration estimates and resource estimates to create an ideal project schedule that can serve as a baseline to track progress. A realistic schedule should always have continuous revising work progress. If the project management plans change, the nature of risk events also gradually changes.

2.7.7 Schedule Control

Schedule control involved managing the schedule baseline to ensure the project completes within the approved time frame. Managing the schedule baseline involves implementing a schedule control system, publishing schedule status reports, analysing schedule performance metrics, determining changes to the schedule baseline, managing the authorized changes, informing stakeholders and taking corrective action. The main product from this component includes schedule reports, schedule performance analysis and revised schedule baseline.

According PMBOK *Guide* (2013), the role of the knowledge area represents a complete set of concepts, term and activities that make up a professional field, project management field or area of specialization. These nine knowledge areas are used commonly on most projects by JKR. For this study, one of the knowledge area, which is Project Time Management will be the main focused criteria towards the establishment of project maturity level for JKR. Referring to Table 2.3, in the knowledge area of Project Management emphasizing on Project Time Management, there are two Project Management Process Group involved. The two groups involved are the planning process and secondly monitoring and controlling group.

Table 2.3: Project Management Process Group and Knowledge Area Mapping (Source: PMBOK *Guide*, 2013)

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes and outlines the methodology used in this study. It also explains how the procedures and the combined method analysis are utilized for analysing the collected data. The data was collected from the interview and distribution of questionnaires to the respondents.

3.2 Interview

An interview is a verbal conversation between two or more people in which facts or statements are elicited from the interviewee. Interviews will help to generate insights and concepts and expand further understanding of the research. An interview also helps to find clues to search for exceptions.

According to Fontana and Frey (1994), interviews can be divided into two types, namely:

i) Structured interview

The interviewer will have a rigorous set of questions, which does not allow one to divert. The interviewer is responsible to control of the subject matter when interviews are conducted.

ii) Semi structured interview

It is an open interview, allowing new ideas to be brought up during the interview as a result of what the interviewee says. The interviewer in a semi-structured interview generally has an open questions and the order is varies to be explored. A particular response may lead ones to another question.

3.3 Exploratory Interviews

As for this study, the type of interview used was the semi-structured interview. The questions asked were based on the current process of JKR project management and information gathered from the literature review. These interviews, considered as explanatory interviews were done in order to get opinions on what are the critical elements that might affect the project maturity time level for time management in JKR. The abstract of the interview questions and discussion of the results is in Chapter 4. The sample Semi-Structured Interview Questions is as Appendix A-1.

3.4 Respondents for Semi-Structured Interview

The interview was conducted by interviewing project management experts. They are senior director and director of development division of Cawangan Pengurusan Projek Kompleks, known as PROKOM and Senior Principal Assistant Director at Cawangan Pangkalan Udara dan Maritim (CPUM). Each selected professional expert has at least 20 years of working experience in the related field.

3.5 Questionnaire Survey

The questionnaire was developed and divided into four sections with the following objectives:

Section A was designed to collect demographic data of the respondents such as current position, working place, year of experience and some questions related to project delay.

Section B was designed to determine in which phase of the project life cycle that contributes most toward project delay.

Meanwhile, Section C determines the maturity level of a characteristic. The questions were designed for respondents to rank the level of the indicated character of maturity level based on the preliminary investigation. The maturity level is ranked from 1 to 5.

Finally the Section D was designed to identify the project time management process and attributes based on the level of maturity stated. The question comprises of five levels of agreement based on the likert scale from least agree to strongly agree.

According to Ticehurst (2000), one of the techniques in measuring attitude and opinion that usually applied in research is using a Likert Scale. Thus, scores (Likert scale) enable the strength of agreement with different statement as well as allowing comparison of opinions from different groups of people.

3.6 Brief of Methodology Process

This study uses both methods of data collection to obtain data. Primary data was collected from the respondents through the use of questionnaire and secondary data was obtained from JKR documents such as JKR Strategic Framework and JKR annual report. The methodology process to obtain primary and secondary data is shown in Table 3.1.

Table 3.1: Methodology Process

No	Objective	Task	Methodology
1	To identify basic critical elements toward establishment of project maturity levels for time management in JKR.	Establishing current problem with JKR Time Management	• Document search • Interview with JKR panels
2	To identify basic critical elements toward establishment of project maturity level for time management in JKR.	Why need to improve?	• Interview • JKR panels • Questionnaire survey
3	To establish maturity level characteristic PTMML for JKR.	Establishing maturity level/step (5 steps).	• Interview • Questionnaire survey
4	To developing appropriate strategies to improve time management process in JKR.	Description of each level/step.	• Interview. • Questionnaire survey

3.7 Contact Methods

According to Sekaran (2003), there are several data collection methods in social science research such as interviews, telephone interviews, questionnaires and observation each of these methods have its own advantages and disadvantages.

Table 3.2 shows the advantage and disadvantage of multi-methods of data collection.

Table 3.2: Advantage and Disadvantage of Multi-methods of Data Collection

Mode of data collection	Advantages	Disadvantages
Personal/Face-to-face interview	Can clarify the questions, clear doubts and add new questions. Can read nonverbal cues. Can use visual aids to clarify points.	Takes personal time Can introduce interviewer biases. Respondents may be concerned about the confidentiality of information given. Costly when a wide geographic region is covered.
Telephone interview	Is less costly and speedier than personal interviews. Greater anonymity than personal interviews. Can reach a wide geographic area.	Nonverbal cues cannot be read. Interview has to keep short. Respondents can terminate the interview anytime.
Personally administered questionnaires	Can establish a relationship and motivate respondent. Doubts can be clarified. Less expensive. Anonymity of respondent is high. Almost 100% response rate ensured.	Organisation may be reluctant to give time for the survey with a group of employees assembled for the purpose.

Table 3.2: Advantage and Disadvantage of Multi-methods of Data Collection (Cont.)

Mode of data collection	Advantages	Disadvantages
Mail questionnaire	Wide geographic regions can be reached. Respondent can take longer to respond at convenience. Anonymity is high.	Low response rate. A 30% rate is quite acceptable. Can't clarify questions. Follow-up procedures for nonresponses are necessary.
Electronic questionnaire	Easy to administer. Can reach globally. Very inexpensive. Respondents can answer at their convenient time.	Computer literacy is a must Respondents must be willing to complete the survey. Respondent must have access to the facility.

This study used survey questionnaires to gather data to determine the maturity level characteristic and to identify the descriptions or attribute for each levels. Some of the questionnaires were administered personally to the respondents at their office and mostly the questionnaires were sent by email/electronic questionnaire. After one week, all questionnaires were collected and follow up was done to the respondents who did not complete the questionnaires. Only 112 respondents completed the questionnaire for this survey.

3.8 Analysis of Questionnaire Data

The data collected from the respondents were analysed using Statistics Package for Social Science (SPSS) software version 20. Several analyses were done on the collected data.

3.8.1 Descriptive Statistic Analysis

Descriptive statistical analysis was applied to describe the variables involved in the study. Therefore, descriptive statistical analysis such as mean, frequency distribution, standard deviation and variation was gathered in order to answer and meet the objectives of the study.

3.8.2 Reliability Analysis: Cronbach's Alpha

Once the data were collected, the test of reliability to be conducted. Reliability coefficient, which is the Cronbach's Alpha, indicates that the internal consistency reliability is applicable to this study. According to Sekaran (2003), Cronbach's Alpha coefficient with less than 0.60 was considered to be poor, 0.60 to 0.70 was acceptable and over 0.80 was considered good.

3.8.3 Mean Average Index

According to Harold. R (2004), in mathematics and statistics the arithmetic mean or simply the mean or average when the context is clear, is the sum of a collection of numbers divided by the number of numbers in the collection. The weightage is based on the responses of questionnaire survey. It is governed by the formula:

The weighted average mean formula is $$M_w = \frac{\sum(M \times n)}{\sum n}$$

where:

M = the mean for each group

n = the sample size per group

The weighted mean is the combination of mean of two or more groups of scores, where the number of scores in each group is disproportionate or unequal. The same or higher values of this weighted are important for the attributes listed. Attribute value below the weightage will be removed. These values were calculated using the Excel Spreadsheets software and are presented in Chapter 5.

3.8.4 Relative Importance Index (RII)

Relative Important Index is the evaluation of the ranking of the questions related to other questions in the survey. The weightage is based on the responses of questionnaire surveys. It's governed by the formula:

$$RII = \frac{\sum [(n_1 \times 1) + (n_2 \times 2) + (n_3 \times 3) + (n_4 \times 4) + (n_5 \times 5)]}{\sum n_i \times 5}$$

where:

RII	= Relative Important Index
n_i	= frequency of occurrence for Likert value i
1, 2, 3, 4, 5	= the Likert Scale chosen

The index value is not more than 1. The higher value of RII and the nearest to one is the highest ranking to be chosen.

CHAPTER 4

DATA COLLECTIONS AND ANALYSIS

4.1 Introduction

This chapter presents the data that has been collected and the detailing of the analysis is carried out on those data. The presentation of the analysis is made based on different methodology used.

4.2 Content Analysis of the Interview with the Expert Panel

For this study, four expert panels representing experience JKR personnel have voluntarily made their contributions of ideas and opinions in discussing the issue related to the JKR project time management aspect. They are senior director, Director of Development Division of Cawangan Pengurusan Projek Kompleks, known as PROKOM and Senior Principal Assistant Director at Cawangan Pangkalan Udara dan Maritim (CPUM). Each selected professional experts have at least 20 years of working experience in the related field.

4.3 Data Analysis for Interview

The initial data for this study have been obtained from exploratory interviews with four JKR professionals. They are the project management experts with vast experiences in managing numerous projects for more than 20 years. The information gathered from the interview has been tabulated in the content analysis shown in Table 4.1. Then the observation has been made to observe the common theme of the responses. The sample of the questions asked during the semi-structured interview is presented in Appendix A-3. The finding from the interview has been utilized to guide the researcher in designing the questionnaire survey form.

Table 4.1: Content Analysis of The Interviews

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
1(a)	Do you agree, in JKR project management there is no standard format or procedures to manage the project schedule with respect to: (Y/N, please specify why?) (a) Preparing and submission of project schedule	Yes agree. But we are planning to have.	Yes agree. The contractor can submit in any format since no procedures on how submission should be.	Disagree. We have own format.	Disagree. We have own format.
1(b)	(b) Reviewing project schedule for acceptance	Yes agree. But planning to have.	Yes agree. Totally under the jurisdiction of PD/SO.	Disagree. We have own format.	Disagree. We have own format set by PROKOM.
1(c)	(c) Standard procedure in monitoring/ updating/ tracking project schedule	Yes agree. Build together with the module	Yes agree. Monitoring/tracking/updating is up to PD/SO. Depending on his/her understanding about scheduling.	Disagree. We have own format.	Disagree. We provide training.
1(d)	(d) Procedures in decision making based on agreed project schedule	Yes agree.	Yes agree. There is no procedure. It all depends on how PS/SO want it done.	Disagree. We have own format.	Yes agree. We cannot have own format because it is already stated in the contract that contractor responsibility to come out with their own project schedule.
2	What method of monitoring is being carried out to ensure the completion of the project is as planned?	Schedule is monitored by Contractor's planning. Usually using SKALA	By conducting site meetings regularly. On top of that technical meetings are also conducted to tackle technical issues.	By using SKALA and conducting project meeting. For 'sick project' if cannot be solved within state, the highest-level	Using SKALA. Certain milestone to be inserted. Certain level people can monitor DASHBOARD.

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
				committee called Project Solving Committee (PSC) will be called for problem solutions. Agreed solutions will be tracked. The contractor will be terminated if the problem still occurs.	
3(a)	Is that true that JKR handle a project based on individual project manager/in charge person personal experiences? (a) If yes, please give the reason.	Yes. Base own experience because no guideline or standard practice.	Yes. How the process is conducted depends on the individual PM	Yes, agree. We have recently to develop JKR Competency Standard.	Yes. But not totally agree. Not for the time being. But JKR certification is an approach to a competent personal. It categorized the competency of personal to the category of project. But JKR has limitations.
3(b)	(b) If not, please give the reason.	-	-	-	-
4	What is the current "state of the art" for Project Time Management in JKR?	Not for JKR. But more to the individual using Microsoft Office as tools. Must make a mandatory as part of the requirement.	JKR has emphasized on CPM quite some time ago.	PROKOM, JKR has initiated teaching in Schedule in Time Management and SKALA. The standard practice is	JKR is leading in many guidelines. E.g.: specifications, WBS. But project delay factor has many variables.

