IDENTIFYING SUCCESS FACTORS IN A PUBLIC SECTOR PROJECT:
An Empirical Study of the Malaysian School Computer Laboratory Project

By

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Dedication

To:

my mum, Hajjah Zubaidah,

my dad, Haji Johari,

my wife, Nor Hayati,

and my children, Amir, Aliah, Atiqah.

Declaration

I declare that this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declared that this thesis has not been previously or concurrently submitted, either in whole or in part, for any other qualification at University of Stirling or any other institutions.

MOHAMAD FARAZI JOHARI

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Abstract

The public sector project is particularly a demanding undertaking, with the requirement to meet diverse demands. Despite huge investment, public sector projects tend to complete behind schedule, indicating shortfall in various project factors. This research was grounded on an empirical study of the Malaysian School Computer Laboratory Programme (SCLP) to examine the project success factors throughout the project life span. The extensive SCLP was divided into six zones, spanning urban and remote environment throughout Malaysia. Its implementation was staggered into several phases, two of which covered in this study, namely phase-1 and phase-2.

This research aimed to fulfil three research objectives: i) to discover the project management's success factors; ii) to determine the product's success factors that encompass various stakeholders; and iii) to identify project characteristics that influenced the project success. A comprehensive review of literature suggested 20 relevant project success factors to be investigated. Those factors were examined using a newly constructed framework, whereby the project life span was clustered into two segments – project process and project product.

The study adopted a qualitative paradigm; nevertheless it utilised both qualitative and quantitative approaches of data collection, which were triangulated to provide a wider scope of interpretation. The quantitative data for a total sample of 357 projects were sourced from Likert-type questionnaire and secondary resources, while qualitative data were sourced from combination of semi-structured interviews with 38 respondents representing 10 groups of project stakeholders and secondary data from various documents.

The results demonstrated that the project management of the SCLP was improperly administered. Out of five success factors investigated to verify the project conceptualization, only two namely project goal and project scope, were reasonably defined. One factor, stakeholder participation, was inadequately defined, while the other two factors, resources assessment and risk management, were not even taken into consideration by the project decision-making committee. There were also some deficiencies in the project planning. From six success factors tested, two were acceptably planned, i.e. project design and project costing. The other four, namely distribution of authority and responsibility, contractor selection, project scheduling, and project documentation, were insufficiently planned. The inadequacies in the project definition and project planning were reflected in the project execution as only two out of six factors, i.e. administrator effectiveness and communication, contributed to the project success. The other four, known as supervising team efficiency, contractor competence, integrity and external influences were negatively affected the project.

Despite some deficiencies in the project management, the outcome or product of the project was found to be successful particularly in the judgement of the target group, the users; they were satisfied with the SCLP deliverables. They also appreciated the benefit from the utilisation of the products, which greatly changed the approaches of teaching and learning. However, the SCLP completion time was not as successful as planned, believed to be a result of unrealistic scheduling during the planning stage. Nonetheless, there were cases of genuine delays due to various factors in the earlier stages.

The results also suggested that some of the project success factors were particularly influenced by project characteristics explored in this studied. The influences of these two characteristics, geographical zone and the project award method, could be seen in both the project management process and the project's product.

Overall, this thesis contributed to extant body of knowledge in various ways. A newly constructed research framework, with the concept of duality of project process and product, added depth to the longstanding idea of project success and expanded premises of the existing theory. This framework offered a better platform to identify when particular factors take place and affect the project along the project life span. This study also added a new insight to the Malaysian public sector projects management strategies in particular and to the other countries with the similar situations in general. A new paradigm in project decision-making by adopting a bottom-up concept rather than traditionally top-down alone during the project conceptualisation and a more realistic resource-based approach during the project planning, is suggested. In addition, this research proposed an ideal way to deal with various critical success factors in a huge programme.

Abbreviations

AGC	-	Attorney General's Chambers
AGD	-	Accountant General's Department
BB	-	Building Block Model
CF	-	Certificate of fitness
CIDB	-	Construction Industry Development Board
CPC	-	Certificate of Practical Completion
CSC	-	Contractor Service Centre (Locally known as *Pusat Khidmat Kontraktor*, *PKK*)
DEO	-	District Education Office
DGLM	-	Department of Director General of Lands and Mines
DO	-	Development order
DPSP	-	Division of Development, Privatisation and Supply, MOE
EOT	-	Extension of time
EPRD	-	Educational Policy Planning and Research Division
EPU	-	Economic Planning Unit
GBP	-	Great Britain Pound (British currency)
GDP	-	Gross Domestic Product
ICT	-	Information and Communication Technology
LA	-	Local Authorities
LFM	-	Logical Framework Method
LoA	-	Letter of Acceptance (also referred to as Latter of Award)
LoI	-	Letter of Intent
MOE	-	Ministry of Education, Malaysia
MOF	-	Ministry of Finance, Malaysia (also referred to as Treasury, Malaysia)
MYR	-	Malaysian Ringgit (Malaysian currency)
OBS	-	Organisational Breakdown Structure
PC	-	Personal computer
PMC	-	Project Management Consultant
PSC	-	Public Service Commission
PSD	-	Public Service Department
PUA	-	Public Utility Authorities
SCLP	-	School Computer Laboratory Project
SED	-	State Education Department
TOR	-	Terms of Reference
WBS	-	Work Breakdown Structure

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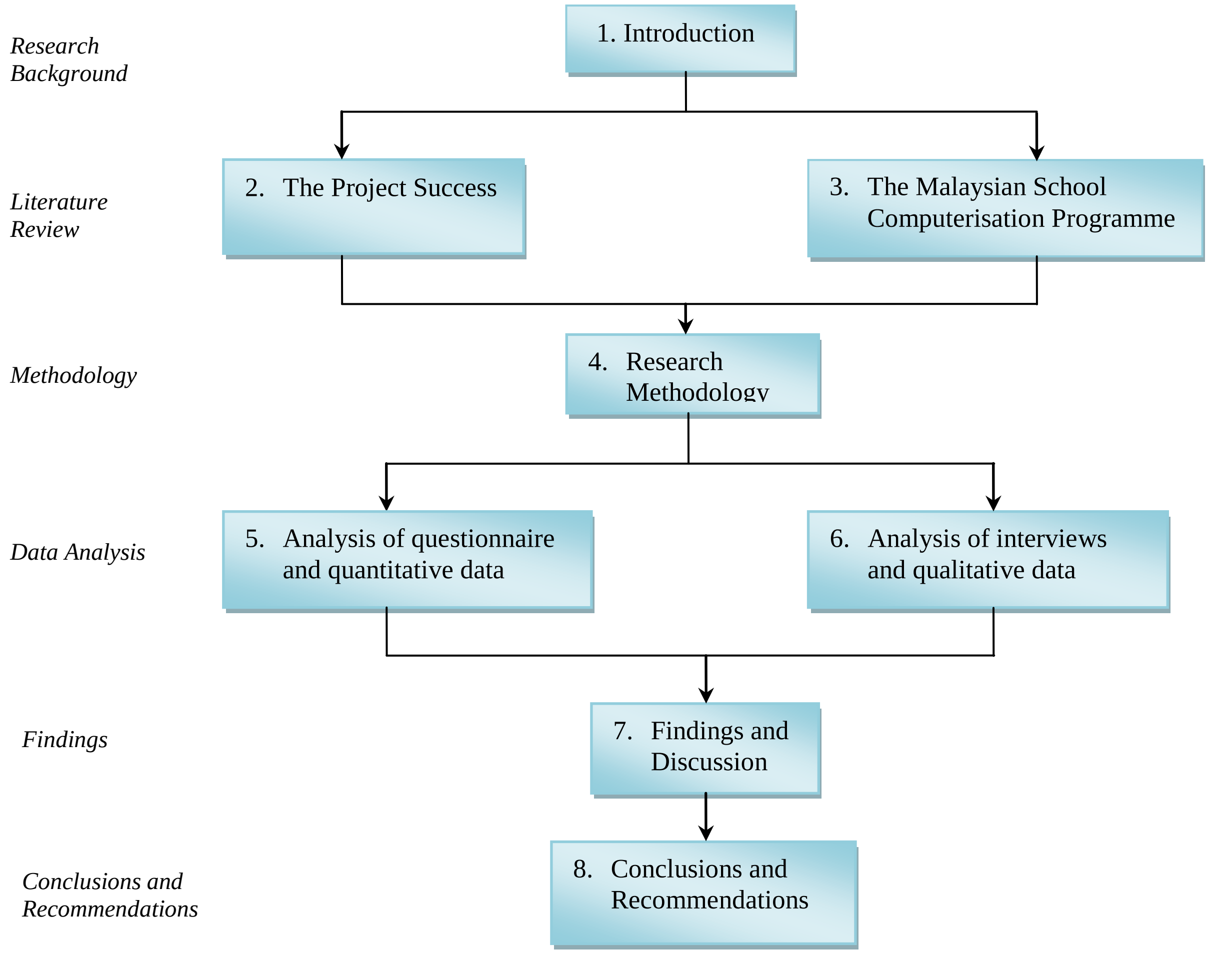
Thesis Roadmap

This thesis explores the success factors of Malaysian public sector projects. The studied case is an extensive computer laboratory programme, which consists of more than 4,000 projects. The research concerns factors contributing to the project success along the project life-cycle. This thesis contains eight chapters. To guide the readers in understanding it, the entire thesis is summarised it into a roadmap as follows:



Chapter 1: Introduction

Provides the background of the project being researched and the rational of selecting this project as studied case. The studied case is an extensive computer laboratory programme, which consists of more than 4000 projects. Also includes the problem statement, research questions, purpose of the study, and contribution of the research.

Chapter 2: Project success

Examines the corpus of the project management literature, and categorises the previous findings of factors contributing to the project success into four stages of project life-span to form a basis for the research. Finally, recognises the project characteristics that influence the success factors of the project, which is important to form a stronger base of investigation

Chapter 3: The Malaysian School Computerisation Programme

Explores the literature to discover the background and details of the studied project to form a strong basis in pursuing the research. Also explains the rationale behind the implementation of such a big project.

Chapter 4: Research methodology

Delineates the research guidelines and steps taken in conducting the research. Develops theoretical framework by proposing concept of duality of project pocess and project product based on epistemic foundation from the previous researches by various researchers. Includes the information about source of data, the data collection exercise and data analyses.

Chapter 5: Analysis of questionnaire and quantitative data

Performs hypothesis tests using data from questionnaires and secondary resources. Six project management factors and three product factors were tested using statistical analysis software, SPSS. Adopts the multi-criteria decision analysis (MCDA) to arrange the weighting for each criterion. Conducts one-way ANOVA to compare six project management success factors among zones, two-way ANOVA to compare six product success factors between phases and between zones, one-sample t-test to verify the performance of each studied factors, and the multiple linear regressions to test the relationship between project success factors.

Chapter 6: Analysis of interviews and qualitative data

Analyse evidence from project stakeholders' experiences gained through interviews and compare with the various project documents using NVivo to find the true story behind the studied project. Analysis of the 17 project management factors and three product factors identified those that were critical to the project success.

Chapter 7: Findings and discussion

Assimilates the results from the quantitative and qualitative analyses performing a triangulation to help confirm findings.

Chapter 8: Conclusion and recommendations

Summarises the important findings and concludes the achievements of the study that contribute to the body of knowledge, and suggests area for further research and action to be taken by Malaysian government to improve the Malaysian public sector projects implementation. Also discusses the limitations of the study. Finally, suggests further works to enhance this research and the best practices for the Malaysian public sector projects.

CHAPTER 1:

INTRODUCTION

1.1. OVERVIEW

Being a developing country, there is a huge development programme in Malaysia[1] to fulfil the demand in all sectors especially the social sector, which includes education, health, welfare, and community development where the government[2] has a high obligation. Rapid economic growth, with the average annual growth rate maintained at 7.0 percent during the period of 1991-2000 (Government of Malaysia 2001), had enabled the government to fulfil its obligation, and this resulted in an enormous number of the public sector projects throughout the country to solve various problems. Education is one of the most important areas and the government has accorded it a high priority. In the 2004 national budget for instance, MYR 3.7 billion (GBP 0.6 billion)[3] or 12.3 percent of the total MYR 30 billion (GBP 4.8 billion) national development expenditure was allocated to education (Treasury 2003), the highest compared to any other areas.

Despite huge investment and years of project management experience, many projects have been completed behind schedule and exceeded their allocated budget. This appears to be a common experience in public sector project but why does it happen? This study endeavours to find the answer by concentrating on identifying factors that significantly contribute to the performance of the public sector projects in Malaysia;

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[1] Please refer to Brief Facts about Malaysia in Appendix 2.

[2] Throughout this thesis, it means the Government of Malaysian unless stated otherwise; in some circumstances it may be represented by its agencies, either individually or collectively.

[3] Throughout this thesis, the currency conversion rate between Malaysia Ringgit (MYR) and British Pound (GBP) is calculated at GBP1.0 = MYR6.3 (exchange rate at 15 May 2008).

using one detailed case study, which incorporates numerous projects under the School Computer Laboratory Programme (SCLP). The aim of this research is to improve the project management practice in Malaysia and identify possible generic lessons for public sector project management.

1.2. THE STUDIED CASE

Developments in information and communication technologies (ICT) in Malaysia have rapidly made their way into the forefront of education concerns, where a total of MYR 637 million (GBP 101 million) of the 2004 development expenditure was allocated for school computerization (Treasury 2003). The Ministry of Education (MOE) has embarked on many different programmes for the use of ICT in schools including Computers in Education, *MySchoolNet*, and Smart School (Ngah & Masood 2006, MOE 2007). The latest of such programmes, the School Computer Laboratory Programme (SCLP), was the most extensive compared with any other previous programmes. The aim of SCLP was to furnish all public schools throughout the country with a computer laboratory by the end of 2003 (MOE 2000). It was not an easy task; records (MOE 2008) showed that there were 7,504 primary schools and 1,902 secondary schools in 2003.

During the early stages, the implementation of the programme faced a dilemma between planning the programme fully in accordance with the project management best practices (PMI 2004, Morris 1988, Cooke-Davies 2002) and fulfilling the requirement to complete the programme rapidly in order to cater the national interest (MOE 2000). Three major government agencies that directly involved in this programme – the Economic Planning Unit (EPU), the Treasury and the MOE - had expended their best effort to translate the vision of this large-scale programme into reality.

In order to make it easier to manage, the SCLP was divided into six zones[4] in accordance with the geography of Malaysia. The programme was also carried out with a phased implementation. By 2006, three phases of the programme namely phase-1, phase-2 and phase-3 had been implemented. However, only the first two phases are considered here since no data describing phase-3 were available at the time of the empirical research.

There were three major components of the SCLP, i.e. construction of laboratory building, supply of furniture and supply of ICT equipment. Normally, public sector projects or programmes in Malaysia were supervised by the Public Work Department (PWD) but the government appointed a private company (MOE 2000) to supervise this programme; this project supervising team is referred to as Project Management Consultant (PMC).

Initially, the government planned to implement the programme through a build-operate-transfer (BOT) privatisation approach. However, due to a variety of political and economical reasons, particularly related to the impact of Asian economic crisis in late 1997 (Government of Malaysia 1998), the government eventually adopted a more traditional public funded project approach to accelerate the programme. The private companies that had proposed the original programme were unable to go ahead with the BOT privatisation approach as they were affected by the economic crisis. However, the projects were eventually awarded to the same companies through direct-negotiation as part of the first phase of the programme.

[4] For anonymity reason, which is required by this study, those zones are not identified by their actual name; within this thesis, those six zone are known as Zone 1, Zone 2, Zone 3, Zone 4, Zone 5, and Zone 6 instead

There were 2,400 projects[5] in the first phase of the programme, which started in November 2000. Those projects were awarded to six contractors[6] (MOE 2000, Chan 2002). Contractor A, Contractor B, Contractor C, and Contractor D were awarded the contract for Zone 1, Zone 2, Zone 3, and Zone 4 respectively with 500 projects in each zone, while Contractor E and Contractor F were awarded the contract for Zone 5 and Zone 6 respectively with 200 projects in each zone. A summary of all six zones in phase-1 of the programme is provided in Appendix 3. However, Contractor F withdrew before the work started because of some disagreement with the conditions of the offer. The government had decided that the implementation of 200 projects originally awarded to Contractor F would be implemented in a later phase while the remaining 2,200 projects of phase-1 would be implemented immediately as planned.

Out of those 2,200 projects, only 1,932 were eventually carried out by the five contractors. Construction of the other 268 was not accomplished due to various constraints. All five contractors were given six months to complete their projects (MOE 2002a). However, none of the five companies managed to complete the all of the projects allocated to them within the specified time. The best contractor, Contractor B took about two years to complete all the projects awarded to them. Overall, the phase-1 of the SCLP did not achieve the target as stipulated in project TOR (MOE 2000).

The second phase of the programme, to provide a further 1,174 projects, started in October 2002 with the project scope and specification remaining largely the same as the first phase. However, after learning from the first phase experience, this second phase of the programme was carried out with two major revisions in implementation. Firstly, the

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[5] Since each computer laboratory project is allocated to a particular school, the project is named after the school where it is located.

[6] Due to anonymity reason, the phase-1 contractors are not identified by their actual name; within this thesis, they are known as Contractor A, Contractor B, Contractor C, and Contractor D, Contractor E and Contractor F instead

1,174 projects were awarded to small-scale contractors, whereby each contractor was given only one project (MOE 2003) to be completed within three months. This decision was made after taking into consideration the advice from the PMC who indicated that the prime contractors of phase-1 had been unable to cope with the volume of individual projects. The second adjustment was in the separation of contract; the supply component of the projects was awarded separately from the building construction component. In making this decision, the decision makers were of the opinion that it would be better for the government to deal directly with the supplier so that the supply of furniture and ICT equipment could be monitored closely.

While each contractor was awarded only one project in the construction component, the supply of furniture for the whole of 1,174 projects in phase-2 was awarded to a single supplier, as was the supply of ICT equipment. Furthermore, both furniture and ICT equipment supply contracts were awarded to the same company. The rationale behind awarding both supply contracts to the same party was to synchronise the supply, which would speed up the implementation of the projects (MOE 2003).

While the mean completion time for projects undertaken in phase-2 was substantially lower than that of phase-1, very few of the phase-2 projects met the 3-month target. In phase-1 the problems were attributed to the volume of projects awarded to each prime contractor: similar errors were repeated in the second phase, whereby contracts for furniture supply and ICT equipment supply were awarded to a single supplier. The supplies of furniture and ICT equipment were not delivered on time even though the buildings were ready.

At this point, after getting feedback from various parties, the government started to believe that the PMC's inability to handle the project management job might be the other major reason for the delay (MOE 2006a). The same company was employed as the PMC in both phase-1 and phase-2 of the programme. It was difficult for a single party to oversee such a large number of projects (Jang & Lee 1998). The PMC's inability to manage huge projects as in this case is not something isolated; it has been reported in several other projects and programmes (Jang & Lee 1998, Che Ahmad et al. 2005).

Overall, both phases of the programme were completed behind schedule and frustrated the government target to make all the schools ‘smart’ by leverage on the ICT programme (Abdullah 2006). Despite special efforts from the government and a large amount of funding, the SCLP was completed behind schedule. The first phase of the programme that started in November 2000 (MOE 2000, Chan 2002) only completed in 2004. The second phase of the programme, which started in October 2002 with some different approaches to improve the implementation after learning from the first phase experiences, was no better than phase-1 in terms of delivery time. The parties involved including project commissioner, project supervisor, and contractors were blaming each other and various reasons based on their own perception were given.

1.3. CONCEPTUAL PROBLEM

The SCLP was viewed by many as a failure. Certainly, delay is a symptom of shortfall in project delivery but should late completion be taken as the definitive measure in judging this programme as a failure? Previous research (e.g. Freeman & Beale 1992, Shenhar et al. 2002) suggested that project success could be affected by various factors; completion time is only one of many possible factors. In order to identify all possible particular factors that affect the project success, a careful investigation is necessary because the effect of those factors could be different from one project to another (Freeman & Beale 1992, Liu & Walker 1998, Shenhar et al. 2002). The programme needs to be seen from various stakeholders’ point of view, starting from pre-development stage to the post-delivery stage. Usually, different parties assess the success of projects in different ways, reflecting their interest in the project (Shenhar et al. 1996, Shenhar et al. 2002). This potential for divergent views and the need to please different parties appears to be particularly important in public sector projects such as the SCLP where there are multiple stakeholders often with very different priorities. Or is this just an excuse and perhaps public sector project management is intrinsically less efficient (Shafik 2001)?

This study aims to identify all possible factors from various stakeholders' perspectives and investigate how they affected the project success throughout the project life span. Since the factors are manifest at different times, it is important to relate them to particular stages of the project life cycle. For the purpose of this study, the project life cycle is divided into four stages namely initialisation, planning, execution and product (Wideman 2002). The first three stages are collectively described as project "process", while the final stage is known as project "product". The success of factors that occurred during the project process is referred to as project management success while the success of factors that occurred during the project product is known as product success (Cooke-Davies 2001). A major theme of this research is to explore the strict use of this concept of duality in striving for a better understanding of the nature of project success.

This concept had been utilised by numbers of previous researches. Baccarini (1999) in his Logical Framework Method (LFM) had clearly distinguished project management success from product success. However, his model was lacking in two important elements, i.e. project life cycle and project success factors. Conversely, Lim and Mohamed (1999) in their Building Blocks (BB) model had clearly acknowledged the project life cycle and project success factors but their model did not distinguish project management success and product success. In this study, the two models are combined to provide a more precise concept of duality as a basis for exploring project success.

In addition, this study aims to discover whether the differences in project characteristics affected the project success factors. One project characteristic, namely the project award method, is often regarded as a major influence on project success. Different project award approaches are illustrated in the different phases of the programme. In phase-1, all three components of the project – building construction, furniture supply and ICT component supply – were packaged in single contract, while in phase-2, the three components were separated into three contracts. The other difference between the two phases was in the number of projects awarded to particular contractors: in phase-1, a large number of projects were awarded to each of five contractors while in phase-2; each contractor was awarded only one project for the construction component.

Malaysia has a number of geographical, economic, social and political features that affect programmes such as the SCLP. In any country, the project management experience has to be viewed within the local context. A notable feature is the diversity across Malaysia so the geographical zone was identified as potentially important to project success. Among those zones, there are considerable differences in socio-economics, the basic infrastructure, standard of living and expectations of people about government projects. The SCLP was an example of a Malaysian public sector programme involving a large capital investments, identifying the success factors is crucial as part of the development of a greater understanding of managing public sector projects. In addition to identifying some practical recommendations for improving the management of future Malaysian public sector programmes, the research is intended to contribute to the existing body of knowledge worldwide of public sector project and programme management.

1.4. RESEARCH QUESTION

The first question this study tries to address is related to the project process, comprising the stages of project conceptualisation, planning and execution:

Research question 1:

What are the factors that critically influenced the success of the project management? How did those factors being deployed throughout the project process?

Previous research (Freeman & Beale 1992, Shenhar et al. 2002) suggests that project success is affected by various factors; this study would consider all those possible factors based on the review of the literature. The study also includes an examination of the differences between two phases and between six zones of the SCLP.

The second question regarding these issues is related to the post-delivery stage of the projects, distinguishing the project product from the project process:

Research question 2:

What are the factors that contributed to the success of the project product? Did those factors encompass the different stakeholders' perspective of success?

As in question 1, answering this question should help understand the differences between phases and zones of the projects. While studying the product success, this research also aims to examine the different perspectives among various stakeholders (Shenhar et al. 2002) with interests in this programme. Addressing the above two questions would contribute to answering a further research question:

Research question 3:

What are the project characteristics associated with the different approaches of project award and different geographical locations? How did those characteristics influence the project success factors?

To address these research questions, the study exploits a rare opportunity of the repetition of similar school laboratory projects across Malaysia. The six zonal divisions provided the data set to enable the analysis of the characteristics related to project location. In the same way, the two phases provided a data set enabling a comparison of programme and project characteristics such as the contract award mechanism.

Answering these three research questions should help resolve some of the problems in managing Malaysian public sector projects in particular and contribute to the body of knowledge of public sector project management worldwide in general.

1.5. RESEARCH OBJECTIVES

This study aims to add to the literature an empirical investigation of the strategies to manage the implementation of public sector projects in Malaysia, particularly large programmes which are exposed to uncertainty. Most of the previous studies of this topic were conducted outside Malaysia. Since the factors that affecting the project might different between different countries (Shenhar et al. 2002) and different situations (Liu & Walker 1998), an empirical study specifically referred to real case of Malaysian local project is essential.

Previous studies conducted by local researchers (e.g. Lim & Mohamed 1999, Jaafar et al. 2007, Sambasivan & Soon 2007) either focussed on a specific single project or on a single issue. This empirical study is different from those previous studies in that it involves a mega-programme across the country and tries to examine the problem from various angles throughout the project life span. This study aims to explore the sources of problems that have been mentioned in 1.2. Three research objectives are identified, as follows:

Research objective 1:

To identify the project management success factors and determine whether they were adequately pursued throughout the project process.

Research objective 2:

To identify the project product success factors and determine whether these factors encompassed the different stakeholders' perspective of success.

Research objective 3:

To discover the impact of project characteristics, notably the different approaches of project award and the different geographical locations to project success factors.

The first objective is intended to demonstrate the importance of proper project process, starting from pre-development stage through to the project completion. Through the case study analysis, this research will identify the factors that influence the project management success. In the same way, the intention of the second research objective is to identify the factors that significantly contribute to the product success. Since different groups of stakeholders might value the project differently, the perspective of each of them is considered. Finally, the third objective is meant to verify whether the impacts of those factors to the project success were influenced by project characteristics and notably the project award approach and geographical location.

1.6. EMPIRICAL SETTING

The research assembled a number of different empirical data sets, qualitative and quantitative, primary and secondary. These were analysed to compare behaviour between projects and also between programmes in an attempt to answer the research questions.

The first major data set was obtained from a series of face-to-face interviews undertaken with representatives of all ten groups of key stakeholders and project participants using a semi-structured set of questions. The use of interviews allowed some of the more subtle issues to be raised, such as the use of non-standard project procedures. These data enabled the exploration of the whole programme in general, the differences between projects undertaken in different phases and the zones and the variation in stakeholders' perspectives.

The second data set obtained through Likert-type questionnaires was intended to expand the information from two groups of stakeholders, the phase-2 contractors and the users. Although the questions were limited to well-defined issues, the survey allowed a reliably large database to be established. In addition to enhancing the analysis of the variations in the perspectives of the different stakeholders, the data from the phase-2 contractors, would help develop an understanding of the variation due to project location, while data from the users would help explain the variation in both award method and project location.

Apart from those primary data, this research also utilised the secondary data obtained from various documents. The qualitative component of these data provided a description of the programme in general were the project completion times for each school laboratory. These completion times were related to the data describing project and programme behaviour, and notably the contract award methods of the two phases.

1.7. RESEARCH METHODS

This study is based on empirical research from an exploratory case study from the Malaysian public sector programme. The study focuses on understanding the project success factors in the Malaysian School Computer Laboratory Programme, starting from conceptualisation stage to post-delivery stage. The Programme consists of a large number of similar projects providing an opportunity to compare experiences. Both qualitative and quantitative approaches of data collection are utilized.