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
				very high.	(stakeholders, consultants, cost, etc.)
5(a)	Are the project schedules being developed based on individual ability and perception to manage the project? (a) If yes, please give the reason	Yes. Still base on individual ability	Yes, when it is at planning stage. Once it is on the construction stage the schedule is being developed by the contractor but checked and approved by JKR.	We have standards for building and road. We have identified 3-4 staffs that have competency as scheduler. They become reference for others especially for the critical projects.	-
5(b)	(b) If not, please give the reason.	-	-	-	Disagree. The project schedule is being developed based on project needs.
6(a)	Does JKR provide method statement on-site guidance to contractors to meet the time frame? (a) If yes, what type of the documents provided to contractor	-	-	Yes. We have scheduling guidelines. Work Program Guideline Book just recently approved. The contractor has to adhere to the guidelines.	-
6(b)	(b) If not, what is the suitable method to be implemented	No, because work program belongs to Contractor.	No, The CPM needs to be realistic and achievable. The Contractor must comply strictly to the approved CPM. But	-	No because work program belongs to Contractor as per contract.

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
			before CPM being approved, a few discussions have to be done so to get a realistic schedule acceptable to all stakeholders.		
7(a)	Does a common process in JKR being standardized and is used by all JKR in Malaysia? (a) If yes, what is the current method being utilised? It is sufficient?	-	Yes. Most of the common process are being standardized and being used by all JKR. e.g.; the process of procurement, evaluation and payment of interim payment, how to handle 'sick project' how to terminate non-performance contractor, etc.	We have guidelines, policy and standards. We have instructed the staffs to practice these standard guidelines. We have yet to monitor the outcomes.	Yes. Like the SPK.
7(b)	(b) If not, any idea to improve the weaknesses? Do you have a model for example to refer?	No.	-	-	-
8(a)	Is there any Standard of Procedure (SOP) issued by JKR for the installation work on the construction site? (a) If yes, when is it forwarded to contractor?	-	-	Yes. JKR come out with specifications and drawings. The contractor will justify the method statement.	Yes. We have standards (e.g. doors, ceiling etc.).

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
8(b)	(b) If not, please indicate why?	Not comprehensive yet.	No. The contractor has to install as per specification and the contractor has to submit a method statement on how to install the work.	-	-
9	When should the action of termination of contractor take place if progress delays? If happens, what is the standard regulation and when the action of termination will be taken?	No standard guide to terminate.	There is no exact time when the contract should be terminated, but it is done when the project becomes 'sick'. Termination will be done once the delay is more than 20% or delay of 60 days, the standard process.	The higher committee will decide for the termination and there is a SOP.	Termination of contractor occurs if the contractor fails to perform the project regularly and diligently. Delay project only cannot be accounted to terminate the contractor. The higher committee will decide for the termination and there is a SOP. If notice has been given, contractor should comply with the instructions/notice
10(a)	Is it necessary to have a standard Work Breakdown Structure (WBS) for implementing projects in JKR? (a) If yes, please give the reason.	Yes. To guide the Contactor	-	Yes or else things will go hair wire.	Yes. PROKOM has developed for road and building standards last year.
10(b)	(b) If not, please give the reason.	-	No. If implemented it makes the contractor schedule inflexible.	-	-

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
11	Is the Project Management Office (PMO) involved in monitoring the project or just giving the advice to the project team member?	Yes. But mostly in monitoring only. No intervention is due to lack of power.	Yes. As it is now, PMO only involve in reporting and present the status of the project.	Yes. PMO does monitoring only. Ideally not just monitoring but on strategies for implementation, initiate ideas and project procurement by partnering with the contractor, which is new to JKR.	At level PO office, PROKOM does the presentations at JPP. (e.g. numbers of project delay, project VO and etc.). More on monitoring only. Due to new setup, PO office has not yet gone into the details of each project analysis and intervention. But that is the hope for the future.
12(a)	Is delayed or late project is used as a reference for the following project? (b) If yes, how to address in the faultiest of the delayed project in JKR?	-	-	Yes. Information lesson learnt are collected for reference under the responsibility of ECKM. Still at an early stage. Projects are monitored by PROKOM at a higher level. PMO is responsible at the state level.	Yes. We try to find ways and have initiatives in Project management Plan, developed schedule plan, scheduling standards, award certified PM. Those are the precautions to avoid delays.
12(b)	(b) If not, please indicate what precautions should be taken to avoid delays.	No. Just from own experience.	No. The CPM should be closely tracked. Any deviation should be addressed	-	-

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
			immediately and effectively.		
13(a)	Are works on site being documented for reference and guide for future projects? (a) If yes, please give examples.	-	Yes. It was documented whichever documents that was prepared for SPK. No, if it was for the use of future projects.	Yes. Documents are documented in booklets by ECKM.	Yes. But documented in the site diary. But difficult to use as a medium for lesson learnt. By right, we have a project closure report. But we don't do that at the moment.
13(b)	(b) If not, please give the reason.	That is our weakness. The nearest documentation is the coffee table publication.	-	-	-
14	What are the most successful projects had been implemented in JKR? Are these projects become the benchmark and references for future projects in JKR?	Pusat Kanser Negara.	Projects in JKR are not documented as far as lesson learnt is concerned.	Pusat Kanser Negara after KLIA project.	KLIA. From 20 billion projects to 11 billion. We took over for the foreigner consultants and we manage to complete on time. Others, Pusat Kanser Negara, Masjid Negara, North South Highway and many more. Difficult for those old days to become the benchmark because of the out dated method

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
					constructions and the standards.
15	Any lessons learned in previous project captured for future project? Please specify the approach for improvements	Lesson learned captured on an individual basis only.	Yes. Only is the same person handles the same type of projects. Any problems faced by the projects should be documented and make known so that it won't be repeated for future projects.	Yes, through J-Pedia WIKI.	Now JKR is developing a body called Enterprise Content Knowledge Management (ECKM). The objective is to share knowledge. Another is WIKI.
16(a)	If there is a successful project, does the project manager in charge to become a role model for others? (a) If yes, what type of output (example: workshops/writings/courses)	-	Yes and should impart his experience to others through e.g.: lecture, workshop or write up.	Yes. Pusat Kanser Negara becomes the role model by applying all the 9 PMBOK area.	-
16(b)	(b) If no, what do you suggest?	No structured role model. To gather the best role model and formed team to solve issues by project	-	-	-
17(a)	Do you agree with the implementation of Project Portfolio Management in JKR? (a) If yes, any idea to improve in managing time for JKR?	Portfolio Management should focus on the overall trend.	Should monitor and advise the project team with regards to not only time but quality and cost as well. Also	Of course. PROKOM is the portfolio.	Yes. The latest is Pusat Kanser Negara worth RM 600K. We want to promote by having a forum for any

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
			responsible to track the CPM diligently, and intervene immediately if it deviates from the schedule.		successful project.
17(b)	If not, any suggestion method needed?	-	-	-	-
18(a)	Does the high rank and top management monitors the entire projects in JKR? (a) If yes, please give examples. Is the current practice sufficient enough or needed further improvement?	Analysis needs to be improved. We are working on problem solving governance with other agencies. Others, to improve the dashboard reporting.	Yes. Monitor only as reported by PMO. Any action taken by the respective SO/PD.	Yes. It is monitored. All can be assessed from PROKOM. Projects also can be monitored in the war room.	Yes, agree. PROKOM provide direction/strategies to top management. Get review approach is practiced to identify if the project is viable or not.
18(b)	(b) If not, what do you suggest?	-	-	-	-
19(a)	In your opinion does JKR have enough experienced personal to professionally manage the project? (a) If yes, are we comfortable with the current project management style or would want to further improve to such big companies like PETRONAS or KLIA project management style?	Yes, we have enough personal. It's just that we don't make ourselves stand out.	Yes, We have enough experienced professionals to manage project. Problem is how to carry out the process and the other problem is some are more competent than others.	Yes. We have enough experience.	Yes. We have a lot of experience. But we have to change towards betterment and also to manage our people.
19(b)	9(b) If not please suggests how to improve the personal to manage projects successfully.	-	-	-	-

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
20	If we want to improve in time management for JKR, what should we do in stages?	First step to develop guidelines with checklist. Next to train people. Later to prosecute (doing the thing).	To inculcate the habit of every stakeholder have to adhere to the schedule that was agreed beforehand.	We must understand, know when and how to use tools such as WBS.	-
21	What is the most delay factor occurs mostly in JKR project? If any, please suggest solutions for improvement.	At the planning stage, there is no tracking. Next during the construction stage there is no guideline to monitor project because not using the tools to monitor scheduling stage. The other factor is neglecting to consider the risk.	During construction. Normally whatever contractor being recommended is not chosen because of outside interference.	Decision delay.	-
22	If the current project time management process is inadequate, what should we do to improve?	To produce more scheduler. Come out with guidelines, put in tools in place include in planning.	The process is adequate, but should improve the competency to whoever to carry out the process.	Must have experienced people to do scheduling.	-
23	What is the vision of JKR to achieve the level of maturity level in time management?	Everybody involves in PM, must have the competency. Time management is important in project.	Vision is already spelt out in the JKR Strategic Framework 2012-2015 where JKR is to become world-	Must train people in PM.	-

Table 4.1: Content Analysis of The Interviews (Cont.)

No	Questions	Respondent #1	Respondent #2	Respondent #3	Respondent #4
			class service provider in PM. This includes time management as well as with acceptable quality and within cost.		
24	What is the main problem faced by JKR in time management for a project?	Contractor is incompetent to competency scheduling skill.	The schedule that is not realistic and not achievable.	On decision-making.	-
25	How to improve time management in a project for JKR? Please specify several options for guidance.	Must have a road map and to monitor staff who have attended courses. Get expert scheduler to train the trainer.	Realistic and achievable schedule Constant monitoring Constant tracking of schedule Improve competency in project scheduling	Learn how to plan, how to schedule, how to do work in 9-knowledge area. Because those will affect the time	-
26	Currently, what is lacking in project time management for JKR? Please specify what are the major causes for the occurred problems.	Staff incompetent in time management. Staff must practice to improve.	Lack of competency in understanding of project scheduling, no tracking done, submission of CPM by contractor is just to satisfy the contract requirement. It is not used as a tool for time management.	-	-

4.4 Distribution of Questionnaire Survey Form

The questionnaire forms have been distributed from 1st December 2013 to 7th December 2013. There were 203 sets of questionnaires distributed to respondents in JKR involved in Project Management. The respondents were the personnel from J41/J44, J48/52, J54 and JUSA grade. Only 112 out of 203 questionnaires returned with feedback. The rate of responds for the questionnaire survey form is approximately 55%. Table 4.2 shows the proportion of the distribution of questionnaire forms among the respondents.

Table 4.2: Distribution of Questionnaire Survey Form

	Jusa	54	52	48	44	41	Total
Business Sector	8	10	12	7	19	18	74
Expert Sector	7	9	8	11	15	16	66
Management Sector	8	8	13	9	11	14	63
Total	**23**	**27**	**33**	**27**	**45**	**48**	**203**

4.5 Demographic Analysis

In Section A of the questionnaires the respondents were asked to answer the questions on the current position, work place and their working experience. Analysis on respondent's background is tabulated in Table 4.3 as follows:

Table 4.3: Frequency of Respondents Current Work Place

Department	Frequency	Percentage
Project Management Office (PMO)	10	8.9
Cawangan Kerja Bangunan Am (CKBA)	13	11.6
Cawangan Pendidikan dan Pengajian Tinggi (CPPT)	4	3.6
Cawangan Kerja Kesihatan (CKK)	10	8.9
Cawangan Kerja Keselamatan (CKS)	3	2.7

Department	Frequency	Percentage
Cawangan Pangkalan Udara dan Maritim (CPUM)	8	7.1
Cawangan Arkitek (CA)	4	3.6
Cawangan Kontrak dan Ukur Bahan	6	5.4
Cawangan Kejuruteraan Mekanikal (CKM)	5	4.5
Cawangan Kejuruteraan Awam, Struktur dan Jambatan (CKASJ)	9	8.0
Cawangan Kejuruteraan Elektrik (CKE)	4	3.6
Others	36	32.1
Total	112	100.0

Table 4.4 and Figure 4.1 show that 49.1% of the respondents were from the J41/44 grade. Meanwhile 39.3% of them were from grade of J48/52 and remaining 11.6% of respondents were from top management J54 grade.