Much of the analysis is undertaken within a framework developed by combining two existing models known as Building Block (BB) model (Lim & Mohamed 1999) and the Logical Framework Method (LFM) model (Baccarini 1999). A major element of this framework is the duality of project process and project product; the other important element is that it helps distinguish the influence of the project success factors at each specific stage along the project life cycle (Shenhar 2002, PMI 2004). This framework is used to the help identify the importance of each project success factors more precisely.

Using the literature, twenty factors that are believed to have some impact on the project success are identified and grouped into four dimensions, namely: project definition, planning, implementation and the delivered product. Seventeen of the factors are associated with the project process while the other three relate to the project product. In addition, various project and programme characteristics are also investigated; these relate to contract award methods and the project locations and may be expected to have certain influences on the success factors. The research considers the perspectives of the different groups of stakeholders when trying to understand project success. Information from the different groups is collected using both questionnaires and interviews providing a basis for analyses comparing their different attitudes and priorities. Ten groups of stakeholders are identified: i) the planner, ii) the financier, iii) the ministry-level owner, iv) the state-level owner, v) the district-level owner, vi) the supervisor, vii) the phase-1 contractor, viii) the phase-2 contractor, ix) the supplier, and x) the user.

The results of qualitative and quantitative analyses are triangulated to enhance the interpretation (Creswell 2003) and to increase the credibility and validity of the findings (Bryman & Bell 2003, Tashakkori & Teddlie 2003). The triangulation is the best method of cross-checking data from multiple sources to get regularities (O'Donoghue &

Punch 2003) which finally gives a more detail and balance picture of the situation (Altrichter et al. 2008).

1.8. RESEARCH FINDINGS

The study identified a number of specific issues that affected the outcome of the SCLP. It appears that there were a number of deviations from standard practice:

- the programme was inadequately conceptualised and planned due to the time constraint;
- some important stakeholders were not given a genuine opportunity to contribute their views;
- the selection of the contractors did not follow the standard ;
- body appointed as the project monitoring and supervising team did not have the necessary experience.

Comparing the contract award policies of the two phases of the SCLP, it appears that while the use of a few prime contractors with a full package contract may be administratively attractive, there are some advantages in making direct awards to multiple small-scale contractors. Awarding a single project to small-scale contractors can be more flexible and responsive resulting in fewer delays but they often require more support. The other lacking in the phase-2 contract method is in the separation of contract according to project components, which requires an appropriate coordination to synchronise.

The late completion of the programmes resulted in some viewing the SCLP as a failure However, other stakeholders, notably the users, judged the individual projects to be successful. This apparent contradiction can be resolved by distinguishing between the project process and the project product. Despite certain shortfalls in the project process, the study indicated that the project products were well accepted by the users. Late delivery was not affecting their judgement of the ultimate benefit of the products to the students as well as the teachers. Although the project may have been a project management failure, the product was a success. This range of views from different stakeholders is likely to be typical of public sector projects.

While Malaysia has particular problems with geography and some attitudes towards adopting standard practices, these may be found in many countries. The findings of this study should be relevant to public sector programme and project management across the world.

1.9. SUMMARY

Despite a high priority accorded by the government, large numbers of public sector projects or programmes in Malaysia were not completed as planned. The SCLP illustrated this problem and provided a case study that was used to identify factors that contributed to the success and failure of the projects in this programme. Adopting the concept of duality of project process and project product, this study developed a new model so that the success factors could be indentified more precisely throughout the project life span. The study also endeavoured to determine the influence of project characteristics on project success: the results indicate that despite some shortfalls in the SCLP project process, the product was a success.

CHAPTER 2:

PROJECT SUCCESS

2.1. OVERVIEW

The concept of project success is multi-dimensional; different people assess the success of projects in different ways (Shenhar et al. 1997), and certain factors may have different impacts on the various aspects of success (Freeman & Beale 1992). This chapter reviews the literature to find out the explanation of the project success before identifying various factors that could significantly contribute to the success of a project. The discussion also elaborates various concepts of project success, makes a clear distinction between those concepts and identifies criteria used to express the success. As different factors may affect the project at different time, this chapter also includes the project life cycle and indicates the point in the project life span where certain factors possibly take place.

2.2. WHAT IS A PROJECT?

Defining the project in order to understand its nature is essential before beginning a critical review about factors that influencing its success. The term project might mean different things to different group of people depending on particular activity they referred. Encarta Dictionary (EDT 2005) defines a project as a task or scheme that regards a large amount of time, effort and planning to complete, while Cambridge Advanced Learner's Dictionary (CALD 2003) defines it as ‘a piece of planned work or an activity which is completed over a period of time and intended to achieve a particular aim’. In Oxford Advanced Learner's Dictionary project is defined as a planned piece of work that is designed to find information about something, to produce something new, or to improve something (OALD 2005).

2.2.1. Project

In project management discipline, the term project is widely used in various contexts by different groups of people to describe their perception, depending on particular kind of work related to them. Buchanan and Boddy (1992) for instance, describe the project as:

> *"A unique venture with a beginning and end, conducted by people to meet established goals within parameters of cost, schedule and quality." (p8).*

These authors emphasise element of uniqueness and temporariness in their description of project. Uniqueness is mentioned as 'a beginning and end'. Their concept of temporariness and uniqueness has been supported by PMI (2004) through a popular book, A Guide to the Project Management Body of Knowledge:

> *"A temporary endeavour undertaken to create a unique product or service." (p368).*

According to this author, unique means the product or service is different in some distinguishing way from all similar products or services. Uniqueness is the only characteristic that distinguishes a 'project' from the day-to-day indefinitely and predictable repetitive works known as 'operation' (Turner 1993, Field & Keller 1998). However, it is useful to consider the fact that there are some projects with a combination of some repetitive aspects from the previous identical project, beside new unique aspects of the project to be implemented. In other word, often projects are not truly unique, just unique for the particular client or contractor.

The other important feature of project is temporariness. PMI (2004) describes temporary as a definite beginning and a definite end for every project. The end of the project is reached when the project's objectives have been achieved, or it become clear that the objectives will not or cannot be met. This includes the situation where the need for the project no longer exits and the project is terminated by the project owner.

On top of those two features discussed above, Buchanan and Boddy (1992) also acknowledge goal as an important feature of every project. Goals sometimes tend to be confusing with objectives. A goal is described by some literature (Turner 1993, Field & Keller 1998, Wideman 2002) as a general, broader and intangible target, while objective is mentioned as a more descriptive, focussed, and tangible aim. Both terms can be simplified as targets or aims expected by an organization to achieve as a result of spending time and resources to complete a project.

Despite acknowledge the importance of 'beginning and end', Buchanan and Boddy (1992) do not include the other elements that are vital to the project, i.e. the project's resources and project's deliverables. Turner (1993) comes out with a broader scope by introducing more features in his definition of project:

> *"An endeavour in which human, material and financial resources are organised in a novel way, to undertake a unique scope of work, of given specification, within constraint of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives." (p8).*

The important element introduces by the author in this definition, is resources. Well utilization of project resources would lead the projects to complete successfully. Project resources can be divided into three major types: human, material and financial. The author also points out beneficial change as the other feature of the project. Beneficial change means the project's deliverables, either product or service, should establish some improvement. Sometimes project deliverable is mention as output and outcome. In a simple explanation, output is the direct and measurable products or services delivered by the project, while outcome refers to the impact of particular output (Taylor-Powell & Henert 2008).

Turner and Müller (2003) who review Turner's (1993) earlier definition find out that it is incomplete definition although it is not wrong; therefore introduced a new definition with some enhancement:

> *"... project is a temporary organization to which resources are assigned to undertake a unique, novel and transient endeavour managing the inherent uncertainty and need for integration in order to deliver beneficial objectives of change". (p7).*

They have included uncertainty and integration as features of the project. Uncertainty, sources from various project characteristics (McFarlan 1981, Wohlin & Mayrhauser 2000) could affect the project, either negatively or positively (Wideman 2002). Negative uncertainty is known as project risk, while positive uncertainty can be describes as opportunity. Project also needs for integration of the resources so that it can be utilised efficiently.

From the above discussion, it is apparent that different authors have different definition of the project, depending on type of work they are working with. After considering those views, the key features of a project can be simplified as in Table 2-1, and for the purpose of this study, a project is defined as:

> *"a unique and temporary endeavour whereby resources are utilised and integrated within a specific time and inherent uncertainty aiming for particular objectives so as to deliver outcome with beneficial change".*

Quality in project is acknowledged by some literature (e.g. Buchanan & Boddy 1992) as a much more elusive substance. There is much debate about the definition of quality in the context of project management (see Flett 2001). Measuring quality in project is not an easy task as its interpretation is often depend on evaluation by various parties, whether it fulfilled their expectation.

Table 2-1: Key features of the project

- unique, that is, a one-off or non-repetitive undertaking, where each one is different from the others;
- temporary, which means, there should be a beginning and an end;
- utilisation of resources;
- constraint of time;
- specific pre-defined objective to be achieved;
- subject to uncertainty;
- need for integration;
- beneficial change, i.e. improving outcome.

2.2.2. Programme

There are situations where numbers of similar project owned by the same organisation, financed by the same financier and managed by the same project management team. Most of the project management literature categorise this group of projects as a programme. PMI (2004) for instance, defines programme as a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Turner and Müller (2003) share the same definition when they mention a programme as a temporary organization in which a group of projects are managed together to deliver higher order strategic objectives not delivered by any of the projects on their own.

The benefit of managing those projects together, rather than manage them individually, is to optimise the utilisation of resources available. Managing programme is easier as those related projects have the same scope and common goals (Murray-Webster & Thiry 2000). Although a clear distinction is needed to show the difference between project and programme, both terms are normally used interchangeably in order to make it easier to discuss (Wideman 2004, Nickson & Siddons 2007).

2.2.3. Portfolio

The situation is more complicated when numbers of dissimilar and unrelated projects are managed together by the same management team, as those projects are not sharing the scope and goals, even though they are owned by the same organisation and financed by the same financier. In this circumstance, the group of projects is referred to as portfolio. A portfolio of projects is defines as an organization (temporary or permanent) in which a group of projects are managed together to coordinate interfaces and prioritize resources between them and thereby reduce uncertainty (Turner & Müller 2003).

Treating a set of projects as a portfolio may not favour some of the stakeholders. Users for instance, are interested in the deliverable rather than the way projects are managed. Project portfolio management benefited those parties who handling numbers of different projects (Cooper et al. 2001, Hubbard 2007) at the same time, including project owner and project financier. It is also of the interest of contractors if they have numbers of different project at the same time.

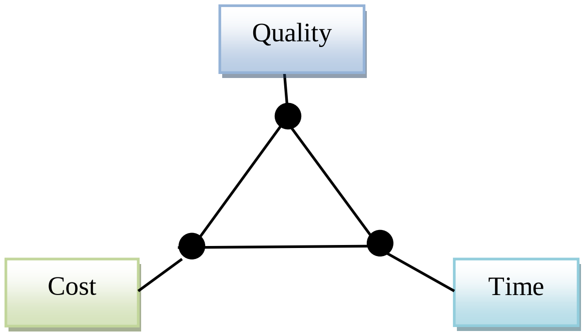
The fundamental purpose is to determine the optimal mix and sequencing of various projects, even though those projects are dissimilar, to gain the best achievement for the organization. A good project portfolio management is the one with proper planning and timing so that the project resources such as skill workers or heavy machineries can be utilized as optimum as possible (Cooper et al. 2001).

2.3. DEFINING PROJECT SUCCESS

The term ‘project success’ sometimes tend to be intertwined with ‘project management success’. Describing the attributes of a successful project could not be done straightforwardly as there is lack of agreement concerning the criteria by which success is judged (Shenhar et al. 1997, Lim & Mohamed 1999, Shenhar et al. 2002). Baccarini (1999) emphasises that even though project success is core concept of the project management, its definition remains elusive. Different stakeholders can interpret success differently because of varying perceptions and different priorities; this could lead to disagreements among them about whether a project is successful (Liu & Walker 1998). To have a better understanding about project success, it is useful to draw a clear distinction between several project management concepts to avoid the confusion.

Before examining factors that influence the project success, it is useful to have a better understanding about the project objective because it is used to depict the performance of the project. The project objective, which sometimes referred to as project goal, is a concrete statement describing what the project is trying to achieve (Wideman 2002). Traditionally, achieving three objectives - time, cost, and quality – as in Figure 2-1 were used to quantify the project success (Cleland & King 1983, Lashbrooke 1992). The project is considered successful when all those three parameters were achieved (Turner 1993).

However, measuring the project success solely on time, cost, and quality has been criticised as inaccurate and inadequate (Shenhar et al. 1997, Wateridge 1998, Shenhar et al. 2002, Yu et al. 2005a). Other parameters, which will be discussed later in this chapter, have been introduced as dimension to measure the project success based on specific objectives determined prior to project implementation. The other important point that needs to be considered was that, different people have their own objective and priorities (Shenhar et al. 2002); success will be determined by individuals from their own perspective (Lim & Mohamed 2000).