Table 4.4: Breakdown of Respondents and Percentages

Grade	Frequency	Percentage (%)
J41/J44	55	49.1
J48/J52	44	39.3
J54 and above	13	11.6
Total	112	100.0

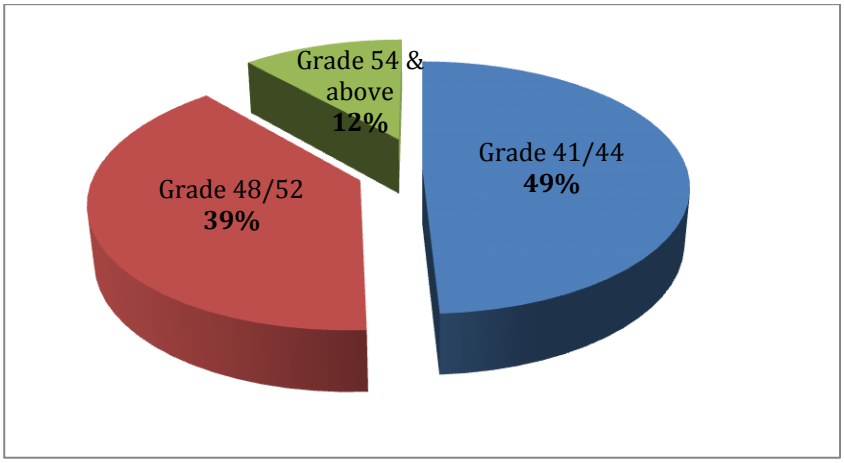

Figure 4.1: Breakdown of Respondents and Percentages in Pie Chart

From Table 4.5 it clearly shows that most of the respondents have 6 to 10 years working experience with the value of 32.14%. In general, it can be concluded that majority of the respondents (73.21%) had been working for more than 6 years.

Table 4.5: Respondents by Years of Experience in Service

Years in Service	Frequency	Percentage (%)
< 5 years	30	26.79
6 - 10 years	36	32.14
11 – 15 years	12	10.71
16 - 20 years	6	5.36
> 21 years	28	25.00

Table 4.6 shows that 54.46% of the respondents have experience of more than 6 years in Project Management. Since majority of the respondents had the Project Management experience of more than 6 years, their responses can be considered as reliable.

Table 4.6: Respondents by Years of Experience in Project Management

Years in Project Management	Frequency	Percentage (%)
< 5 years	51	45.54
6 - 10 years	36	32.14
11 – 15 years	8	7.14
16 - 20 years	6	5.36
> 21 years	11	9.82

Figure 4.2 shows the common delayed projects. From the table, the hospital development projects found to be the most delayed project followed by public facilities and schools.

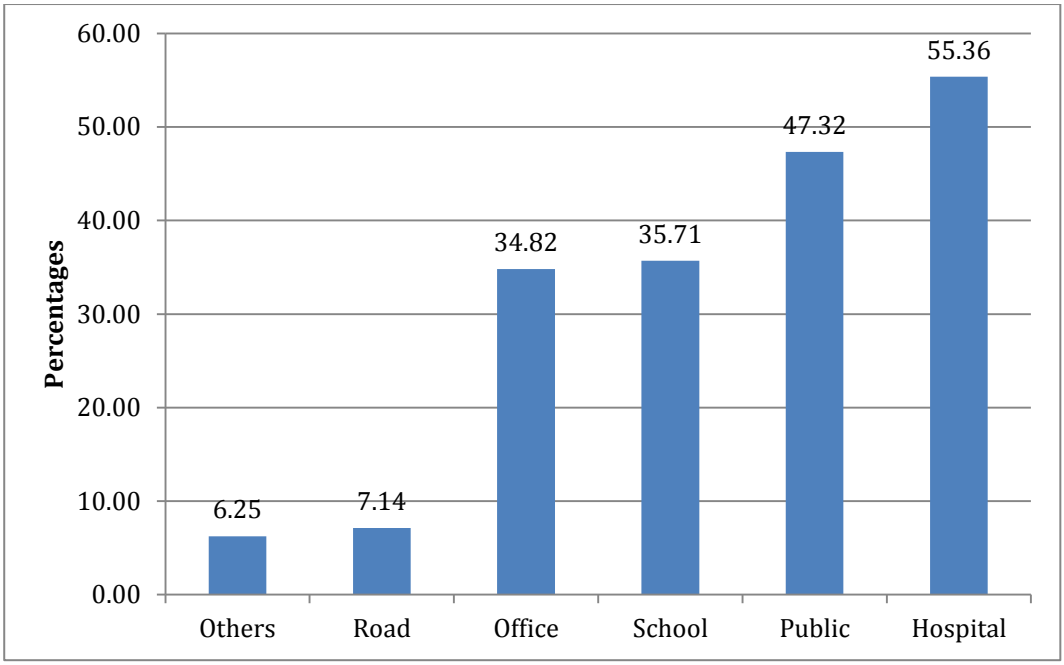

Figure 4.2: Statistics of Delayed Projects

Figure 4.3 shows that 70.54% of the respondents agreed that the project delay has become a common norm (culture) in JKR and it caused most of the projects in JKR cannot be completed in time. Most of the respondents have 3 delayed projects at one time while they were handling project at JKR shows in Figure 4.4.

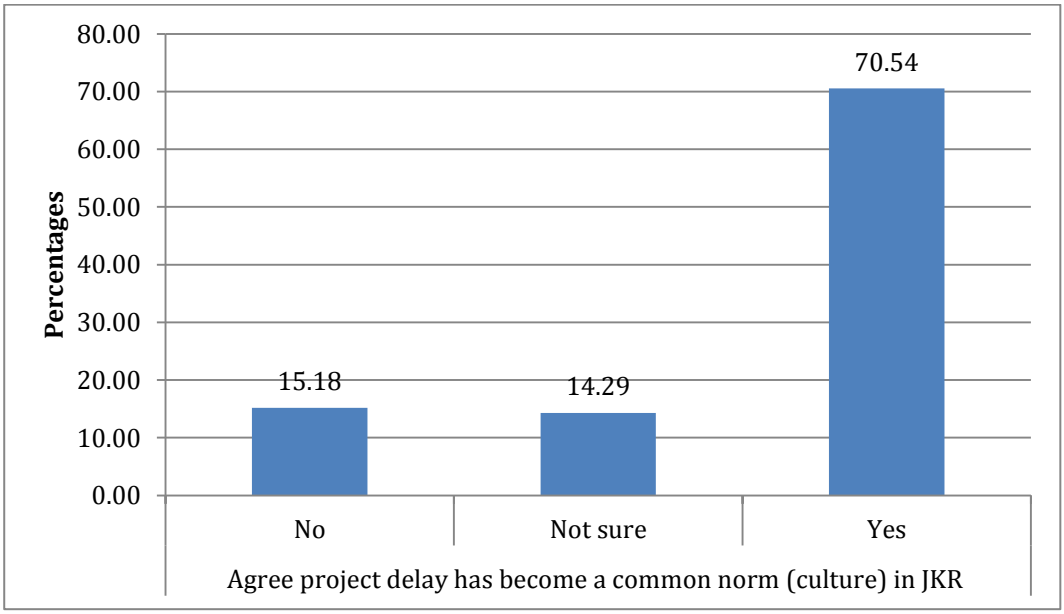

Figure 4.3: Project Delay Perception of JKR

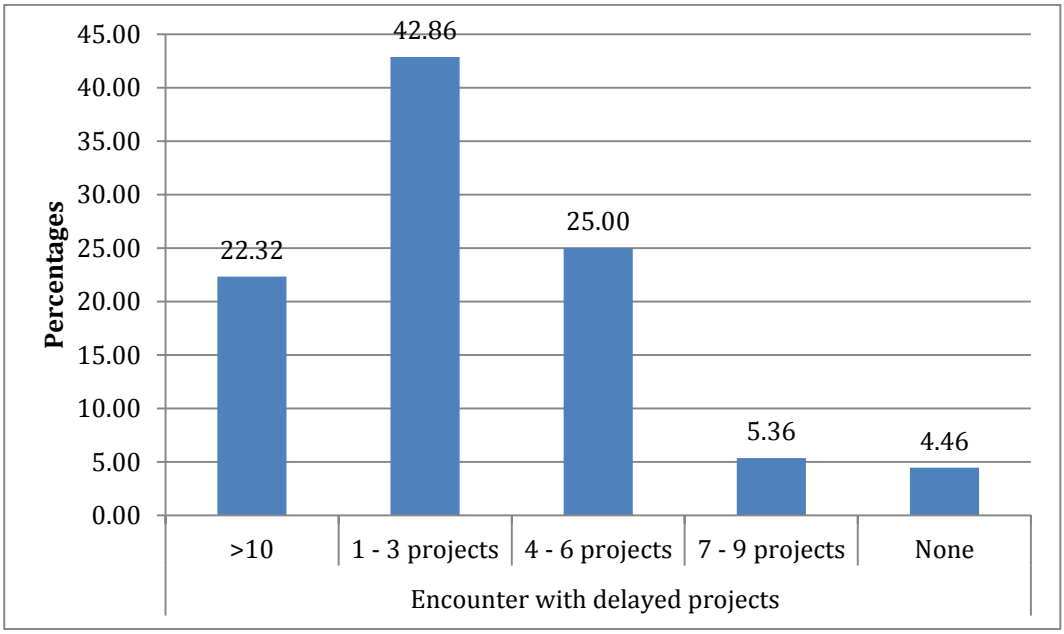

Figure 4.4: Project Delay Encounter

4.6 Project Management Process Group Contribute to Delay

From the Table 4.7 shows that the project management life cycle process group started with the initiation process, followed by planning, executing, monitoring and controlling and finally closing process. From the result shows, based on RII analysis, executing process was placed in the first rank, secondly the planning process and monitoring and controlling process. As a conclusion, it is found that the time management process contributes to delay. See Table 4.7.

Table 4.7: Project Management Process Group

Main Factor	Frequency					Total	Mean	RII
	1	2	3	4	5			
Initiate Process	14	23	28	35	12	112	3.07	0.61
Planning Process	4	11	26	42	29	112	3.72	0.74
Executing Process	1	9	28	47	27	112	3.80	0.76
Monitoring and Controlling Process	2	12	27	45	26	112	3.72	0.74
Closing Process	9	31	26	39	7	112	3.04	0.61

4.7 Main Factor Cause Delay in Time Management Analysis

The main factor in time management that causes delay in project handle by JKR was listed and given to the respondents to rank it. From the result shows, based on RII analysis, late of decision-making were placed at the first rank, secondly by scope changes and thirdly the schedule does not represent actual work program at the site. See table 4.8.

Table 4.8: Lists of the main factors that cause a delay in time management for projects in JKR ranked by position.

Main Factor	% for each scale					Total	Mean	RII
	1	2	3	4	5			
Late of decision making	1	6	22	37	46	112	4.08	0.82
Scope changes	0	6	19	52	35	112	4.04	0.81
Schedule does not represent actual work program at site	3	6	19	44	40	112	4.00	0.80
The schedule is not realistic, cannot be used to monitor and tracking project performance	3	8	20	47	34	112	3.90	0.78
Lack of project monitoring and controlling skill	8	11	25	43	25	112	3.87	0.77

4.8 Mean Index for Selected Attributes

The development of appropriate strategies to improve time management process in JKR was established from the final analysis. The analysis from the result will determine which attribute is suitable for each level of character in table 4.9 below shows the mean score and standard deviation from the questionnaire section D. The total mean values for each level were used to calculate the mean average index.

Table 4.9: Totals Mean Score for Each Maturity Level

Levels	Mean	Std. Deviation
Level 1	3.47	0.77
Level 2	3.48	0.54
Level 3	3.66	0.61
Level 4	3.43	0.70
Level 5	3.66	0.63

The selected attributes calculated from the average mean index were discussed in Chapter 5. As discussed previously in Chapter 3, the values of this weightage need to be recognised in order to identify the appropriate attributes. Lower of weighting value for the attributes list was to be removed. The result for the average mean index is 3.5. But in this study, the mean index discussed in Chapter 5 is greater than 3.0, considering that JKR is still at the initial stage in developing the 9 area knowledge in a project in time management.

4.9 Critical Elements Towards Establishment of Project Time Management Maturity Level for JKR

The first research objective was to identify basic critical elements toward establishment of project maturity level for time management in JKR. The lists of attributes were chosen from the raw basic critical element shown in Appendix A-3. Altogether, 50 numbers of attribute maturity levels were determined from literature review and exploratory interviews which relevant to the study. The attributes were selected to the suitable character based on a preliminary investigation. The attributes are presented in table 4.10 to 4.14 including mean for each attributes.