Source: Turner (1993)

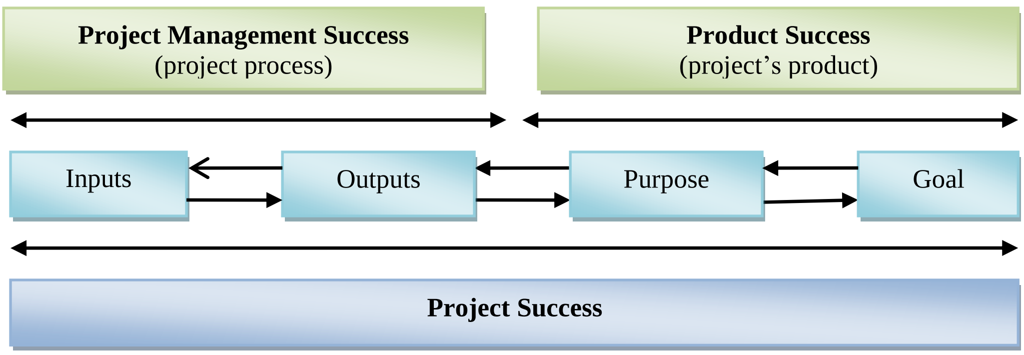
Figure 2-1: Conventional project objective - cost, time, and quality

Cox et al. (2003) suggests an alternative approach to this complex situation using key performance indicators (KPI) to constitute those success criteria. It is suggested that KPIs are helpful to compare the actual and estimated performance of effectiveness, efficiency and quality of both project process and product. In construction projects, this approach is still new (Chan et al. 2004) and has not yet been demonstrated in practice; perhaps further research on this area would be carried out by some researchers so that it can be a potential guideline of applying it by construction project to measure the performance (Cox et al. 2003).

2.3.1. Project Management Success and Product Success

It is useful to distinguishing ‘project success’ from ‘project management success’ in order to avoid confusion between these two terms. According to de Wit (1988) project success is measured against the overall objectives of the project, and project management success is measured against the widespread and traditional measures of performance against cost, time and quality. This author does not emphasise ‘product’ as the other important component of the project besides ‘project management’, despite quality, which is measured during the product stage, is included. Quality is often measured by comparing the specification or expectation with the outcome.

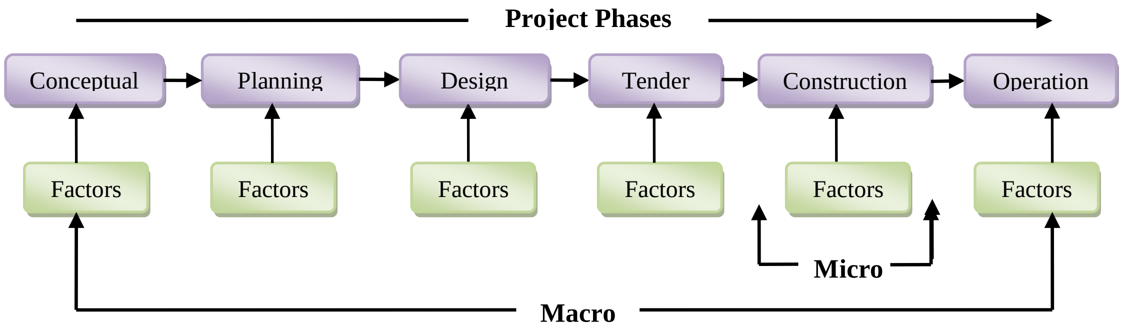
Through a project hierarchy known as Logical Framework Method (LFM), Baccarini (1999) introduce a more clear distinction between the two; furthermore isolating the two segments of project success, i.e. project management success and product success. According to this author, project management success focussed upon project process, which in particular, the successful accomplishment of cost, time and quality; while product success dealt with the effects of the project's final product or output. By applying this concept, project life span was explicitly divided into two segments, i.e. project process and project product. These two components were link by four smaller components of objectives known as input, output, purpose and goal as in Figure 2-2. Success is measured in terms of how these objectives have been met.



Sources: Baccarini (1999)

Figure 2-2: Logical framework method (LFM) and project success

This model is similar to the model of the building blocks (BB) by Lim and Mohamed (1999) that show the complete project life cycle as a project progresses, starting from the conceptual phase until the operation phase. There are series of factors along the life cycle that contribute to project success. As presented in Figure 2-3, those contributing factors are mentioned as micro view, while the whole cycle is described as macro view.



Source: Lim and Mohamed (1999)

Figure 2-3: Building blocks (BB) of project life cycle

The formations of both models mentioned above were based on the same platform, i.e. project stages or life cycle. As factors influencing project success might be different along the project life cycle, the separation of project into stages was crucial. Successful projects were those that met both project management success and product success (Baccarini 1999). Even though this situation is difficult to attain (Wateridge 1998), it is not something impossible with sufficient effort from all parties involved in the project.

A project could be a product success despite project management failure if the objectives are met. Conversely, a project could be product failure despite project management success if the objectives are not achieved. In general, the product success was of a higher order and ultimately of greater important (Baccarini 1999). Two projects in Britain are good examples to explain these concepts. The Millennium Dome in London, opened to public on 1 January 2000, was a project management success; it was completed on time and within the predetermined £750 million budget. However, from the British people viewpoint it was considered a product failure, as it failed to attract the number of visitors anticipated (BBC 2001) and its long-term purpose was unclear. In contrast, Scottish Parliament scheduled to open in 2001 was more than three years late. The building eventually opened in 2004 with an estimated final cost of £414 million, more than ten times higher than initial estimates of £40m (White & Sidhu 2005). Obviously, it was a project management failure but it is a product success, as this building has become a positive national symbol.

2.3.2. Success Criteria and Success Factors

The other two project management concepts that need to be distinguished are 'success criteria' and 'success factors'. Cooke-Davies (2002) defines success criteria as the measures by which success or failure of a project or business will be judged; while success factors is defined as those inputs to the management system that lead directly or indirectly to the success of the project or business.

Lim and Mohamed (1999) have almost the same view in defining those two project management concepts. These authors define the success criteria as the set of principles or standards by which project success is or can be judged; while success factors as the set of circumstances, facts, or influences that contribute to the project outcomes. To make it easier to understand, the term 'element' could be useful to mention those three measures - circumstances, facts, and influences – in a single term.

A clear distinction between success criteria and success factors is important to avoid confusion and intertwine between the two. However, in the actual practice it is not always easy to make a distinction. Sometimes a particular contributing factor could also be a measure to judge the other group of factors. For instance, ‘project completion time’ is a success criterion when it is used to measure the project performance; at the same time, it could be one of the factors contributed to stakeholder satisfaction.

The matter becomes more complicated after taking the other project management term, project characteristics, into the figure. Dyrhaug (2002) emphasizes that project characteristics such economic climate, stakeholder interference, project ownership, and project size could influence the impact of the project success factors. The affect of project characteristics on the project success will be discussed later in this chapter.

Success is not only a performance indicator measured after project delivery but it is also a strategic planning made prior to project implementation. Several researchers (Shenhar et al. 1997, Wateridge 1998) suggested that project success criteria should be clearly defined before project starts. The criteria should be determined after considering views from key stakeholders. Since different groups of stakeholder might have different priorities (Shenhar 2002), give-and-take among them is important so that they could reach some extent of consensus before the project started.

2.3.3. Critical Success Factors

Among those success factors, there were some that extremely important and must exist to ensure the project complete successfully; these important factors are referred to as ‘critical success factors’ (CSF). This concept has been used as early as nineteen seventies by Rockart (1979). This author mentioned it as the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. Wideman (2002) defined CSF as those measurable factors, listed in order of importance, that when present in the project environment are most conducive to the achievement of a successful project. According to this author, CSF might vary depending on project characteristics.

In the project management discipline, Pinto and Prescott (1988) were among the earliest who introduced this concept. They distinguish factors that were critical for the project successes in various disciplines. Pinto and Slevin (1988) also apply CSFs concept while researching the competencies of project participants across the project life cycle. Construction project, especially in the large-scale projects, is a challenging area that requires CSFs to be identified prior to project implementation (Toor & Ogunlana 2008).

Since late nineteen eighties, there were numbers of researchers (Ashley et al. 1987, Savindo et al. 1992, Songer & Molenaar 1997, Chua et al. 1999, Chan et al. 2001, Cooke-Davies 2002, Yu et al. 2005b, Fortune & White 2006) who investigate CSF in the construction projects. Despite lots of researches conducted, there is little agreement on the CSFs among those researchers. Table 2-2 records lists of different CSFs from different researchers.

Table 2-2: Different CFS determined by different authors

Authors	**CSFs**
Pinto and Slevin (1988)	mission, top management support, schedule, client consultation, personnel, technical, client acceptance, communication, feedback, and trouble-shooting
Chua et al. (1999)	project characteristics, contractual arrangements, project participants, interactive processes
Chan et al. (2001)	project team commitment, contractor's competencies, risk and liability assessment, client's competencies, users' needs, constraints imposed by users
Yu et al. (2005b)	project-related factors, human-related factors, process-related factors, input-related factors, output-related factors
Fortune and White (2006)	goals and objectives, performance monitoring, decision-maker(s), transformations, communication, environment, boundaries, resources, continuity

2.4. CRITERIA USED TO MEASURE PROJECT SUCCESS

As mentioned in 2.3.2, success factors are those inputs in project that lead to its success. The contributions of those factors to the project success, either positively or negatively, are judged using success criteria. Many factors have been found to affect project success, which several authors divided them into smaller sets so as to make them easier to understand. Pinto and Slevin (1988) for instance, divided the factors identified by their sample of project managers into ten groups namely mission, top management support, schedule, client consultation, personnel, technical, client acceptance, communication, feedback, and trouble-shooting. The term dimension is used by most of the authors (e.g. Kirsilä et al. 2007, Ipsilandis et al. 2008) to refer to the groups of those projects success factors. Set of success factors grouped under particular dimension are associated with the same particular criteria.

2.4.1. Dimensions

Traditionally, as mentioned in 2.3, performances of the three principals of project - cost, time, and quality - were used to portray the project success. Cleland and King (1983) for instance, described the project as a complex effort to achieve a specific objective within a schedule and budget; schedule referred to time while budget referred to cost. Lashbrooke (1992) concluded that the project is considered successful when the project owner is satisfied with the quality of the output, while the completed project met the predetermined budget and time.

Recently the concept has been changed; judging the project performance solely based on those three criteria has been criticised as inaccurate and inadequate. Other dimensions have been used to measure project success; mainly focusing on the impact of the project to the organisation or the stakeholders. Cooke-Davies (2001) emphasised that recently the project success criteria take into consideration the existence of a product or service that the project creates, not just the project management process. However, different authors offered different dimensions to be used as criteria to judge project success. As projects were multi-dimension, it is difficult to find a common understanding of the criteria used; the matter become more complicated when different people have different priories in the project. They assess the project success in different ways and the assessment of the success may vary over time depending on their personal interest (Shenhar et al. 2002).

Several studies have introduced more sophisticated approaches on how project success might be measured. Pinto and Slevin (1987) described the successful project as one that results in organisation change. However, this definition seems imperfect, as it did not mention any measure of the product or outcome of the project to the organisation or project stakeholders. Specially referring to the engineering and construction portion of the project life cycle, de Wit (1986) outlined six success criteria that are most frequently used to measure construction project success: budget performance, schedule performance, client satisfaction, functionality, contractor satisfaction, and project manager/ team satisfaction. While traditional criteria of budget and time (mentioned as schedule) were maintained, it is apparent that special focus has been given to the stakeholders' satisfaction by the author. Surprisingly, users' satisfaction was not clearly mentioned, even though this group of stakeholders should be regard as possibly the most important.

Based on studies of success of IS/IT projects, Wateridge (1998) provided a wider definition by suggesting six success criteria: profitable for the owner and contractors, achieves its business purpose, meets defined objectives, meets quality thresholds, completed within specified resources (specification, budget, and time), and all parties are happy during the project and with the outcome of the project. Even though project lifecycle was not clearly stated, the criteria used by the author almost covered the entire lifespan of the project compared to de Wit's which highlighted only the construction portion.

Freeman and Beale (1992) review 14 papers, and summarise their finding about project success criteria into seven categories: technical performance, efficiency of project execution, managerial and organizational implications, personal growth, project termination, manufacturability and business performance, and technical innovation. However, it is unusual to include project termination as one of project success criteria. Shenhar et al. (1997) used 13 factors for project success and grouped into four dimensions: meeting the design goals, benefit to the customer, commercial success, and future potential. Comparing Chinese and Norwegian project management, Andersen et al. (2002) defined project success from three dimensions: project goals achieved, project purpose achieved, and learning and motivation.

2.4.2. Different Perceptions

It is apparent that the literature discussed in 2.4.1 above offer diverse definitions, making it difficult to have a universal agreement of the success criteria. Prioritising the criteria is also difficult as priority varies by project. Whatever criteria determined for measuring project success, they must be set out by the decision-maker during the conceptualisation stage of the project. Munns and Bjeirmi (1996) highlight that top management who responsible for the success of the project in the long term were ultimately responsible for setting the project goal and purpose; they cannot abdicate responsibility by passing all duties to project team. Determination of the project purpose was beyond the responsibility of project management team (Youker 1993), as their duty was only during the project execution and ended once the product delivered to the costumer. Even though the users were those stakeholders who determined the project's product, they were not generally responsible for the failure. However, they can influence the project such as posing unnecessary requests which directly or indirectly affected project performance.

Since various groups of stakeholders are involved in the implementation of a project, each group's views need to be considered. Different groups of stakeholders have different interests in the project and this results in different priorities set in order to fulfil their own needs. It is important to verify the real extent of the involvement of those stakeholders in the project definition process. With a genuine involvement in the project definition, the stakeholders will have the opportunity to air their views. This is especially important to ensure that all the project fundamentals were taken into consideration. However, as the inputs encompass a wide range of people with their own subjective perception of success, the project might not equally satisfy everybody; the project may be considered successful if some stakeholders are satisfied in some degree (Shenhar et al. 1996). However, equally the project may be described as a failure if some stakeholders are dissatisfied.