Table 4.10: Development of Attributes for Level 1

Attributes for Level 1	Mean	RII	Acceptance
No standard format or procedures to prepare a project schedule and are existed in JKR. Schedules are prepared based on individual experience.	3.29	0.66	Accepted

Table 4.10: Development of Attributes for Level 1 (Cont.)

Attributes for Level 1	Mean	RII	Acceptance
Schedules are prepared without specific objective.	3.05	0.61	Accepted
The implementation schedule of the project in the planning stage is developed based on the ability of individual perception.	3.58	0.72	Accepted
Schedule is not validated by an accredited professional.	3.57	0.71	Accepted
No standard Work Breakdown Structure (WBS) existed in guide schedule preparation.	3.16	0.63	Accepted
Schedule is prepared using standard planning software but not project monitoring and tracking process.	3.38	0.68	Accepted
Schedule prepared is time driven schedule	3.82	0.76	Accepted
Schedule serve as general guidelines only on project decision making.	3.54	0.71	Accepted
The task/activity value is not rationalized with contract BQ.	3.48	0.70	Accepted
There is no decision-making procedure on agreed project schedule. Final decision is entirely depends on PD/SO.	3.82	0.76	Accepted

Table 4.11: Development of Attributes for Level 2

Attributes for Level 2	Mean	RII	Acceptance
Contractor appointed by JKR has sufficient knowledge in preparing the project schedule.	2.76	0.55	Rejected
JKR staff competence (sincere, honest, trustworthy, fair and equitable) in evaluating schedule.	3.19	0.64	Accepted
JKR have a competent personal to evaluate and approved schedule submitted for the project.	3.30	0.66	Accepted
Preparation of project schedule includes the estimation of resources activity.	2.75	0.55	Rejected
Expert schedulers are deployed on critical projects.	3.15	0.63	Accepted
JKR to evaluate the contractor estimating activity duration based on certain guidelines not by personal experience.	3.19	0.64	Accepted
In the construction stage, the project schedule is prepared and developed by the contractor and verified by JKR.	4.04	0.81	Accepted
SO/PD is responsible to monitor, to track and updating project information.	4.00	0.80	Accepted
Sufficient certified scheduler in JKR is needed to handle projects.	4.08	0.82	Accepted
The contractor should provide very detail activity/task (class 4) in project planning schedule.	4.32	0.86	Accepted

Table 4.12: Development of Attributes for Level 3

Attributes for Level 3	Mean	RII	Acceptance
Standard procedure prepared by JKR for the installation of works at the construction site.	3.37	0.67	Accepted
PROKOM guide and prepare requirements for reviewing the project schedule for delayed projects.	3.26	0.65	Accepted
JKR provided the method statement on-site as guidance to the contractors to meet the time frame.	3.16	0.63	Accepted
Each stakeholder adheres or follows the schedule that has been agreed by JKR.	3.55	0.71	Accepted
The Project Management Office (PMO) is the centre of reference for documentation, advisor expertise and standardizing the practice of project management and execution.	3.50	0.70	Accepted
Contractors appointed by the JKR should consist of good tender price, good track record and vast experience.	4.23	0.85	Accepted
Appointed contractor of JKR is based on the highest mark in the evaluation of tenders.	3.61	0.72	Accepted
To use a standard process to terminate the contractor if they fail to show interest to meet the time frame datelines for project completion.	3.98	0.80	Accepted
In JKR practice, the Precedence Diagramming Method (PDM) is the highest-level technique used for managing time in project management or normally known as CPM by JKR.	3.83	0.77	Accepted
The most common method of monitoring project progress in JKR is by conducting site and technical meeting frequently.	4.10	0.82	Accepted

Table 4.13: Development of Attributes for Level 4

Attributes for Level 4	Mean	RII	Acceptance
Project team members are constantly engaged in monitoring project on site.	3.63	0.73	Accepted
Project team members are constant engaged in tracking of schedule.	3.43	0.69	Accepted
All information on the site work was regularly updated, recorded and documented as a guide for future projects.	3.33	0.67	Accepted
All information related to the previous delayed project will be recorded later as a guide for carrying out projects in the future	3.37	0.67	Accepted
Project schedule will have baseline as project time management benchmark.	3.83	0.77	Accepted

Table 4.13: Development of Attributes for Level 4 (Cont.)

Attributes for Level 4	Mean	RII	Acceptance
The Project Management Office (PMO) is involved in monitoring projects.	3.43	0.69	Accepted
The Project Management Office (PMO) is responsible to give advices to the project team member.	3.48	0.70	Accepted
Decisions related to the project are based on the project schedule.	3.54	0.71	Accepted
The WIKI or J-Pedia on JKR website becomes a source of reference to make a decision making for the project team to manage the project.	3.03	0.61	Accepted
ECKM (Enterprise Content and Knowledge Management) serves as an information resource management and organisational learning.	3.28	0.66	Accepted

Table 4.14: Development of Attributes for Level 5

Attributes for Level 5	Mean	RII	Acceptance
Any issues encountered during any project will be resolved partly as wholly guided by the project schedule.	3.37	0.67	Accepted
Lessons learned in previous projects served as a guide for future projects and continuous improvement.	3.71	0.74	Accepted
The most successful completed projects in JKR will become a portfolio, benchmark, inspiration and reference for future projects.	4.01	0.80	Accepted
All JKR in Malaysia used the Standard Work Procedures (SPK) for project reference.	4.09	0.82	Accepted
Project portfolio management is implemented in JKR and is responsible to monitor and advise the project team in managing time.	3.79	0.76	Accepted
Provide ample time to discuss the problem of delay project in the War Room and brainstorming sessions for problem solving.	3.71	0.74	Accepted
SKALA is a perfect monitoring tool for JKR.	3.16	0.63	Accepted
JKR is to become World Class Service Provider in project management. This includes time management as with acceptable quality and within cost.	3.73	0.75	Accepted
Provide a DASHBOARD report accurately for effective information delivery.	3.73	0.75	Accepted
PEMANDU (Performance Management and Delivery Unit) is an important committee at top management levels for project monitoring.	3.34	0.67	Accepted

4.10 Establishment of Maturity Level Characteristics

The second research objective was to determine the maturity level characteristic for JKR. The respondents were given five levels of maturity characteristics namely; Level 1 - JKR traditional practice, Level 2 - managing by practical schedule, Level 3 - standardization of scheduling, Level 4 - schedule as central guidance for project manager and Level 5 - establishment and mature scheduling practice.

The respondents will choose the same level of maturity characteristics as stated if they agree to determine level indicated. If not, they will have to indicate their preferred level. Figure 4.5 to 4.9 shows the respondents preferred maturity characteristics level.