The other issue in studying project success is that, it is not always easy to make a distinction between success factor and success criteria. Sometimes a particular input is a contributing factor to the project success but at the same time it is also criteria used to judge the other group of factors. For instance, 'time' is a criterion when it is used to measure the project performance; at the same time, it could be one of the factors contributed to stakeholder satisfaction.

2.5. THE PROJECT LIFE SPAN (LIFE CYCLE)

Both LFM and BB models, discussed in 2.3.1, are associated with the project life cycle. Most of the authors (de Wit 1986, Wateridge 1998, Shenhar et al. 2002) also relate their discussion about success criteria with life cycle of the project. Elaboration about association between project life cycle and success factors is essential so that it could be clearly understood. This is especially because different factors occur and affect the project at the different stage of the project life cycle.

Most of the literature (Field & Keller 1998, Cooper et al. 2001, PMI 2004, Nicholas 2004) refer to the sequence period throughout the project as project life cycle. However, Wideman (2004) has a different view; his argument is that not all projects possess the feature of a cycle or repetition; thus, suggesting a more appropriate term, 'project life span'. According to him (Wideman 2007, personal communication) many 'experts and academics' have misuse the term 'life cycle' but the problem is that once an (false) idea gets entrenched, it is very difficult to correct it. In this study, both terms are used interchangeably.

It appears that there is no universal understanding of dividing the timescale of the project life span. While most of the literature divide it into four (Ruin 2003, Nicholas 2004) or five (Cooper et al. 2001, PMI 2004, Kerzner 2006) stages[7], there are some authors (e.g. Morris 1998) who introduce more complexity. There is no single best way to define an ideal project life span that applies to all projects (Field & Keller 1998, PMI 2004). The same issue arises in naming those stages. Table 2-3 summarise the nomenclature and number of stages used by different project management authors.

[7] The term 'phase' is more widely used by most of the literature, but in this thesis, the term 'stage' is used so that it is not confusing with the project phase (refer to 1.2)

For the purpose of this research, a four sequential life span as suggested by Wideman (2002), which better suit the project being researched, is adopted. The four stages, as illustrated in Figure 2-4, are as follows:

Table 2-3: Project life cycle

Authors	No. of stages	The stage name
Cooper et al (2001)	5	Scoping, build business case, development, testing & validation, launch/post-launch
Kerzner (2006)	5	Conceptual, planning, definition, implementation, conversion
Lim & Mohamed (1999)	6	Conceptual, planning, design, tender, construction, operation.
Morris (1998)	10	Inception, feasibility, design, plan, procurement, detailed design, contracting, execution, commissioning and start up, post-completion evaluation
Nicholas (2004)	4	Concept, design & development, production, operation
PMI (2004)	5	initiating, planning, executing, controlling, closing
Ruin (2003)	4	initiating, specifying, producing, closing

- **Definition** (also known as **concept**): An imaginative stage where set of ideas is arranged. This is the first stage of a project, where the decision-makers examine the needs and establish the goals of the project. It is also known as project initialisation, conceptualisation or formulation whereby a formal document, project charter, is authorised at the end of this stage (PMI 2004).

- **Planning**: This is the stage where the detail project activity plans are produced based on 'project charter' set in previous stage, depending on available resources. It is the process of formulating project scope, developing the project management plan, and scheduling the project time and activities (PMI 2004). Organisational breakdown structure (OBS), work breakdown structure (WBS), and project schedule are produced at the end of this stage.

- **Execution** (also known as **implementation):** The period during which the actual physical work of creating the project's deliverables is carried out.

- **Product** (also known as **operation)**: A post-delivery stage, whereby all respects of work is completed and the finished product is transferred to the custody, usage, care, and control of the owner.

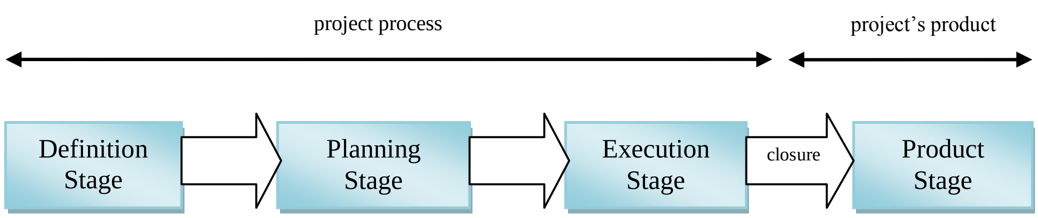


Figure 2-4: Project life span

Some authors (see Table 2-3) consider project as completed when it is handed over to the owner; they refer it as a final stage, know as closure. However, it is inaccurate to regard the project closure as a stage, as it is only a transition point between the two stages, i.e. between project execution and product. This transition point is also known as 'milestone' (Yu et al. 2005a, Wideman 2002). It is also inaccurate to ignore the product stage as it has a great impact to the overall project success. The four stages above can be regrouped into two segments, which Baccarini (1999), in his LFM model (see Figure 2-2), refers it as ‘project process’ and ‘project’s product’. Based on the above four stages life span, project process comprises definition, planning, and execution stages; while the fourth stage, product stage, falls under project’s product after incorporating into LFM model. It is apparent that Baccarini regards product as one of the stages, in line with the other authors (Morris 1998, Lim & Mohamed 1999, Cooper et al. 2001, Nicholas 2004, Kerzner 2006).

2.6. FACTORS CONTRIBUTING TO THE PROJECT SUCCESS

Dating back to 1980’s there has been extensive research about project success factors with many suggestions being proposed to improve the project undertaking. However, as mentioned in 2.3.3 and summarised in Table 2-2, those findings could not be generalised to all projects and many problems remain. This is because success factor is a multi-dimensional concept, whereby certain factors may have different impacts on different projects (Freeman & Beale 1992, Shenhar et al. 2002). Furthermore, different people assess the project success in different ways and the assessment of the success may be made at different times (Shenhar et al. 1996, Shenhar et al. 2002) resulting in a more complicated situation.

To appreciate the occurrence of the success factors more clearly, they are grouped into particular dimensions at different stage of the project life cycle as shown in Figure 2-5. The figure illustrates where the factors most likely to occurs. However, it is difficult to place them accurately as some factors might affect the project more than once or occur at the milestone, in the between the stages.

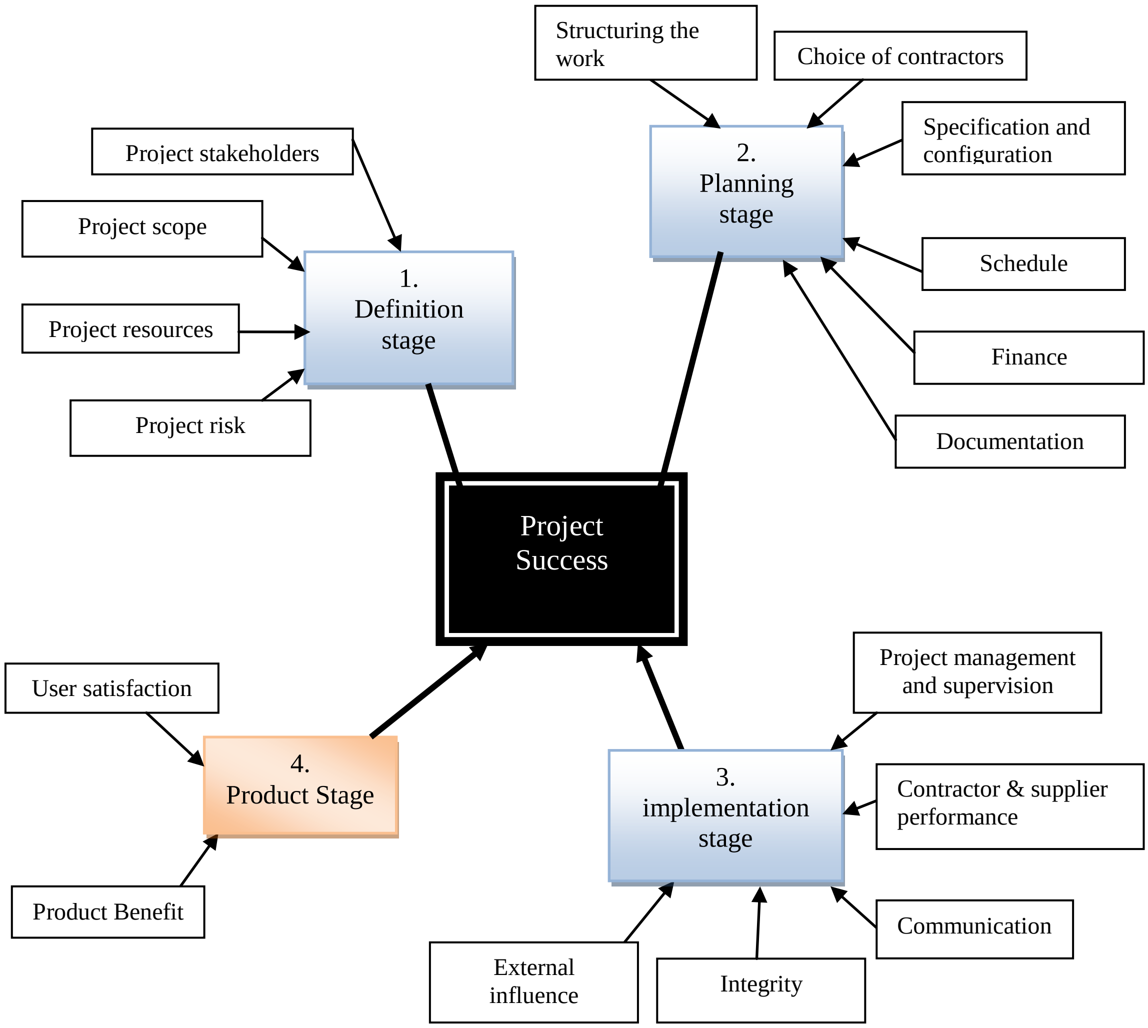


Figure 2-5: Project Management Success Factors

2.6.1. Definition Stage

This is the 'imaginative' stage of the project where the decision-makers examine the needs, assess the resources, and establish the goals and objectives of the project (Wideman 2002). Well management of the factors in this stage is essential in order to form a strong foundation for the overall project success (Webster 1999). Projects that start based on previous identical project (see 2.2) might be easier to define compared with those start from scratch.

2.6.1.1. Stakeholder participation

Stakeholders are persons, groups of persons with the same interest, or institution that have interest and could influence the project (Carroll 1993, SDD 1995). This definition highlights three elements: persons, their interest, and their influence to the project. Persons in this context could be an individual, groups of individuals or the organisations. Project Management Body of Knowledge (PMI 2004) also includes those three elements, while describing the project stakeholder as follows:

> *'Individuals and organisations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion' (p 15).*

Based on the above definition, the project stakeholders could consist of various groups of people who involve in the project. Especially in the public funded project, everybody is the stakeholder (Alexander 2003), since they can claim their interest as a tax payer or recipient of a service. In the ideal world, to fulfil the needs of each stakeholder is very important to make sure that the project is perceived as success from the perception of everyone. Espousal of such practice as a project culture could motivate the project team and affect the implementation of project; even though the real project management practice it is not an easy task. Wideman (1990) cynically mentions that the most successful project as one in which all the stakeholders are equally dissatisfied. His remark illustrates the view that in practice it is difficult to satisfy each stakeholder of the project.

Yu et al. (2007) divide stakeholders into two categories, i.e. primary and secondary stakeholders. Primary stakeholders are those who have a legal contractual relationship to the project, while secondary stakeholders are those who influence or affected by the project but not regularly engaged and may not responsible for its survival. According to these authors, all groups of stakeholders should be identified and represented during the early stages of the project, in order to understand their various interests in the project. Involvement of all relevant parties during the early stage of the project, to identify their differing demands and requirement of the project, could help overcome lots of problem (Gil et al. 2004, Olander & Landin 2005).

As different stakeholders play different roles in the project, it is crucial to define who they are and what their function in the project is. The decision-maker would face a great challenge when different stakeholders have opposing priorities (Gil & Beckman 2007). The situation becomes more complicated when one particular stakeholder is powerful and influential, which some of them are beyond the capability of the project management team to control; only those of higher rank in the organisation of the project could manage to control them (Morris & Hough 1988). However, such people, for instance the politicians (Pinto 2000), are sometimes could help to accelerate the effectiveness of the management team or the key players in the project managed to utilise them properly (Pinto 2000, Sheikh & Khan 2005).

2.6.1.2. <u>Project goal and mission</u>

A successful project must have clear project goal and mission (Fortune & White 2006). Goal is something one targeted to accomplish, while mission is an end to be obtained (Wideman 2002). In a simple way, goal is a short-term target to be achieved; while mission is more a strategic management to be achieved in the long run. Besides clear and attainable, the project goal and mission should be conveyed to all key stakeholders so that everybody would work towards its achievement. Otherwise every stakeholder might have different opinion about the project (Naaranoja et al. 2007) and could end up with unnecessary conflict during the project execution.

As mentioned in 2.2.1, goal is sometimes tend to be intertwined with objectives. Though, both terms can be described as aims expected to be achieved, conceptually both terms are different each other. Good project goals should fulfil SMART (specific, measurable, agreed upon, realistic, and time-lined) characteristic test (Murray-Webster & Thiry 2000, Richman 2006). Description of SMART is shown in Table 2-4. It is also important to bear in mind that the purpose of undertaking a project is to fulfil the needs or requirement of the stakeholders; there is no project if nobody needs it.

Table 2-4: SMART Objectives

Objective feature	**Descriptions**
Specific	Clearly and precisely defined of what project will do so that even anyone with basic knowledge can easily understand.
Measurable	Defined in measurable terms and not ambiguous.
Achievable and Agreed upon	Should be possible to achieve. The objective also should be agreed by stakeholders.
Realistic	Sensible and not ruthless, based on available resources.
Time-lined	Ensure that sufficient time is allowed after taken into consideration all possible opportunities and constraints.

Sources: Murray-Webster & Thiry (2000), Richman (2006)

The other concept which are widely used (Mayeske & Lambur 2001, Millar et al. 2001, Rossi et al. 2004.) with regard to the deliverable of the project are output and outcome. According to these authors, output is the deliverables of the project, whether in the form of products and services, while outcome is a description of the intended result, effect, or consequence that will occur from carrying out a program or activity. In other word, output is the impact of the output.

2.6.1.3. Project Scope

Wideman (2002) defines project scope as the project's product deliverables; where deliverables are the physical items to be delivered for a project. This definition seems inadequate as it does not mention the process. PMI (2004) provide a better description when both process and output are included in the definition: the work that needs to be accomplished to deliver a product, service or results with the specified features and function. From both definitions, project scope can be simplified as ‘works that need to be done based on determined specified features in order to deliver a product or service’. The key point is ‘specified features’, which are the specifications that have been agreed upon among the project stakeholders (see 2.6.1.1).

Project scope has certain impact on of project success. It is important that the project scope determined by the decision-maker is attainable. There are evident that unreasonable project scope is one of the causes of project failure (Levene & Braganza 1996). Unreasonable scope happened when it was set beyond the available resources; this includes luxurious specification and large size or volume. The larger projects have a lower likelihood of success (Mansfiled et al. 1994, Assif et al. 1995). Perhaps, trade-off between project scope and the project resources is the best option to increase the possibility of project success (Luong & Ohsato 2008).

2.6.1.4. Resources Assessment

As mentioned in 2.6.1.4, there is a relationship between project scope and project resource. It is essential to evaluate the resources before determining the project scope.

Wideman (2002) describes resource as any human, material or equipment required for the performance of an activity. However, the list seems incomplete; money should be included as one of the project resources (Bent & Humphreys 1996, PMCC 2004). During the project definition the availability of resources should be determined (Jiang et al. 1996) in order to make sure that project completed successfully within schedule. Usually, resource assessment is one of the dimensions determined by researchers who study project success criteria (Shenhar et al. 1996, Cooke-Davies 2004). Targeting the project beyond the available resources would result in project failure; trade-off between scope and available resources is essential.

Human resource is one of the most crucial in determining project success. The involvement of human factors in the implementation of the project is started from the initiation stage through the production or the output stage of the project. Specifically referring to construction projects, Thevendran and Mawdesley (2004) defined the human factor as follows:

> *'Individual, project team and organizational factors, which influence the behaviour of people and the climate at work, in a way which can increase or decrease productivity of a construction project'. (p132).*

The success or failure of any project implementation is very dependent on the management of the human factors of the project (Jannadi 1995, Loosemore 1998, Fong et al. 1999, Lim & Mohamed 2000, El-Sabaa 2001, Wong 2007). There are authors who dispute the dominance of human factors, even though such a finding is very rare. For instance, Pinto and Prescott (1988) in their field study across four stages of the project life cycle concluded that the personnel factor is only a marginal variable in project success. However, Belout (1998) criticised that unexpected result and suggested that future research needs to retest that conclusions.

Previous researches (Odeyinka & Yusif 1997, Assaf et al.1995) indicate that shortage in manpower could seriously cause delay in the project completion time. Project Management Institute has also included human resource management as one of the six fundamental basic functions of project management (PMI 2004). Sambasivan and Soon (2007) who researched in Malaysia found that the quality and quantity of labour supply could have major impact on the projects. According to these authors, the matter is aggravated by the dependence of the Malaysian construction industry on the foreign workers; it is estimated that 20% of the workers in the Malaysian construction industry are foreign workers, mainly from Indonesia and Vietnam. A few of them are illegal workers and their work quality is relatively low when compared to local labourers. The low quality and productivity of the foreign workers have impact on the project progress and efficiency. The illegal workers are frequently detained by the Malaysian authority, and this causes shortage of labour pool in the construction industry.

The other project resource that is critical to the project success is material success. Many researchers (Mansfield et al. 1994, Ogunlana & Promkuntong 1996) demonstrate that shortage in material is one of the factors that cause the project delay. Sambasivan and Soon (2007) found that the main reason for shortage is competition with other projects. According to these authors, especially in Malaysia, the shortages in basic materials like sand, cement, stones, bricks, and iron is one of the six factors contributes to the project delay. It is a consequence of the improper assessment of that resource during the initial stage of the project.

2.6.1.5. Risk Management

It has been claimed that all project management is risk management (Field & Keller 1998). Risk is describes as a combination of hazard and exposure (Chicken & Posner 1998), which creates the potential for unwanted negative consequences of event (Rowe 1977). PMI (2004) acknowledges the importance of risk management and includes it as one of the nine focuses in project management. This author describes risk management as:

> *'the processes of conducting risk management planning, identification, analysis, responses planning, and monitoring and control on a project'. (p11).*

According to PMI (2004), the objectives of project risk management are to increase the probability and impact of positive events as well as to decrease the probability and impact of events adverse to the projects. The ability to identify and then manage the variety of different hazards to which a project may be exposed, is an important skill. Thevendran and Mawdesley (2004) define risk management as:

> *'A continuously monitored integrated formal process for defining objectives, identifying sources of uncertainties, analysing these uncertainties and formulating managerial responses, to produce an acceptable balance between risk and opportunities' (p131).*

With many uncertainty features such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures, construction projects are prone to enormous risks (Flanagan & Norman 1993, Smith 1999). The assorted interests and priorities among project stakeholders in the construction project could aggravate the risks (Zou et al. 2006).

Two general approaches have been recognised as methods of handling the project risks, i.e. by reducing the risks where it advantageous to do so or by monitoring and managing those risk which remain (Kwakye 1997). Normally, the first approach takes place during the early stage of the project, whereby project is thoroughly designed and planned to minimise the inherent uncertainty. Experiences may be useful in this case but it is not possible to eliminate risk entirely from the project (Turner 1993). In the second method, an appropriate project strategy is implemented so that the project team will be more responsive to the deviations as they occur.

Uncertainty should be managed properly as it may represent risk to a project; it should be taken into account as early as during preparing the project proposal (Field & Keller 1998). Kolltveit and Grønhaug (2004) in their Norwegian experience found that uncertainty is the main factor in particular affects project performance. The result of their study showed that project uncertainty is at its highest during the early stage of the project, especially for projects with a high degree of novelty.

The plan of action to avoid or to reduce the risks impact on project is absolute only after the risks have been identified and their likelihood has been determined. Turner (1993) suggests five steps assessing risks (see Table 2-5). Field and Keller (1998) prioritise the risk after rating them based on probability of occurring and impact to the project as follows: high impact - high probability, high impact - low probability, low impact - high probability, and low impact - low probability risk.

As risk = impact x probability (PMI 2004), even those with low impact would affect the project if the probability is high. Impact could be in the forms of late completion, extra cost to remedy, not fulfilled the users' need, and not fulfilled the specified quality. Only those with low impact - low probability risk might not worth expending more effort on.

Table 2-5: Risk assessment steps

▤ Identify the potential risks;
▤ Determine their individual impact and select those with significant effect for further analysis;
▤ Access the overall impact of the significant risks;
▤ Determine how the likelihood on impact of the risk can be reduced;
▤ Develop and implement plan of controlling the risk and achieving the reduction.

Adopted from Turner (1993)

The big challenge is in assessing the risk as this process is often matter of opinion and experience; there is no universal agreed method (Chicken 1994). The assessment often depends on the past experiences of the project team. After identifying the risk, the project team needs to determine the appropriate actions. Even though risks cannot be eliminated, proper management through early identification would lead the projects to complete successfully (Smith 1999).

2.6.2. Planning Stage

This is the stage where the detailed of how the project is going to be implement is planned, which includes step-by-step process; it is helpful to get the input from relevant stakeholder or outsourced experts (Fanelli 2005). The ideal project completed on time and within the approved budget to meet a pre-defined quality. To achieve that target, the project needs proper planning based on available resources (see 2.6.1.2).

2.6.2.1. <u>Structuring the work</u>

During the planning stage, project is divided into pieces of work and particular parties are given responsibility for each of those portions (Kerzner 2006). The structure of works divided into groups, known as Work Breakdown Structure (WBS) while organisation of those parties involved in carrying out the job called Organisational Breakdown Structure (OBS) (Nicholas 2004).

Turner (2000) criticises most of the researchers for not using the WBS in accordance with its original definition some fifty years ago (the WBS terminology was invented by the US military in 1950s). According to this author, based on its original definition, WBS should be used to define the components of the final deliverable of the project, and not to use it as the starting point, which will lead the project team to do unnecessary work. However, Lamers (2002) argues Turner's idea and describe it as unnecessary. This author believes that the WBS as well as OBS is still relevant as an essential instrument for project management.

A WBS that organize and define the total scope of the project (PMI 2004) should be carried out as the first step in the planning process (Taxén & Lilliesköld 2008). It guides the decision-maker in making right decision. By breaking the project down into manageable work packages, the project manager can easily define smaller projects within the overall project; each of these can be planned, delegated and managed more precisely compared to treating the whole project as a single work package (Kerzner 2006). It is also thought (Taxén & Lilliesköld 2008) that smaller elements could reduce risk and uncertainties.

Based on the tasks that have been decided in the WBS, certain people with relevant knowledge and skill are assigned to perform the tasks. This process of matching the OBS with WDB is known as distribution of authority and responsibility. Authority is the power granted to individuals, possibly by their position so that they can make decisions, while responsibility is the obligation incurred by individuals in their roles in the formal organisation to effectively perform assignment (Kerzner 2006).

2.6.2.2. <u>Choice of Contractors</u>

Normally, selection of contractors in public sector construction projects is done through tender process, where the lowest bidder in term of price is accepted to be awarded the project (Russell & Skibniewski 1988). The problems arise when the best bidder is not the best contractor in term of performance. Hatush & Skitmore (1998) believe that the evaluation based on lowest price is one of the major causes of project delivery problems. Odeh & Battaineh (2002) reported the same problem in managing public projects in Jordan.

However, as project owner in the public sector is accountable for their decisions, explaining the rationale of the selection of the contractor other than the lowest bidder is difficult (Topcu 2004). The worst scenario is when open bidding is more costly due to excessive time delays and claims from the contractor who purposely submit a low bid with the intention of obtaining extra income from the claims as compensation to offset the low bid price (Chan & Yeong 1995).

In some circumstances, a screening method known as prequalification is employed. Contractors with good record of accomplishment based on past performances will be short-listed, so that the possibility of selecting non-capable contractors can be minimized (Ng & Skitmore 1999). Only capable contractors will be invited for bidding to select the best contractor to be awarded the project. A similar technique can be applied to consider the match between specification and proposals for each contractor. Typically, the contractors' proposals may be scored against a set of criteria corresponding to the specification and requirements. Those proposals achieving an acceptable match may then be shortlisted. Although this method seems to be the better option in term of fairness as well as better prospect for the project, the project owners recognize the disadvantages of using this approach because it is time-consuming. This is especially true in the situation where there is pressure for the project to be ready within a shorter duration.

To overcome this problem, the negotiation method is used, whereby contractors with good reputation or has worked successfully in the past are invited. This process is performed after an assessment of the expertise and integrity of particular contractors who have good track record is made (Hendrickson & Au 1998). By having a highly reputable contractor, the project owner could trust them to proceed with the project execution without waiting for the completion of the detailed plans and specifications if the completion deadline is a must to fulfil. According to Hendrickson and Au (1998), this method can be adopted only if the owner's staff or project administrators are highly knowledgeable in evaluating the contractors and monitoring subsequent performance. Hence, this method is not a general solution to the problem of possibility of awarding the project to the wrong contractor; in some circumstances, might be worse. Therefore, pre-qualification of tenders and selective bidding is a better alternative to ensure project is awarded to the right contractors (Chan & Yeong 1995). In public sector, where large pool of contractors available, could take more advantage of this practice.

2.6.2.3. Specification and configuration

The project specification is more than just for project planning but is also a tool which is used by the project manager’s team to track performance. It is also useful for project manager to spot problems early and rectify them before they become disaster (Blair 2005). In other words, it is a safeguard to protect the project manager from being accountable for the problems that are beyond the original scope of the project, which means beyond the project manager's control.

Likewise, configuration is also important in managing the project. Configuration is defined as the complete technical description required building, testing, installing, operating and maintaining, and supporting a system, which includes all documentation pertaining to the system as well as the system itself (Field & Keller 1998). The management team should identify what they are supposed to build, what they are building and what they have built so far; this would provide data integrity throughout the design-and-build cycle and the organisation is not at undue risk when it comes to supporting and warranting the product (Bartuli & Bourke 2005).

Change to the configuration item can only be made through a systematically approved and recorded manner (Field & Keller 1998). According to these authors, change cannot be prevented; it is difficult to find the projects that emerge at the end exactly as they were planned at the beginning. However, that is not an excuse to avoid the process of preparing a proper project configuration. The detailed project specification is the basis for ensuring that the technical quality of the project can be tracked closely as in actual project implementation. Project specification can define the type and quality of equipment and materials to be used (Hendrickson & Au 1998) as well as set performance standards which include details on testing and verification.

2.6.2.4. Project Schedule

While discussing project schedule it is important to differentiate it with the project life span (see 2.5). Project life span is high-level strategic plan at the 'first step' of the project (Kerzner 2006, Wideman 2004), while project scheduling is a more task-oriented, which is done at the later stage of the project. Even though both involve timescale, scheduling is more detail, as it display the specific performing activities besides the planned dates or duration (PMI 2004), while the project life cycle is only displaying sequence.