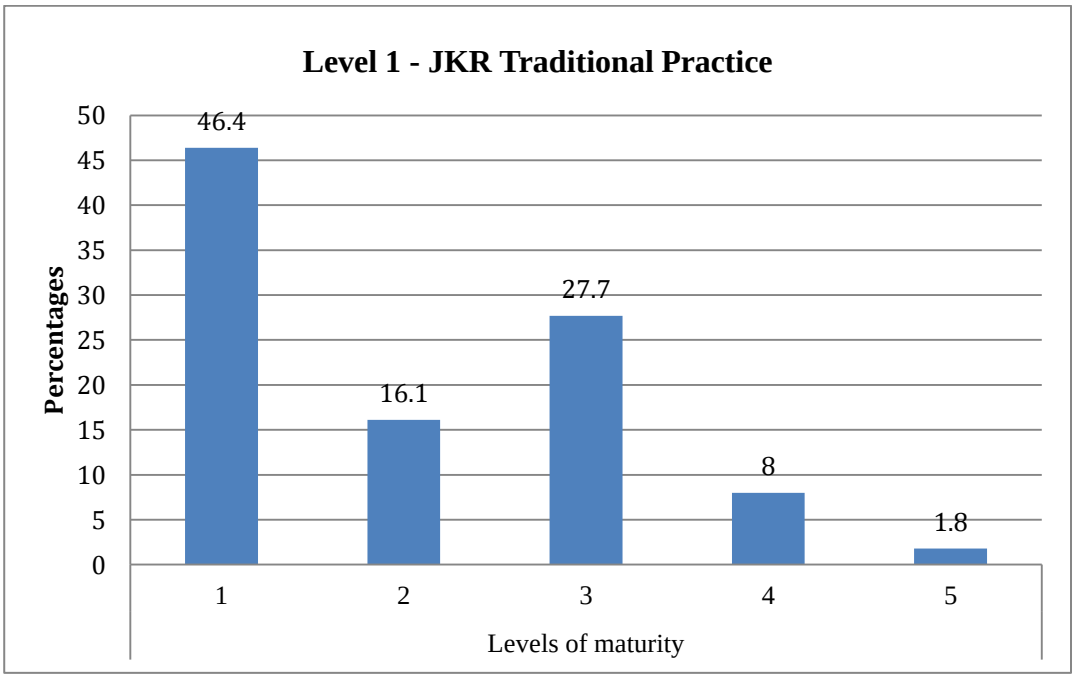

Figure 4.5: Most preferred chosen character by respondents for Level 1

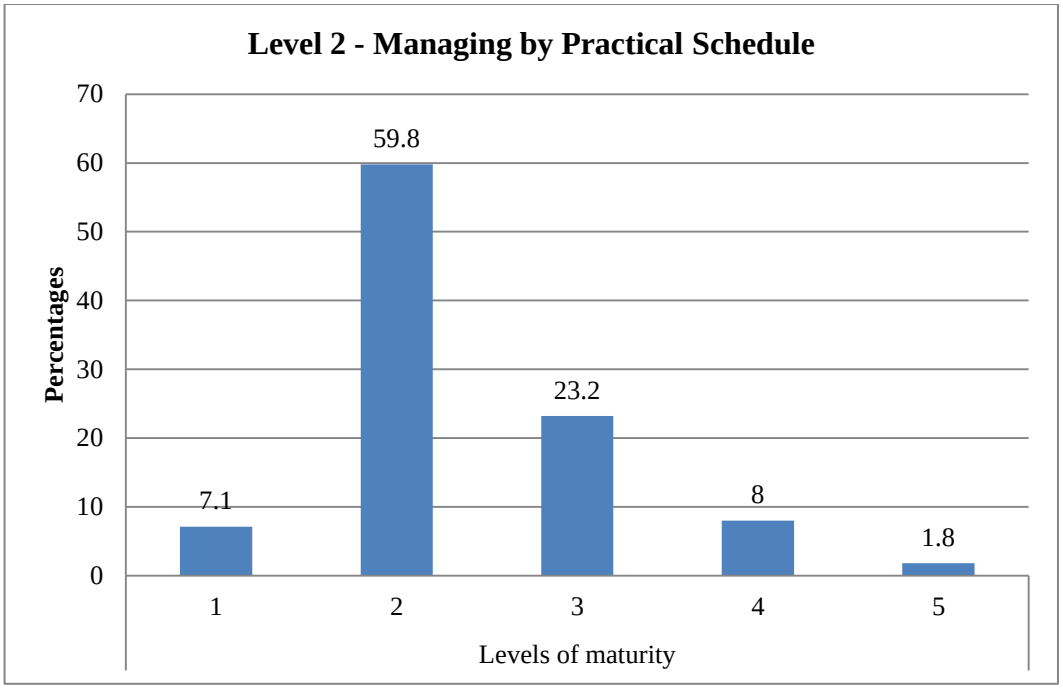

Figure 4.6: Most preferred chosen character by respondents for Level 2

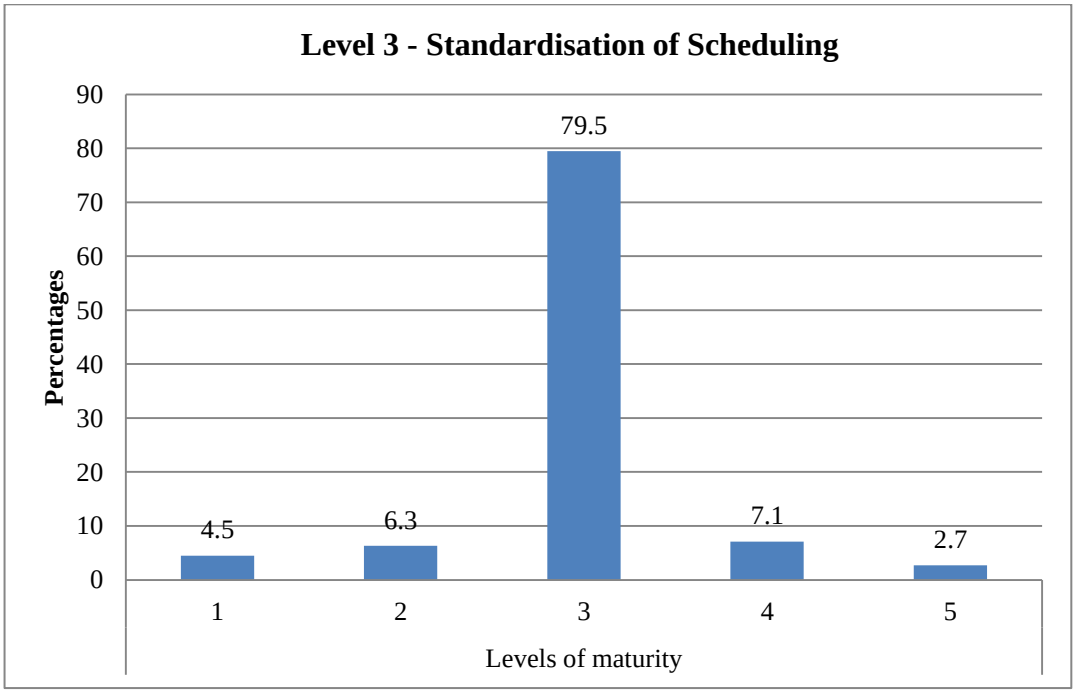

Figure 4.7: Most preferred chosen character by respondents for Level 3

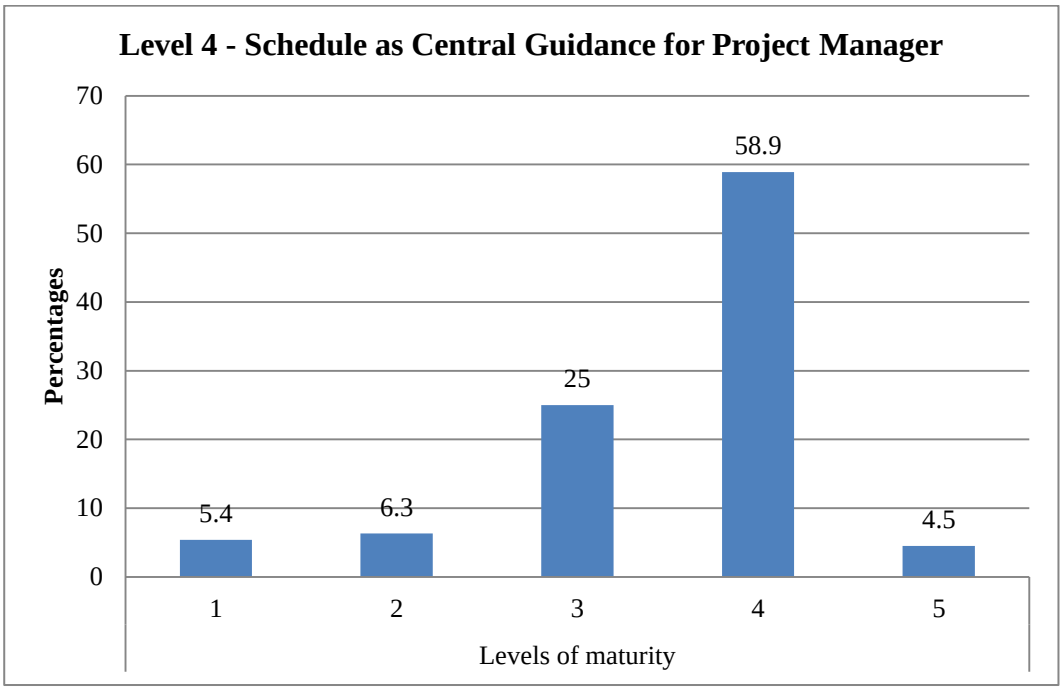

Figure 4.8: Most preferred chosen character by respondents for Level 4

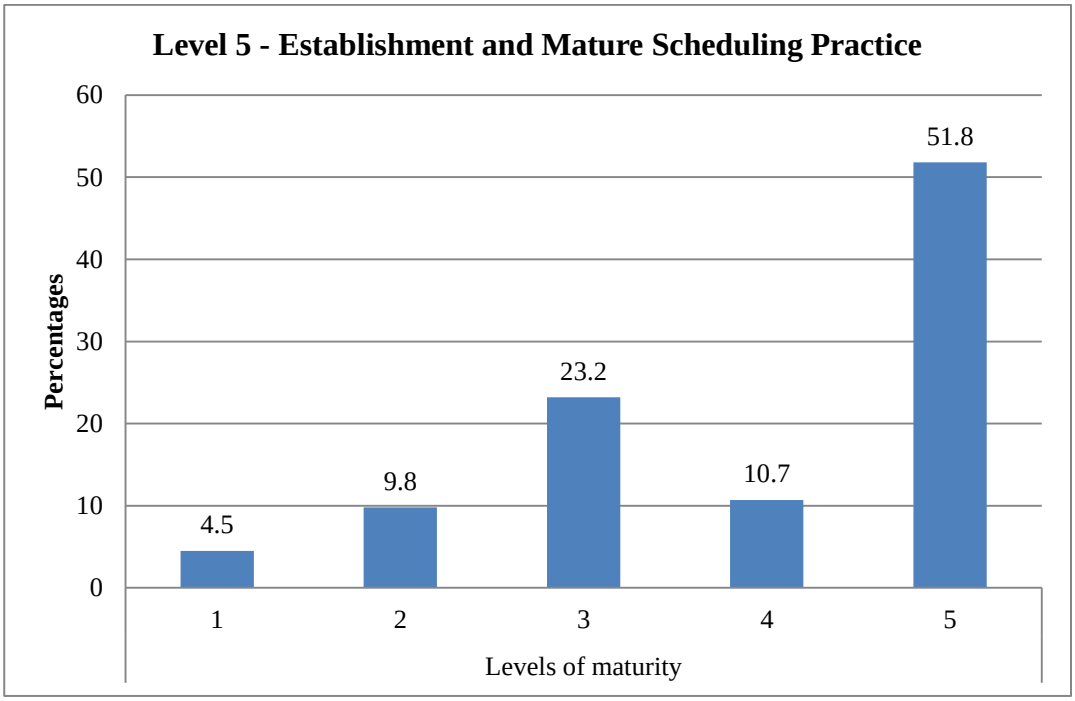

Figure 4.9: Most preferred chosen character by respondents for Level 5

4.11 Validity and Reliability Tests

The Cronbach‘s Alpha value of the reliability test is to indicate the internal consistency of the measurement. The alpha coefficients were determined by using SPSS Version 20 software. Table 4.15 shows the alpha coefficient for Section B and Section D. According to Sekaran (2003), alpha coefficient of 0.6 to 0.7 will be considered adequate in exploratory research.

Table 4.15: Cronbach’s Alpha Value for Section B, C and D

Section	Level	Cronbach’s Alpha	No. of Items
B	-	0.89	12
C	-	0.60	5
D	1	0.89	10
	2	0.77	10
	3	0.80	10
	4	0.89	10
	5	0.84	10

CHAPTER 5

DISCUSSION OF RESULT

5.1 Introduction

This chapter discusses the inferences made from the research data that have been analysed in the previous chapter. However, the discussion of the development of PTMML is made in Chapter 6. Discussion on the basic critical elements was based on the mean values and finally the critical elements were ranked by the Relative Importance Index (RII) values.

5.2 Project Delay Contributed by Various Phases of Project Life Cycle Phase

From respondent opinions they collectively moderately agreed that all phases in project life cycle have some contribution towards project delays factor. The planning, execution and monitoring and controlling process are regarded to have more impact compared to initiate and closing program as previously discussed in Chapter 4.

5.3 Major Delay Causes in JKR Projects

The main factor in the project time management namely are late of decision making, scope changes, schedule does not represent actual work program at site and

the schedule is not realistic, cannot be used to monitor and tracking project performance and lack of project monitoring and controlling skill. Factors of late of decision making are regarded as the most delay factor by respondent's opinion. Secondly followed by scope changes and least agreed opinion are lack of project monitoring and controlling skill. The details are discussed in Chapter 4 previously. To mitigate delay project in JKR, fast and prompt decision making has to take place either by the JKR or contractor side. From the client's side, scope changes in any project should be avoided.

5.4 Determining Maturity Level Characteristic

The finding from Figure 4.5 to 4.9 of Chapter 4 shows that the respondents agreed to the indicated level of maturity as proposed by this study. As a conclusion, the highest percentage of each level of maturity was tabulated and highlighted in Table 5.1. The highlighted pattern was presented as a ladder model of PTMML and further discussed in Chapter 6.

Table 5.1: Summarised of maturity level characteristics from Figure 4.5 to 4.9

Characteristic	**Maturity level agreed by respondents**				
	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Mature and establish scheduling practice	4.5%	9.8%	23.2%	10.7%	**51.8%**
Schedule as central guidance for project manager	5.4%	6.3%	25%	**58.9%**	4.5%
Standardization of scheduling	4.5%	6.3%	**79.5%**	7.1%	2.7%
Managing by practical schedule	7.1%	**59.8%**	23.2%	8%	1.8%
JKR Traditional Practice	**46.5%**	16.1%	27.7%	8%	1.8%

5.5 Determination of Attributes for Each Maturity Level

The main aim of this study is to finally establish PTMML that can be used by JKR. In previous section, the respondent has mutually accepted five pre-determined maturity levels for PTMML. Therefore this study will adopt those five levels of maturity as a basis to develop the JKR's PTMML. However, as a step forward in developing PTMML, it is necessary for this study to establish the basic criteria that describe the characteristic of each maturity level.

Several characteristic corresponding to each maturity level has been presented in the questionnaire survey form distributed to the respondents. They were required to rate the level of agreement with 5 likert scales as explained in Chapter 3. Upon evaluating, the responses follow the rules have been used in this study as acceptance criteria for attributes. Only the responses that has means index of greater than 3 are considered acceptable. Otherwise, index of 3.5 to 4.0, as discussed previously in Chapter 3 and 4 could be carried out for further study research. The detail finding of accepted and rejected attributes could be referred in table 4.10 to 4.14. The detail of PTMML establish by this study is presented in the next chapter.

Table 5.2 to 5.6 listed the entire chosen attributes using the index of >3.0. The attributes were selected from the mean value of >3.0. The listed attributes selected have been arranged accordingly by using the RII value from the highest to the lowest value.

Table 5.2: Attributes on the basis of the index of >3.0 for Level 1

Level 1- JKR Traditional Practice	Mean	RII
There is no decision-making procedure on agreed project schedule. Final decision is entirely depends on PD/SO.	3.82	0.76
Schedule prepared is time driven schedule	3.82	0.76
The implementation schedule of the project in the planning stage is developed based on the ability of individual perception.	3.58	0.72
Schedule serve as general guidelines only on project decision making.	3.54	0.71
Schedule is not validated by an accredited professional.	3.57	0.71

Table 5.2: Attributes on the basis of the index of >3.0 for Level 1 (Cont.)

Level 1- JKR Traditional Practice	Mean	RII
The task/activity value is not rationalized with contract BQ.	3.48	0.70
Schedule is prepared using standard planning software but not project monitoring and tracking process.	3.38	0.68
No standard format or procedures to prepare a project schedule and are existed in JKR. Schedules are prepared based on individual experience.	3.29	0.66
No standard Work Breakdown Structure (WBS) existed in guide schedule preparation.	3.16	0.63
Schedules are prepared without specific objective.	3.05	0.61

Table 5.3: Attributes on the basis of the index of >3.0 for Level 2

Level 2 – Managing by practical schedule	Mean	RII
The contractor should provide very detail activity/task (class 4) in project planning schedule.	4.32	0.86
Sufficient certified scheduler in JKR is needed to handle projects.	4.08	0.82
In the construction stage, the project schedule is prepared and developed by the contractor and verified by JKR.	4.04	0.81
SO/PD is responsible to monitor, to track and updating project information.	4.00	0.80
JKR have a competent personal to evaluate and approved schedule submitted for the project.	3.30	0.66
JKR staff competence (sincere, honest, trustworthy, fair and equitable) in evaluating schedule.	3.19	0.64
JKR to evaluate the contractor estimating activity duration based on certain guidelines not by personal experience.	3.19	0.64
Expert schedulers are deployed on critical projects.	3.15	0.63

Table 5.4: Attributes on the basis of the index of >3.0 for Level 3

Level 3- Standardization of scheduling	Mean	RII
Contractors appointed by the JKR should consist of good tender price, good track record and vast experience.	4.23	0.85
The most common method of monitoring project progress in JKR is by conducting site and technical meeting frequently.	4.10	0.82
To use a standard process to terminate the contractor if they fail to show interest to meet the time frame datelines for project completion.	3.98	0.80
In JKR practice, the Precedence Diagramming Method (PDM) is the highest-level technique used for managing time in project management or normally known as CPM by JKR.	3.83	0.77
Appointed contractor of JKR is based on the highest mark in the evaluation of tenders.	3.61	0.72

Table 5.4: Attributes on the basis of the index of >3.0 for Level 3 (Cont.)