PMBOK defines project schedule as the planned dates for performing activities (PMI 2004). The definition seems incomplete, as it does not acknowledge the resources. Wideman (2002) introduces a more precise definition of scheduling as 'the process of converting a general or outline plan for a project into a time-based schedule based on available resources and time constraints'. It is important for the decision maker to make a realistic schedule by taking into consideration the available resources and constraints. As mentions by Nicholas (2004), scheduling is the most important step in planning because it is the basis for allocating resources, estimating cost, and tracking project performance. Some of the projects that completed late were not purely due to poor performance of the contractors but because of over-ambitious planning of timescale by the project decision-maker (Chan & Kumaraswamy 1997). Usually the contractors accept the offers even though they realise that the timescales are impractical because they worried of losing the work.

The Gantt chart, uses bars to represent activities or tasks, is widely used to convey a project's schedule (Taxén & Lilliesköld 2008). The chart includes the start and end points of the work, total duration needed to complete tasks, and percentage of completion (Nicholas 2004). However, in the actual practice the members of project management team are rarely referring to the chart as guidance. That means, in most cases projects are implemented as it happened, and that is obviously not a good project management practice.

Project Evaluation Review Technique (PERT) and Critical path method (CPM) are the other tools used in scheduling the project (Kerzner 2006). Both methods are used to analyse the inter-relationships between the tasks identified by the work breakdown structure (as mentioned in 2.6.2.1) and to define the dependencies of each task, but many projects fail to employ such techniques due to a lack of expertise.

2.6.2.5. Project Finance

Adequate project finance and proper control of budget is the other ingredient for the project success. Accurate initial cost estimate is one of the success factors suggested by Baker et al. (1988). However, accuracy is subjective; since estimation is made before the project execution, it is difficult to have accurate figure for the project cost. Fair, if not accurate, budgeting is important to avoid cost overrun.

Chua et al. (1999) set budget performance as the primary importance in their study. Their research, using an application of neural network approach, found eight important project management attributes associated with achieving successful budget performance: (1) number of organisational levels between the project manager and craft workers; (2) amount of detailed design completed at the start of construction; (3) number of control meetings during the construction phase; (4) number of budget updates; (5) implementation of a constructability programme; (6) team turnover; (7) amount of money expended on controlling the project; and (8) the project manager’s technical experience. They also claim that their model can be used to forecast budget performance of a construction project.

The other issue in project finance is proper control of the budget. Long et al. (2004) who conducts his research in Vietnam found that bad bureaucracy, fraudulent practices and kickbacks are among the factors that caused project failure. These authors estimated that 20–40 percent of capital investment in construction in Vietnam is lost due to poor management, whereby bureaucracy and bribery are mainly responsible.

2.6.2.6. <u>Project Documentation</u>

Project documentation could be any information available in written form that is required or support to perform a project (Stoehr 2002). This is one of the important factor that contribute to the project success, as those documentation provide not only a record of decisions but also tasks required at a particular stage in a project and should not be viewed as superfluous to the project (Government of Tasmania 2005). Besides time consuming in producing a proper documents, the challenge is to ensure that they are treated accordingly in a proper way by all parties who involve in the project. According to Stoehr (2002) there are two categories of project documents, i.e. technical document and legal document. Based on this classification, contract document is the most important document to the project, as it is both legal and technical documents. Thus, to prepare it properly so that the terms are fair to all parties involved in the project, and to complete on time is crucial.

2.6.3. Execution Stage

As mentioned in 2.5, this is the third stage in the project life cycle. This is the stage where the deliverables, in the form of physical product or service, is carried out by the contractor based on decisions made in the earlier stages. Usually, this is the longest stage in the project life span and it typically consumes the most project resources (Kerzner 2006).

2.6.3.1. <u>Project Management and Supervision</u>

Barnes (2002) sees project management as a series of activities undertaken by a group of people which is intended to achieve a result, while Turner (1993) defines it as the process by which a project is completed successfully, that is, it achieves its business purpose. It is essential for the project manager to pay close attention to the entire picture of the project without losing sight of the critical details and he is responsible for assuring that tasks are completed on time and within budget (Shtub et al. 1994).

In investigating problems of large construction projects in Vietnam, Long et al. (2004) concludes that human factor in the project such as inadequate project management assistance, impractical design, lack of involvement through project life, and incompetent project team are among the factors that affecting the project performance. Iyer and Jha (2005) who investigating factors affecting cost performance found that effective project monitoring and feedback by the project manager ranked the highest attribution.

Work undertaken by more than one person requires co-ordination and it needs a strong personality to handle it. This is especially true for projects because they involve work patterns that differ from the routine (see 2.2). Project management is not just about managing time, money and the quality of product or service being developed; it is also about the authority to make judgements in order to meet pre-defined targets.

The situation is more complicated in the multi-parties project management, whereby a clear boundary is required. King (2005) outlines five basic requirements of such people: personal insight, resourcefulness, courage, willingness to face, and foresight. In studying the relationship between other stakeholders and project manager, Turner (2003) outlines four necessary conditions (see Table 2-6) that must all be there to deliver the project success.

Table 2-6: Necessary conditions to deliver the project success

- The success criteria should be agreed with the stakeholders before the start of the project, and repeatedly reviewed throughout the project.
- A collaborative working relationship should be maintained between the project owner and project manager, with both viewing the project as a partnership.
- The project manager should be empowered, with the owner giving guidance as to how they think the project should be best achieved, but allowing the project manager the flexibility to deal with unforeseen circumstances as they see best.
- The owner should take an active interest in the performance of the project.

Adopted from Turner (2003)

2.6.3.1.1 Project manager and management team

Typically, a project manager is the person who leads a project team, accountable for the particular project and responsible for ensuring the project runs as planned. Mansfield el al. (1994) in their study of the causes of delay and cost overrun problems in Nigerian construction projects concluded that most of the problems were human and management problems, not technical problems. Among the main factors are related to finance and payment arrangements, poor contract management, materials shortage, inaccurate estimation and overall price fluctuations

The project manager need not be an expert; the important role is to make sure the expert in any particular type of work to perform their job sufficiently. In order to perform that job, the project managers must have sufficient understanding of the issues, including the right time to do particular piece of works, so that he or she can guide the team efficiently. It is critical for the project owner or project leader to identify individuals who manage to perform this key role throughout the project life span. Hauschildt (2000) has identified seven key sets of talents and abilities, summarises in Table 2-7, that must be present on the project to insure success.

Since project, especially construction project, deal with technical issues (Hendrickson & Au 1998), a trained technical people, e.g. an engineer may be the best person to fill the project manager post. This type of person is required to perform the task of technical nature and to handle a mechanical approach to problem solving (Ruin 2003). However, besides technical issues, project manager are often faced with managerial tasks in project management, which require him or her to provide financial assessments, cost calculations, and communicate with the other people related to the project. An engineer might not acquire this skill. The best solution is to have a combination of both technical and management expertise in a project management team, led by someone who is good in the interpersonal skill. The one who lead the project team, not necessarily expert in technical field but he or she must have sufficient understanding of all issues related to the project.

Table 2-7: Talent and abilities of project managers

Factor	Description
Organizing Under Conflict	The abilities to delegate and manage time are linked with conflict tolerance and ability to handle criticism.
Experience	This factor includes items directly mentioning experience or years of employment, and one concerning knowledge of procedures. The knowledge comes, presumably, from years of experience.
Decision-Making	The items in this factor have to do with judgment, thinking, and decision-making.
Productive Creativity	These items include creativity and idea generation, linked to the ability to carry out those ideas.
Organizing With Cooperation	Items on the ability to plan and organize are included here with items having to do with the ability to include others in a positive way through learning, sensitivity, and team orientation.
Cooperative Leadership	The ability to motivate others is associated here with the ability to cooperate and communicate with others.
Integrative Thinking	The ability to think analytically is associated with the ability to attend to the ideas of others, which should involve analysis using disparate ideas that must be brought together.

Adopted from Hauschildt (2000)

As project is dynamic, the managers rely on the project information. Effective control of information is vital throughout project's implementation in order to support activities such as for decision making, analysing progress, and providing basis estimation for future project (Tenah 1986). The use of information technology or a computerized information system is essential to support large amount of information; it would increase the project manager's performance in retrieving relevant project information (Tokar 1990).

A big project needs a group of people. Blair (2005) stresses that group-work is particularly good in combining talents and providing innovative solutions to the possible unfamiliar problems. Working as team can lead to a spirit of cooperation, coordination and commonly understood procedures by their mutual support (PMI 2004). The most important characteristic in the management team is the people's willingness to work as a team toward a common goal from the very beginning of a project until the project completion, regardless of who they are – the politicians, the top managements, the project managers, the contractors, and the suppliers. In an exploratory study into recurring construction problems, Lim & Mohamed (2000) found that 'management did not care' as one of the four unusual factors leading to problems and project failure. In this case, 'management' is referring to people at the top of project management hierarchy, which is in the domain of human factors.

2.6.3.1.2 Outsourcing

Beaumont and Sohal (2004) defined outsourcing as having work that is formerly done inside the organization performed by an external organization whereby the external organization may be an independent entity or a wholly owned subsidiary. The advantage of outsource is to optimise the resources through the employing expertise of the external organization (Benko 1993). This is especially true in the situation where internal resources are limited or essential skills are not available and cost can be reduced (Chandrasekar 2005). New recruitment or training the existing staff might incur a higher cost. In the context of managing public sector projects, outsourcing can increase performance based on the classic belief that the private sector is intrinsically more efficient than the public sector, as they are forced to organised themselves to use resources efficiently (Fergusson 1991).

However, outsourcing does not always result in as expected, and as stressed by Lonsdale and Cox (2000) outsourcing the intellectual or skills is a bad strategy. The question of loyalty and responsibility is always arises especially in managing the government project as outsourcing implies hiring one private company to manage the other private company, where bias is the main issue. As a private company, profit is their priority. In the worst scenario, important information may leak and this can create a threat to the owner.

2.6.3.2. Contractors and Supplier Performance

The aim of each project is to get project ready on specified time, within allocated cost, and to the client's satisfaction level of quality. One of the essential requirements to achieve this target is by having a competence contractors and suppliers (Chinyio et al. 1998). Selecting the right and competent contractors and supplier through a proper selection procedure, as has been discussed earlier (see 2.6.2.2), is the most important project decision to be made. Long et al. (2004) report that a bad practice in project awarding, which includes awarding the project to the incompetent contractors could badly contribute to project failure.

2.6.3.2.1 Staff expertise

Competent contractors should acquire expertise in particular field of job they are committing in the project. Skilful staffs would provide better performance to project. Blair (2005) divides skilful staffs into two main sets:

- Managerial Skills
- Interpersonal Skills

It is critical to make sure that not only the project recruits the right people but also the talents required. As mentioned by Turner (1993), it is dangerous to have people to do their work because of their availability, not because they have the right skills. Everybody in the project need to understand their roles and be able to fulfil them rather than focusing on their own selfish.

2.6.3.2.2 Staff training

Investments in training are related to increased business and financial performance. Workers' performance gains a 31 percent increase in overall job performance as a result of training (Bellout 1998). In their study across African enterprises, Rosholm et al. (2007) found that training could give returns 20% in general.

Training and staff development exercise are carried out for various reasons (Turner et al. 2000, PMI 2004), particularly to improve knowledge and acquire skill needed in performing the tasks in the project. Kerzner (2006) divided training into three categories: on-the-job experience, education, and knowledge transfer. Unfortunately, this is rarely done by the companies (Pinto 1999). Among the reasons are the companies top management do not believe in contributions gain through training and reluctant to spend company's money to sponsor staff training.

Besides better quality gains by the company as a result of increasing efficiencies among workers, training could also increase the employees' motivation and might help in reducing the employee turnover. The other relevant area of training that needs attention, which is not mentioned by the above authors, is communications skill. Especially for the person who led the management team, communication and interpersonal skill is essential. With the increasing diversity, which goes cross the international borders, the ability to communicate in other languages is a bonus. As different people might have different culture, it is also necessary for those who work internationally to understand it, especially the work culture.

2.6.3.2.3 Technical factors

Issues related to technical can be one of the most critical elements for success (Long et al. 2004). Especially in a large-scale project, technical planning is as critical as planning the other element of the project, such as budget and schedule. It should be set as early as during the early stage of the project life span and establish it as a standard that need to be followed. With that, the project management could perform enforcement should the contractors do not fulfil any of the technical requirements. This is including the use of certain technology to maintain the quality of the construction. In developing countries, this issue can be mere critical due to problem of transfer of technology (Saad et al. 2002). Large-scale contractors might have utilised the higher technology compared to their small-scale counterparts. The problem is even worse for the contractors that lack in skilled manpower (Ng et al. 2004).

2.6.3.2.4 Competition

The multi-project environment tends to face internal market forces, where all project compete each other for resources (Lycett et al. 2004). This is the phenomenon where all projects begin at the same time and need to be completed within limited time frame, while resources are shared from a common pool. In construction projects, two most highly sought resources are human (mainly labourer) and construction materials. Lacking in one of these resources will result in the project disorder.

Mulcahy (2003) concluded that project failure is often being attributed to a lack of adaptation of organisational policies where project management do not adjust the processes to the needs of each project. In describing how multi-projects should be handled, Eskerod (1996) divided project management into two levels. First, from the viewpoint of senior managers, who have control of the whole of multi-projects from the outside, and secondly from the viewpoint of project managers of each projects.