Level 3- Standardization of scheduling	Mean	RII
Each stakeholder adheres or follows the schedule that has been agreed by JKR.	3.55	0.71
The Project Management Office (PMO) is the center of reference for documentation, advisor expertise and standardizing the practice of project management and execution.	3.50	0.70
Standard procedure prepared by JKR for the installation of works at the construction site.	3.37	0.67
PROKOM guide and prepare requirements for reviewing the project schedule for delayed projects.	3.26	0.65
JKR provided the method statement on-site as guidance to the contractors to meet the time frame.	3.16	0.63

Table 5.5: Attributes on the basis of the index of >3.0 for Level 4

Level 4 - Schedule as central guidance for project manager	Mean	RII
Project schedule will have baseline as project time management benchmark.	3.83	0.77
Project team members are constantly engaged in monitoring project on site.	3.63	0.73
Decisions related to the project are based on the project schedule.	3.54	0.71
The Project Management Office (PMO) is responsible to give advices to the project team member.	3.48	0.70
Project team members are constant engaged in tracking of schedule.	3.43	0.69
The Project Management Office (PMO) is involved in monitoring projects.	3.43	0.69
All information on the site work were regularly updated, recorded and documented as a guide for future projects.	3.33	0.67
All information related to the previous delayed project will be recorded later as a guide for carrying out projects in the future.	3.37	0.67
ECKM (Enterprise Content and Knowledge Management) serves as an information resource management and organisational learning.	3.28	0.66
The WIKI or J-Pedia on JKR website becomes a source of reference to make a decision making for the project team to manage the project.	3.03	0.61

Table 5.6: Attributes on the basis of the index of >3.0 for Level 5

Level 5 - Mature and establish scheduling practice	Mean	RII
All JKR in Malaysia used the Standard Work Procedures (SPK) for project reference.	4.09	0.82
The most successful completed projects in JKR will become a portfolio, benchmark, inspiration and reference for future projects.	4.01	0.80
Project portfolio management is implemented in JKR and responsible to monitor and advise the project team in managing time.	3.79	0.76
Provide a DASHBOARD report accurately for effective information delivery.	3.73	0.75
JKR is to become World Class Service Provider in project management. This includes time management as with acceptable quality and within cost.	3.73	0.75
Provide ample time to discuss the problem of delay project in the War Room and brainstorming sessions for problem solving.	3.71	0.74
Lessons learned in previous projects served as a guide for future projects and continuous improvement.	3.71	0.74
Any issues encountered during any project will be resolved partly as wholly guided by the project schedule.	3.37	0.67
PEMANDU (Performance Management and Delivery Unit) is an important committee at top management levels for project monitoring.	3.34	0.67
SKALA is a perfect monitoring tool for JKR.	3.16	0.63

CHAPTER 6

PROJECT TIME MANAGEMENT MATURITY LEVEL IN JKR

6.1 Introduction

This chapter presents a final development of PTMML for JKR. All the data used in developing this matrix have been discussed and analysed in Chapter 4 and 5. The maturity ladder steps are proposed to be established for the project time management framework. This chapter also describes the guideline how this PTMML can be used to develop an appropriate strategy to improve time management process in JKR.

6.2 Maturity Level Characteristics of JKR

According to Erling and Svein (2002), the step of maturity indicates that there is an increase development and improvement from one level to another. Based on the result from the summarised of maturity level characteristic of respondents in Chapter 5, the maturity ladder steps were derived from the highest percentage result of each maturity level. The steps were finally illustrated as the Project Time Management Maturity Level for JKR, shown in Figure 6.1.

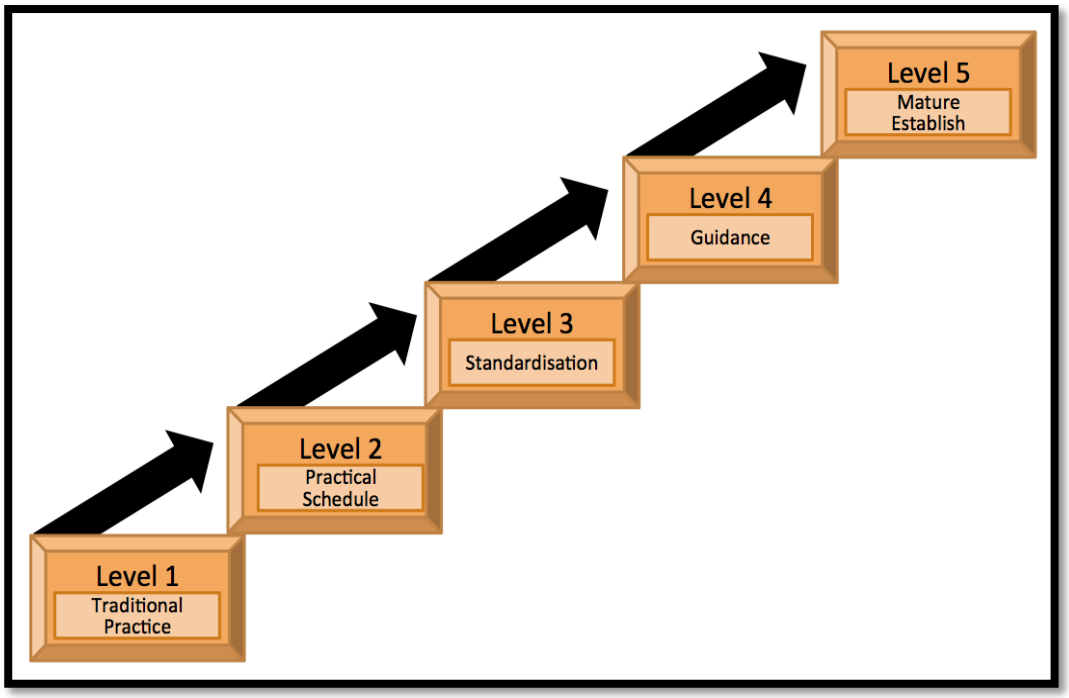

Figure 6.1: Project Time Management Maturity Level for JKR

6.3 Description of The Maturity Level Characteristics

Level 1- JKR Traditional Practice

At this stage, the organisation realize that it has no standard format to prepare for the project schedule. The scheduled prepared is time driven. Decision making and the implementation schedule are based on individually perception. Accredited professional does not validate the schedule.

Level 2 – Managing by practical schedule

JKR emphasizes on getting the schedule prepared correctly. At this stage, the schedules are prepared comprehensively and certified schedulers are required for every project. SO/PD is fully responsible to monitor, tracking and updating project information.

Level 3- Standardization of scheduling

At this stage, the preparation of standard scheduling exists in JKR. All entire projects in JKR will use this standard procedure. Variety of scheduling tools and techniques are available for effective schedule control. JKR common method of monitoring projects progress is by conducting site and technical meeting frequently. If the contractor fails to show interest to meet the time frame dateline, a standard process for termination is applied.

Level 4 – Schedule as central guidance for project manager

Schedule will be used as a main source of guidance for JKR to manage all projects. Standard schedule control processes and practices are integrated to become a benchmark. The decisions related to project are based on the project schedule e.g. extension of time, payment and variation order.

6.4 List of Attributes for Each Character

The index of 3.0 was chosen based on the likert scale as discussed in Chapter 4 and 5. The appropriate attributes for each character of the ladder step in the maturity framework were selected with determined attributes. Finally, the determined attributes were illustrated as a matrix framework in Table 6.1.

Table 6.1: The List of Attribute on PTMML Matrix Framework

Nos. of Attributes	Levels				
	Level 1 **Traditional Practice**	**Level 2** **Practical Schedule**	**Level 3** **Standardisation**	**Level 4** **Guidance**	**Level 5** **Mature Establish**
1	There is no decision-making procedure on agreed project schedule. Final decision is entirely depends on PD/SO.	The contractor should provide very detail activity/task (class 4) in project planning schedule.	Contractors appointed by the JKR should consist of good tender price, good track record and vast experience.	Project schedule will have baseline as project time management benchmark.	All JKR in Malaysia used the Standard Work Procedures (SPK) for project reference.
2	Schedule prepared is time driven schedule	Sufficient certified scheduler in JKR is needed to handle projects.	The most common method of monitoring project progress in JKR is by conducting site and technical meeting frequently.	Project team members are constantly engaged in monitoring project on site.	The most successful completed projects in JKR will become a portfolio, benchmark, inspiration and reference for future projects.
3	The implementation schedule of the project in the planning stage is developed based on the ability of individual perception.	In the construction stage, the project schedule is prepared and developed by the contractor and verified by JKR.	To use a standard process to terminate the contractor if they fail to show interest to meet the time frame datelines for project completion.	Decisions related to the project are based on the project schedule.	Project portfolio management is implemented in JKR and responsible to monitor and advise the project team in managing time.

Table 6.1: The List of Attribute on PTMML Matrix Framework (Cont.)

Nos. of Attributes	Levels				
	Level 1 **Traditional Practice**	**Level 2** **Practical Schedule**	**Level 3** **Standardisation**	**Level 4** **Guidance**	**Level 5** **Mature Establish**
4	Schedule serve as general guidelines only on project decision making.	SO/PD is responsible to monitor, to track and updating project information.	In JKR practice, the Precedence Diagramming Method (PDM) is the highest-level technique used for managing time in project management or normally known as CPM by JKR.	The Project Management Office (PMO) is responsible to give advices to the project team member.	Provide a DASHBOARD report accurately for effective information delivery.
5	Schedule is not validated by accredited professional	JKR have a competent personal to evaluate and approved schedule submitted for the project.	Appointed contractor of JKR is based on the highest mark in the evaluation of tenders.	Project team members are constant engaged in tracking of schedule.	JKR is to become World Class Service Provider in project management. This includes time management as with acceptable quality and within cost.
6	The task/activity value is not rationalized with	JKR staff competence (sincere, honest,	Each stakeholder adheres or follows the schedule that has	The Project Management Office	Provide ample time to discuss the problem of

Table 6.1: The List of Attribute on PTMML Matrix Framework (Cont.)

Nos. of Attributes	Levels				
	Level 1 Traditional Practice	**Level 2 Practical Schedule**	**Level 3 Standardisation**	**Level 4 Guidance**	**Level 5 Mature Establish**
	contract BQ	trustworthy, fair and equitable) in evaluating schedule.	been agreed by JKR.	(PMO) is involved in monitoring projects.	delay project in the War Room and brainstorming sessions for problem solving.
7	Schedule is prepared using standard planning software but not project monitoring and tracking process.	JKR to evaluate the contractor estimating activity duration based on certain guidelines not by personal experience.	The Project Management Office (PMO) is the center of reference for documentation, advisor expertise and standardizing the practice of project management and execution.	All information on the site work was regularly updated, recorded and documented as a guide for future projects.	Lessons learned in previous projects served as a guide for future projects and continuous improvement.
8	No standard format or procedures to prepare a project schedule and are existed in JKR. Schedules are prepared based on individual	Expert schedulers are deployed on critical projects.	Standard procedure prepared by JKR for the installation of works at the construction site.	All information related to the previous delayed project will be recorded later as a guide for carrying out projects in the future.	Any issues encountered during any project will be resolved partly as wholly guided by the project schedule.

Table 6.1: The List of Attribute on PTMML Matrix Framework (Cont.)

Nos. of Attributes	Levels				
	Level 1 Traditional Practice	**Level 2 Practical Schedule**	**Level 3 Standardisation**	**Level 4 Guidance**	**Level 5 Mature Establish**
	experience.				
9	No standard Work Breakdown Structure (WBS) existed in guide schedule preparation.	Nil	PROKOM guide and prepare requirements for reviewing the project schedule for delayed projects.	ECKM (Enterprise Content and Knowledge Management) serves as an information resource management and organisational learning.	PEMANDU (Performance Management and Delivery Unit) is an important committee at top management levels for project monitoring.
10	Schedules are prepared without specific objective.	Nil	JKR provided the method statement on-site as guidance to the contractors to meet the time frame.	The WIKI or J-Pedia on JKR website becomes a source of reference to make a decision making for the project team to manage the project.	SKALA is a perfect monitoring tool for JKR.

6.5 General guideline for JKR to achieve improvement based on PTMML

As we can observe from the matrix developed, JKR need to strategies the programme and monitor toward achieving better and improved time management process. JKR can use this matrix to establish an appropriate strategy to enhance their manager's knowledge and practice to ensure the entire project can be completed on time. JKR need to map this matrix to determine at what level they are now in order to ascertain to achieve improvement. The detail discussion and the appropriate strategy is beyond the scope of this study

6.6 Suggestions to JKR

Based on the result finding from this study, it is suggested that the management of JKR could use this PTMML to:

i) Determine the score of the maturity level in time management in JKR.

ii) Guide the organisation of JKR to use the attributes findings analyses for reference to manage project management particularly on time management.

iii) Improve the current weakness and to enhance the process of project time management in JKR.

iv) Upgrade the current knowledge in managing time and to train more expertise to manage the project accordingly.

v) Concentrate and to emphasize on these basic critical element to improve time project management for JKR.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 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.

7.2 Objective #1: To identify the basic critical elements towards establishment of project time management maturity level for JKR

Total of 50 factors of basic critical elements toward establishment of project maturity level for time management were determined from literature reviews, interviews and document search. These elements are presented in Table 4.10 to 4.14.

7.3 Objective #2: To establish maturity level characteristic PTMML for JKR

The character of each maturity level was determined and the attributes of each level were arranged and discussed in Chapter 6. Analysing from the summarised in maturity level characteristic of respondents, the maturity ladder steps were derived from the highest percentage result of each maturity level. The model of PTMML for JKR was shown in Figure 6.1. The lists of characteristics for every step of maturity level are:

Level 1 - JKR Traditional Practice

Level 2 - Managing by practical schedule

Level 3 - Standardization of scheduling

Level 4 - Schedule as central guidance for project manager

Level 5 –Establishment and mature scheduling practice

7.4 Objective #3: To establish appropriate attributes for each element of PTMML.

The appropriate findings of strategies were obtained from the analysis. The list of attributes for each character was discussed in Chapter 6. The index of 3.0 was chosen based on the likert scale to determine the maturity framework of JKR was discussed in Chapter 5. Finally the determined attributes were illustrated as a matrix framework in Table 6.1.

7.5 Recommendations for Further Study

It is recommended that further study to be carried out on PTMML especially on the following aspect:

i) To design Matrix Maturity Guideline (MMG) base on PTMML matrix framework for evaluating the level of achievement in time management for JKR projects.

ii) Based on the PTMML given, will help to facilitate to further study on the other 9 knowledge area of project management for improving the project management in JKR.

iii) Based on the attributes for each maturity level, a study is required to refine and established clear guidelines for JKR to achieve highest level of maturity in time management.

LIST OF REFERENCES

Alan Bryman, Emma Bell (2007). Business Research Method. New York: Oxford University Press.

Andrea Fontana and James H. Frey (1994). The Art of Science. *The Handbook of Qualitative Research.* Sage Publications. pp. 361-376

Becker, J., Knackstedt, R. AND Popperlbu, J. (2009). Developing maturity models for IT management – a procedure model and its application. *Bussiness and Information Systems Engineering.* Vol 1 No. 3, pp. 213-22.

Carnegie Mellon (2010). Improving processes for developing better products and services. *CMMI ® for Development, Software Engineering Institute*. V1.3.

Chan DWM, Kumaraswamy MM. (1997). A comparative study of causes of time overrun in Hong Kong construction projects. *International Journal of Project Management*. 15 (1): 55–63.

Erling S. Anderson and Svein Arne Jessen (2002). Project Maturity in Organisations. Norwegian School of Management BI, Norway

Graham Williams (2009). Maturity Model (P2MM). *PRINCE2® GSW Consultancy Limited*. V2.1. London.

Gottschalk, P. (2009). Maturity levels for interoperability in digital government. *Government Information Quaterly*.Vol. 26 No. 1, pp 75-81.

Harold Kerzner (2006). Book of Project management -A Systems Approach to Planning, Scheduling, and Controlling (9th Edition). USA: John Wiley and Sons, Inc.

Harold Kerzner (2003). Book of Project management -A Systems Approach to Planning, Scheduling, and Controlling (8th Edition). USA: John Wiley and Sons, Inc.

Iversen, J. Nielsen, P.A. and Norbjerg, J. (1999). Situated assessment of problems in software development. *Database for Advances in Informations Systems.* Vol. 30 No 2, pp. 66-81.

Jacob, Harold R. (1994). Mathematics: A Human Endeavor (Third ed.). *W.H. Freeman.* P.547

JKR Annual Report 2012, Ibu Pejabat Jabatan Kerja Raya Malaysia.

Kazanjian, R.K. and Drazin R. (1989). An empirical test of a stage of growth progression model. *Management Science.* Vol 35 No 12, pp. 1489-503.

Kent Crawford (2007). Project Management Maturity Model - Second Edition, pp. 75

Kometa ST, Olomolaiye PO, Harris FC. (1994). Attributes of UK construction clients influencing project consultants' performance. *Construction Management and Economics;* 12:433–43.

Le-Hoai, L. and Lee, Y.D. (2009), Time-cost Relationship of Building Construction Project in Korea. *Facilities* Vol. 27, Nos. 13/14 pp. 549-559.

Lim EC, Alum J. (1995). Construction productivity: issues encountered by contractors in Singapore. International Journal of Project Management. 13(1):51–8.

Maximilian Roglinger (2012). Maturity Models in Business Process Management, *Bussiness Process Management Journal.* Vol. 18, No. 2 pp. 328-346.

Michael Rosemann and Tonia de Bruinn (2005). Towards A Bussiness Process Management Maturity Model. *Queensland University of Technology.* Brisbane, Australia.

PMBOK (2013). A Guide to the Project Management Body of Knowledge 5th Edition. *Project Management Institute.* Newtown Square, Pennsylvania, USA.

Sekaran, U. (2003). Research Methods for Business. *John Wiley and Sons.* USA.

Strategic Framework JKR 2012-2015, Ibu Pejabat Jabatan Kerja Raya Malaysia.

Ticehurst, G. W. (2000). Business Research Method: A Managerial Approach. Addison Wesley *Longman.* Australia

Wheatley, M. (2007). Maturity matters. *PM Network.* 21(7), 49-53.

APPENDIX A-1

QUESTIONS FOR INTERVIEW

PROJECT TIME MANAGEMENT MATURITY LEVEL IN JKR (PTMML)

LEVEL 1

1. Do you agree, in JKR project management there is no standard format or procedures to manage project schedule with respect to: (Y/N, please specify why?)
    a. Preparing and submission of project schedule
    b. Reviewing project schedule for acceptance
    c. Standard procedure in monitoring/updating/tracking project schedule
    d. Procedures in decision making based on agreed project schedule

2. What method of monitoring is being carried out to ensure the completion of the project is as planned?

3. Is that true that JKR handle a project based on individual project manager/in charge person personal experiences?
    a. If yes, please give the reason.
    b. If not, please give the reason.

4. What is the current "state of the art" for Project Time Management in JKR?

> The term "**state of the art**" refers to the highest level of general development, as of a device, technique, or scientific field achieved at a particular time. It also refers to the level of development (as of a device, procedure, process, technique, or science) reached at any particular time as a result of the common methodologies employed.

5. Are project schedule being developed based on individual ability and perception to manage the project?
    a. If yes, please give the reason.
    b. If not, please give the reason.

LEVEL 2

6. Does JKR provide method statement on-site guidance to contractors to meet the time frame?
    a. If yes, what type of the documents provided to contractor
    b. If not, what is the suitable method to be implemented

7. Does common process in JKR being standardized and is used by all JKR in Malaysia?
    a. If yes, what is the current method being used? It is sufficient?
    b. If not, any idea to improve the weaknesses? Do you have a model for example to refer?

8. Is there any Standard of Procedure (SOP) issued by JKR for the installation work on the construction site?
    a. If yes, when is it forwarded to contractor?
    b. If not, please specify why?

9. When should the action of termination of contractor take place if progress delay? If happens, what is the standard regulation and when the action of termination will be taken?

10. Is it necessary to have a standard Work Breakdown Structure (WBS) for implementing projects in JKR?
    a. If yes, please give the reason.
    b. If not, please give the reason.

LEVEL 3

11. Is the Project Management Office (PMO) involved in monitoring the project or just giving the advice to the project team member?

12. Is delayed or late project are used as a reference for the following project?
    a. If yes, how to address in the faultiest of the delayed project in JKR?
    b. If not, please indicate what precautions should be taken to avoid delays.

13. Are works on site being documented for reference and guide for future projects?
    a. If yes, please give examples.
    b. If not, please give the reason.

LEVEL 4

14. What are the most successful projects had been implemented in JKR? Are these projects become the benchmark and references for future projects in JKR?

15. Any lessons learned in previous project captured for future project? Please specify the approach for improvements.

16. If there is a successful project, does the project manager in charge become a role model for others?
    a. If yes, what type of output (example: workshops/writings/courses)
    b. If no, what do you suggest?

LEVEL 5

17. Do you agree to the implementation of Project Portfolio Management in JKR?
    a. If yes, any idea to improve in managing time for JKR?
    b. If not, any suggestion method needed?

18. Does the high rank and top management monitor the entire projects in JKR?
    a. If yes, please give examples. Is the current practice sufficient enough or needed further improvement?
    b. If not, what do you suggest?

19. In your opinion does JKR have enough experienced personal to professionally manage project?
    a. If yes, are we comfortable with the current project management style or would want to further improve to such big companies like PETRONAS or KLIA project management style?
    b. If not, please suggest how to improve the personal to managing projects successfully.

OTHERS

20. If we want to improve in time management for JKR, what should we do in stages?

21. What is the most delay factor occur mostly in JKR project? If any, please suggest solutions for improvement.

22. If the current project time management process is inadequate, what should we do to improve?

23. What is the vision of JKR to achieve the level of maturity level in time management?

24. What is the main problem faced by JKR in time management for a project?

25. How to improve time management in a project for JKR? Please specify several options for guidance.

26. Currently, what is lacking in project time management for JKR? Please specify what are the major causes for the occurred problems.

APPENDIX A-2

PROJECT TIME MANAGEMENT MATURITY LEVEL IN JABATAN KERJA RAYA

(JKR - UTM joint-venture programme)

At present I am a final year student of the Master in Project Management, Universiti Teknologi Malaysia (UTM), and a joint-venture programme between JKR-UTM. I am undertaking a research on **PROJECT TIME MANAGEMENT MATURITY LEVEL IN JABATAN KERJA RAYA (PTMML)** to fulfil the requirements for the award of Master Project Management.

The aim of this study is to develop time management maturity level for JKR. To achieve this aim the following objectives has been determined:

a) To identify basic critical elements toward establishment of project time management maturity level for JKR
b) To establish maturity level characteristic PTMML for JKR
c) To establish appropriate attributes for each element of PTMML

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. And all your answers will be treated as **CONFIDENTIAL**. Your cooperation is much appreciated. If you have any questions do not hesitate to contact.

Detail of Researcher

Name	**:**	**ALFA RIZAL BIN ZAINUDIN**
Course	**:**	**Master of Project Management (MAZ)**
Department	**:**	**Monitoring and Control Division, Ministry of Finance Malaysia**
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Contact	**:**	**019-2266798 / 03-88824533**
Supervisor	**:**	**ASSOC. PROF. DR. MOHAMAD IBRAHIM MOHAMAD**
Faculty	**:**	**Civil Engineering (FKA)**

THANK YOU VERY MUCH FOR YOUR KIND COOPERATION AND TIME

SECTION A: GENERAL INFORMATION

Please tick (/) and answers all question.

1. Grade :

41/44		48/52		54 & above	

2. Years in 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 dan Pengajian Tinggi (CPPT)	
4	Cawangan Kerja Kesihatan (CKK)	
5	Cawangan Kerja Keselamatan (CKS)	
6	Others: (please specify)	

5. Which construction project commonly delayed in completion time? (Please tick one or more)

School		Office		Public Facilities		Hospital		Other	

6. How often you encounter with delayed projects?

None		1 - 3 projects		4 - 6 projects		7 - 9 projects		≥ 10 projects	

7. Do you agree project delay has become a common norm (culture) in JKR?

Yes		Not Sure		No	

SECTION B: CRITICAL FACTOR FOR DELAY

Based on the current situation, please tick (/) the appropriate number representing the scale to describe the **critical factor for delay** in JKR projects.

For each option, please tick (/) to show your level of agreement based on the Likert scale given below.

1	2	3	4	5
Least Contribute	Slightly Contribute	Moderately Contribute	Contribute	Most Contribute

No	Which of the following group contribute most to occurrence of project delay?	1	2	3	4	5
BA1	Initiate Process					
BA2	Planning Process					
BA3	Executing Process					
BA4	Monitoring and Controlling Process					
BA5	Closing Process					

For each option, please tick (/) to show your level of agreement based on the Likert scale given below.

1	2	3	4	5
Least Agree	Slightly Agree	Moderately Agree	Agree	Strongly Agree

No	The main factor which causes delay in project handled by JKR	1	2	3	4	5
BB1	Lack of understanding in project scheduling					
BB2	Limited knowledge about time management					
BB3	The schedule is not realistic, cannot be used to monitor and tracking project performance					
BB4	Lack of project monitoring and controlling skill					
BB5	Late of decision making					
BB6	Scope changes					

No	The main factor which causes delay in project handled by JKR	1	2	3	4	5
BB7	Current report system do not give ample warning about problematic project potentially time delay					
BB8	In charged personal not knowledgeable and not skillful in project time management					
BB9	Schedule does not represent actual work program at site					
BB10	Project management do not use schedule as a guiding major document to guide all action					
BB11	Schedule is prepared and verified by incompetent person					
BB12	No clear guideline how to prepare the schedule					

SECTION C: DETERMINING MATURITY LEVEL CHARACTERISTIC

Based on preliminary investigation the following level of project time management has been determine for JKR as way forward for achieving perfection in **project time management**. Please indicate your agreement toward each of this level by indication the ranking from 1 to 5.

Level of characters	Determine Level*	Your Level**	Descriptions
JKR traditional practice.	1		As per current practice
Managing by practical schedule.	2		Emphasis on getting the schedule prepared correctly
Standardization of scheduling.	3		Preparation of standard scheduling exists in JKR. All project entity in JKR will used this standard procedure
Schedule as central guidance for Project Manager.	4		Schedule will be used as a main source of guidance for JKR to manage all projects. Decision made for project based on schedule.
Establishment and mature scheduling practice.	5		JKR set a standard for industry in time management especially for other government sector.

* If you disagree with determine level, please indicate your level in the box given.
** If you agree with determine level, please tick as the same number stated.

SECTION D: PROJECT TIME MANAGEMENT PROCESS

The followings indicate five different phases in project life-cycle phase.

Please indicate your level of agreement for each phase with regard to their contribution toward project delay.

1	2	3	4	5
Least Agree	Slightly Agree	Moderately Agree	Agree	Strongly Agree

No.	LEVEL 1	1	2	3	4	5
TP1	No standard format or procedures to prepare project schedule and validate existed in JKR. Schedules are prepared based on individual experience.					
TP2	Schedules are prepared without specific objective.					
TP3	The implementation schedule of the project in the planning stage is developed based on the ability of individual perception.					
TP4	Schedule is not validated by accredited professional.					
TP5	No standard Work Breakdown Structure (WBS) existed in guide schedule preparation.					
TP6	Schedule is prepared using standard planning software but not project monitoring and tracking process.					
TP7	Schedule prepared is time driven schedule.					
TP8	Schedule serve as general guideline only on project decision making.					
TP9	The task/activity value is not rationalized with contract BQ.					
TP10	There is no decision-making procedure on agreed project schedule. Final decision is entirely depends on PD/SO.					

No.	LEVEL 2	1	2	3	4	5
PS1	Contractor appointed by JKR has sufficient knowledge in preparing the project schedule.					
PS2	JKR staff competence (sincere, honest, trustworthy, fair and equitable) in evaluating schedule.					
PS3	JKR have competent personal to evaluate and approved schedule submitted for the project.					
PS4	Preparation of project schedule includes the estimation of resources activity.					
PS5	Expert schedulers are deployed on critical projects.					
PS6	JKR evaluate the contractor estimating activity duration based on certain guidelines not by personal experience.					
PS7	In the construction stage, the project schedule is prepared and developed by the contractor and verified by JKR.					
PS8	SO/PD is responsible to monitor, to tracking and updating project information.					
PS9	Sufficient certified scheduler in JKR is needed to handle projects.					
PS10	Contractor should provide very detail activity/task (class 4) in project planning schedule.					

No.	LEVEL 3	1	2	3	4	5
SD1	Standard procedure prepared by JKR for the installation of works at the construction site.					
SD2	PROKOM guide and prepare requirements for reviewing project schedule for delayed projects.					
SD3	JKR provided the method statement on-site as guidance to the contractors to meet the time frame.					
SD4	Each stakeholder adheres or follows to the schedule that has been agreed by JKR.					

No.	LEVEL 3	1	2	3	4	5
SD5	The Project Management Office (PMO) is the centre of reference for documentation, advisor expertise and standardizing the practice of project management and execution.					
SD6	Contractors appointed by the JKR should consist of good tender price, good track record and vast experience.					
SD7	Appointed contractor of JKR are based on highest mark in evaluation of tenders.					
SD8	To use standard process to terminate the contractor if they fail to show interest to meet the time frame datelines for project completion.					
SD9	In JKR practice, the Precedence Diagramming Method (PDM) is the highest level technique used for managing time in project management or normally known as CPM by JKR.					
SD10	The most common method of monitoring project progress in JKR is by conducting site and technical meeting frequently.					

No.	LEVEL 4	1	2	3	4	5
GD1	Project team member are constantly engaged in monitoring project on site.					
GD2	Project team member are constant engaged in tracking of schedule.					
GD3	All information on the site work were regularly updated, recorded and documented as a guide for future projects.					
GD4	All information related to the previous delayed project will be recorded later as a guide for carrying out projects in the future.					
GD5	Project schedule will have baseline as project time management benchmark.					
GD6	The Project Management Office (PMO) is involved in monitoring projects.					

No.	LEVEL 4	1	2	3	4	5
GD7	The Project Management Office (PMO) is responsible to give advices to the project team member.					
GD8	Decisions related to the project are based on the project schedule.					
GD9	The WIKI or J-Pedia on JKR website becomes source of reference to make a decision making for the project team to manage project.					
GD10	ECKM (Enterprise Content and Knowledge Management) serves as an information resource management and organisational learning.					

No.	LEVEL 5	1	2	3	4	5
EP1	Any issues encountered during any project will be resolved partly as wholly guided by project schedule.					
EP2	Lessons learned in previous projects served as guide for future projects and continuous improvement.					
EP3	The most successful completed projects in JKR will become a portfolio, benchmark, inspiration and reference for future projects.					
EP4	It is necessary for all JKR in Malaysia to implement the standard work procedures (SPK) for project reference.					
EP5	Project portfolio management is implemented in JKR and responsible to monitor and advise the project team in managing time.					
EP6	Provide ample time to discuss the problem of delay project in War Room and brainstorming sessions for problem solving.					
EP7	SKALA is a perfect monitoring tool for JKR.					
EP8	JKR is to become World Class Service Provider in project management. This includes time management as with					

No.	LEVEL 5	1	2	3	4	5
	acceptable quality and within cost.					
EP9	Provide a DASHBOARD report accurately for effective information delivery.					
EP10	PEMANDU (Performance Management and Delivery Unit) is an important committee at top management levels for project monitoring.					

Thank you for completing this questionnaire

APPENDIX A-3

List of potential critical element toward establishment of PTMML gathered from the exploratory interview:

- Monitoring, tracking and updating project are up to the SO/PD understanding and personal experiences.
- There is no decision-making procedure on agreed project schedule. It entirely depends on PD/SO needs.
- The most common method of monitoring project in JKR is by conducting site and technical meeting frequently.
- JKR handle a project based on individual SO/PD personal experiences
- The highest level technique in JKR for managing time in project management will emphasize on the Precedence Diagram Method (PDM)
- In the construction stage, the schedule is being developed by the contractor and verified by JKR.
- JKR provide method statement on-site guidance to contractors to meet time frame.
- Standard Work Procedure for JKR is used by all JKR in Malaysia.
- No Standard of Procedure (SOP) issued by JKR for the installation work on the construction site.
- There is a standard process to terminate the contractor if they fail to proceed regularly and diligently on the project.
- It is necessary to have a standard Work Breakdown Structure (WBS) for implementing projects in JKR.
- In JKR project management, there is no standard format or procedures to manage a project schedule.

- The Project Management Office (PMO) involved in monitoring projects.
- The Project Management Office (PMO) is responsible giving to give advices to the project team member.
- The PMO is the source of documentation, guidance and metrics on the practice of project management and execution.
- Delay project information is usually used as a reference for the following project.
- All works on site were documented for reference and guidance for future projects.
- Any problems encountered in in a project will be recorded for future reference.
- The most successful completed projects in JKR will become a benchmark and references for future projects.
- Lesson learned in previous project are captured for future projects.
- The WIKI or J-Pedia on PWD website is useful for team project to manage project.
- Successful SO/PD in charge the project will become a role model for others.
- Reviewing of project schedule is guided by the requirement issued by PROKOM.
- Expert scheduler should be placed on critical projects.
- Project portfolio management need to be implemented in JKR
- Increasing the number of certified scheduler in JKR
- Improve competency (sincere, honest, trustworthy, just and fair, humble) in project scheduling
- Certified project manager must be a SO/PD
- Every stakeholders compulsory to adhere to the schedule that has been agreed
- In JKR Strategic Framework, JKR is to become world-class service provider in project management.
- No standard format or procedures to prepare project schedule and validate existed in JKR. Schedules are prepared based on individual experience.
- Schedules are prepared without specific objective

- The implementation schedule of the project in the planning stage is developed based on the ability of individual perception.
- Schedule is not validated by accredited professional.
- No standard Work Breakdown Structure (WBS) existed in guide schedule preparation.
- Schedule is prepared using standard planning software but not project monitoring and tracking process.
- Schedule prepared is time driven schedule.
- Schedule serve as general guideline only on project decision making.
- The task/activity value is not rationalized with contract BQ.
- Contractor appointed by JKR has sufficient knowledge in preparing the project schedule.
- JKR staff competence (sincere, honest, trustworthy, fair and equitable) in evaluating schedule.
- JKR have competent personal to evaluate and approved schedule submitted for the project.
- Preparation of project schedule includes the estimation of resources activity.
- JKR evaluate the contractor estimating activity duration based on certain guidelines not by personal experience.
- In the construction stage, the project schedule is prepared and developed by the contractor and verified by JKR.
- SO/PD is responsible to monitor, to tracking and updating project information.
- Sufficient certified scheduler in JKR is needed to handle projects.
- Contractor should provide very detail activity/task (class 4) in project planning schedule.
- Standard procedure prepared by JKR for the installation of works at the construction site.
- PROKOM guide and prepare requirements for reviewing project schedule for delayed projects.
- Each stakeholder adheres or follows to the schedule that has been agreed by JKR.

- The Project Management Office (PMO) is the center of reference for documentation, advisor expertise and standardizing the practice of project management and execution.
- Contractors appointed by the JKR should consist of good tender price, good track record and vast experience.
- Appointed contractor of JKR are based on highest mark in evaluation of tenders.
- To use standard process to terminate the contractor if they fail to show interest to meet the time frame datelines for project completion.
- In JKR practice, the Precedence Diagramming Method (PDM) is the highest-level technique used for managing time in project management or normally known as CPM by JKR.
- Project team member are constantly engaged in monitoring project on site.
- Project team member are constant engaged in tracking of schedule.
- All information on the site work were regularly updated, recorded and documented as a guide for future projects.
- All information related to the previous delayed project will be recorded later as a guide for carrying out projects in the future.
- Project schedule will have baseline as project time management benchmark.
- Decisions related to the project are based on the project schedule.
- The WIKI or J-Pedia on JKR website becomes source of reference to make a decision making for the project team to manage project.
- ECKM (Enterprise Content and Knowledge Management) serves as an information resource management and organisational learning.
- Any issues encountered during any project will be resolved partly as wholly guided by project schedule.
- Lessons learned in previous projects served as guide for future projects and continuous improvement.
- The most successful completed projects in JKR will become a portfolio, benchmark, inspiration and reference for future projects.
- All JKR in Malaysia used the Standard Work Procedures (SPK) for project reference.

- Project portfolio management is implemented in JKR and responsible to monitor and advise the project team in managing time.
- Provide ample time to discuss the problem of delay project in War Room and brainstorming sessions for problem solving.
- SKALA is a perfect monitoring tool for JKR.
- JKR is to become World Class Service Provider in project management. This includes time management as with acceptable quality and within cost.
- Provide a DASHBOARD report accurately for effective information delivery.
- PEMANDU (Performance Management and Delivery Unit) is an important committee at top management levels for project monitoring.