The role of senior manager is to make sure that each project progresses without affecting the others unduly. In order to do that, accurate information from each project managers is essential. In current practice however, there is evidence from construction industry suggesting that the organisation is often not interested in the potential competition between projects, and projects operate autonomously. The staffs of one project do not know what other projects' staffs are working on (Lycett et al. 2004). It is more critical if the project management team depend so much to the contractor to get the information. The contractors who competing each other would not reveal the problems of their own project the project management team because they are worried that this may cause their project to get a lower priority or may even be closed down (Eskerod 1996), besides do not want to scarify their reputation.

It is very important for the project management to gain accurate information about the project and its progress by close monitoring so that significant mistakes in one project are not repeated in the others. Whilst each project competes for the best performance, the multi-project's management should closely monitor and control the overall project so that all projects are completed successfully. To remove competition in a multi-project environment, the top management need to build up a new strategy focusing on cooperation, coordination of knowledge between all parties involved (Eskerod1996). In public sector, this role could be played by central agency that control or monitoring the overall public sector project.

2.6.3.3. Communication and Feedback

Especially, in a large project where many parties' involved, good communication and feedback among them is vital (Pinto & Slevin 1988, Chua et al. 1999, Cooke-Davies 2002), especially construction project (Egbu 1999, Nguyen et al. 2004, Toor & Ogunlana 2008) where fast information and decision is critical. In the early stage (see 2.6.1.1), various stakeholders need to express their needs in the project for the decision-maker to decide; good communication among them would result in win-win situation. On one hand, all stakeholders should clearly and reasonably express their requirement and avoiding any ambiguities (Phua 2004). On the other hand, the decision-makers should be responsive to the needs of project stakeholders and consider it wisely (Pinto & Slevin 1988).

During project execution, communication is in the form of information, instruction, and feedback. At this stage, good communication among parties is very important to avoid, or at least to minimise, confrontation (Toor & Ogunlana 2008). Clear direction is essential and the top management should be a good listener.

Communication also regards as an important tool in trouble-shooting and problem solving, provided that all parties are sincere and transparent (Clarke 1999). Hiding the problem by contractors or project managers to maintain their reputation could make it worse (Long et al 2004, Sambasivam & Soon 2007). Sometimes, in this situation, diplomacy together with good judgement from those parties in power would be very helpful to avoid conflict.

2.6.3.4. Integrity

Integrity is a very sensitive issue; its secretive nature makes it difficult to be discussed openly. Many authors (Saad et al. 2002, Long et al. 2004, Chondroleou et al. 2005) suggest that project management in developing countries is especially difficult due to various uncertainties; one of the uncertainties is related to integrity among the parties involved in the project (OECD 2002).

2.6.3.4.1 The Inefficiency of Bureaucracy

The Cambridge Advanced Learner's Dictionary defines bureaucracy as 'a system for controlling or managing a country, company or organization that is operated by a large number of officials who are employed to follow rules carefully' (CALD 2003). There is evidence that bureaucratic performance is important for development performance (Kaufmann et al. 2000). In project management, bureaucracy is essential in order to have the checks-and-balances to enable projects to run smoothly. However, an improper practice of bureaucracy can cause unnecessary delays, as mentioned by Long et al. (2004). It has been reported (Hyden 1983, Blunt 1983) that the poor development performance of many countries in Africa is a result of the weakness of bureaucracy.

According to Hyden et al. (2003), there are five most significant determinants of bureaucratic performance, namely: influence, meritocracy, accountability, transparency, and access. Especially in construction projects, getting approval from various agencies before, during, and even after the project completion is one of the hard tasks that need to be faced by contractors (Long et al. 2004). However, it is not appropriate to generalise and assume that bad bureaucracy is everywhere in developing countries. Sheikh and Khan (2005) demonstrate it in their finding about a construction project in Pakistan that completed on time, within expected budget, and with pre-defined quality. In that project, politician used his good office to obtain fast approval from various authorities, making effective vie of the bureaucracy. These authors mention it as positive influence.

2.6.3.4.2 Non-standard practice

Stansbury (2003) reported that the practice of bribery in the construction and engineering industry is a serious problem and widespread all over the world; it is not only a problem in the developing countries but also a serious problem in the developed nations. Because of its nature, the exact figure of corruption is not known but the Commission of the European Communities estimates that the global cost of corruption adds up to approximately 5% of the world economy; and the organised crime groups use up to 30% of their proceeds to bribe police, prosecutors, judges and public administration in general to escape from law enforcement (CEC 2003).

The Transparency International Corruption Perceptions Index 2004 suggests that corruption is worse in developing countries, with Bangladesh and Haiti at the most bottom of the table with score of 1.5. Finland is at the top with score of 9.7 (TI 2005a). The same index shows that the UK is at the 11^{th} place with 8.6 score, while Malaysia and Tunisia share the 39^{th} place with 5.0 score. In 2007 the ranking is worsening as

Malaysia has been put at 43rd place together with South Korea and South Africa (TI 2008) with 5.1 point, even though the score has been improve from 5.0 to 5.1 (comparison: Italy at 42nd place with 5.2 point, UK at 12th place with 8.4 point, Myanmar & Somalia sharing 179th (last) place with 1.4 point, and Denmark/ Finland/ New Zealand sharing the first place with 9.4 point). However, this index has been criticised locally as bias (Star 2008, UM 2008), as local survey conducted by Institute of Integrity Malaysia shows that Malaysia has a better score of 6.79.

The awarding of contracts is an important source of power that can be subject to abuse (TI 2005b). In public sector, while the whole projects or services taken into account, a large amount of money is involved in those activities. The power of contracts awarding is often abused for the private benefit at the expense of the public resources and public needs especially during the contracting processes (Long et al. 2004). Transparency International (TI 2005b) reported that, even before the contracting process starts, opportunities for corruption appear when decisions are taken about what, when and how to contract which results with some projects being conceived with contractors already in mind. There is also room for abuse once the contracting process is completed and the contractor has been selected. Such abuse can take the form of underperformance, contract renegotiation, change orders, over-invoicing and non-compliance.

Steps have been taken by some countries to overcome or at least to reduce this problem. For instance, the Organisation for Economic Co-operation and Development reported that Government of Malaysia has taken action to create awareness among government servants about the importance of carrying out their tasks professionally, where about 950,000 civil servants were required to sign the "letter of undertaking" with the government by 30March 2002 (OECB 2002). Those who fail to do so are liable to disciplinary action in accordance with the Public Officers (Conduct and Discipline) Regulations 1993. The move is one of the government's big steps to have an efficient and credible civil service, which will lead the country to perform its development in a proper manner.

It is important that the enforcement should be implemented to whoever is involved in the abuse of power, regardless of who they are. No matter how tight the rule of the law is, selective prosecution will not overcome this problem. Besides that, a procedure of contract awarding and any other arrangement that involves the power of approval needs to be transparent and have the mechanisms of check-and-balance.

2.6.3.5. External influences

So far, discussions about project success factors cover those that related to the project itself or the stakeholders who involved in the project. Besides those factors, there are few others that were significantly influence the project success but they are beyond the control of any stakeholders. These act as obstacles to the project which need to be recognized in the project implementation (Wideman 1990). Nicholas (2004) sees these factors as risks or hazards. From the long list of possible hazards, they can be divided into three categories: irrelevant but influential parties, unpredictable environment (including weather and site-related problem), and economic climate. Discussion about human-related factors has been included in 2.6.1.1.

2.6.3.5.1 Unpredictable environment

External environment events such weather should be taken into account when dealing with project management as almost all projects, especially construction activities, are exposed to this kind of hazards (Kwakye 1997). As the weather can have a great impact on project progress (Kwakye 1997), proper planning and schedule is essential so that the consequences can be avoided. Projects in the heavy rain area or flood prone area for instance, should not be started during rainy season.

Underground condition of the construction site is the other problem in construction project that is difficult to estimate, especially in the case of multi-location projects. Chan & Kumaraswamy (1997) observed that unforeseen ground conditions is one of the five most significant sources of delays as perceived by the clients, consultants and contractors in both the building and the civil engineering projects in Hong Kong.

2.6.3.5.2 Economic climate

Despite badly affected by the East Asian currency crisis in 1997 Malaysia is one of those developing Asian countries which were badly hit by that economic crisis in 1997-98 when regional currencies came under attack by speculators who drove down their value (Government of Malaysia 1998). In July 1997, just before the crisis, the Malaysia Ringgit (MYR) was very stable at MYR2.5 to USD1.00 but fell during the crisis to reach MYR4.88 on 7 January 1998 (Kukreja 1999). In that kind of situation, any project that depends on material from abroad would suffer bad experiences of cost increase. This phenomenon shows how changes in economic situation cold badly affected the project. Fixed exchange rate of MYR3.80 to USD1 introduced by the Malaysian government, from September 1998 to21 July 2005 did not much help. Currency peg could affect projects in many ways (Taylor & Watling 1979).

Commodity price fluctuation is the other influence that could affect the project, particularly contractor's profit, especially for projects with a long completion time (Wideman 1995). Normally, the basis of material cost adjustment is the basic price list prepared by the contractor prior to the bidding process (Kwakye 1997). Quoting a low price for the sake of winning the tender during the bidding process can cause a contractor great difficulty when commodity prices increase during the project execution (see 2.6.2.2).

In the case of genuine difficulties (not because of non-standard practice during the tender process), the project owner or financier should consider the reimbursement if the commodity price increase beyond the reasonable point, where contractor could not make profit. For this reason, it is fair to include the reimbursement claim as one of the contract's conditions as long as it is fair to both sides and fulfils conditions agreed by both parties.

- The material must be on the basic price list;
- The price fluctuation must be due to a market price change or tax change;
- The acceptable increased price is the one relevant to the dates of material delivery to site.

To the project owner, this condition might be seen as an extra burden. However, a proper project management practice should anticipate the increase in the commodity price, and treat it as one of the major potential risk during the conceptual stage. A proportion of budget must be set aside as a contingency.

2.6.4. Product Stage

As mentioned in 2.5, in this stage, all respects of work are completed and the finished product is transferred to the project owner. There are several factors in this stage that influence the project success. Evaluation of the project success based only on project management factors without the product factors is inappropriate and could mislead (Shenhar & Levy 1997).

2.6.4.1. Customers satisfaction

Customers' satisfaction is very important to reflect the project success. This reason encouraged some researchers (Baker et al. 1988, Pinto & Slevin 1988, Barrett 2000; Torbica & Stroh 2001, Maloney 2002, Yasamis et al. 2002) to include it as one of the project success criteria. In service industry, satisfaction is key in securing customers' loyalty (Jones & Sasser 1995) and in strengthening the relationship between a customer and a company (e.g. Storbacka et al. 1994), which actually benefits either sides. Baird (1991) calls for integration between the designer/contractor and the customer to cater everybody's needs. Ireland (1992) identifies lists of the potential customers which have wants and needs that could affect the project outcome. The list includes the co-contractors and partners, project director, project team members, contractors and subcontractors, vendors and suppliers, users of the product and services and society.

In construction industry, customers' satisfaction came into discussion only after the starting of new millennium (Barrett 2000' Torbica & Stroh 2001, Maloney 2002, Yasamis et al. 2002). Quality is one of the aspects evaluated by the customers. However, sometimes people tend to misuse the term quality by associate it with expensive, luxurious, sophisticated, or comforting to extremely high specification (Turner 1993). According to this author, quality does not necessarily mean state-of-the-art; it mean supplying the customers with what they want, to the standard and specification they asked for, with a predictable degree of reliability and uniformity, and at price that suits their needs. Quality control is one of the most fundamental requirement during the development of a project; defects or failures in constructed facilities can result in cost increase and project delay, due to re-construction requirement (Hendrickson & Au 1998).

As mentioned in 2.6.1.1, different group of customers might have different level of satisfaction based on their own interpretation. To have a project scope (see 2.6.1.3) that each of them agreed upon, during the definition stage, perhaps the best alternative to reduce the differences during the product stage. On the contrary, should "all stakeholders equally satisfied to perceive project as successful (Wideman 1990)" applied to all conditions? In the case of Lim & Mohamed (1999) for instance, despite both the developer and contractor suffered bad experience with the project, users were highly satisfied and appreciate the product. Could not it be considered as success?

Previous research (Al-Momani 2000) indicates that public sector construction projects are less satisfying customers compared to private sector projects. However, the author does not mention whether the different is related to bureaucracy, as there was claim (Shafik 2001, Fergusson 1991) that private sector is more efficient compare to public sector. The interesting point related to this issue, as raise by Yu et al. (2005a) is that, whether satisfaction is based on customers' initial requirements or their expectation. This is especially true among the users, the group that utilise the product. Users are the ultimate group for which the product is intended (Bucher 2002, Govindarajulu 2003). Even though it is not always true, but there are cases where expectation is different from requirement (Ryker et al. 1997). In the projects where ICT equipment integrated in construction (Jaafar et al. 2007), the tendency to have this kind of difference is higher, as ICT specification tends to be obsolete in a short period. Nonetheless, that is not an excuse to avoid seeking their inputs, as has been discussed earlier (2.6.1.1).

2.6.4.2. Product Benefit

Sometimes customers' satisfaction of the product is evaluated as perceived benefit. The users are the best party to verify the product benefit since they are the ones who utilised it. Usefulness and ease of use are among the factors used to measure the product benefit (Mahmood et al. 2000), especially for ICT or technology related product. In that situation, their knowledge about the product is essential.

Although users are willing to tolerate some difficulties in product operation as long as it benefits them (Mahmood et al. 2000), training so as to familiarise the users with the product (Guimaraes et al. 1992), perhaps is a better approach in order to get them to appreciate the product. Through proper training the user could increase their knowledge about the product and thus would offer a fair judgement on the product benefit. Interestingly, Dvir (2005) found that user preparations prior to product commissioning are highly correlated with product benefit. To include training as one of the product specification, i.e. task that need to be performed by contractor, is one of the alternatives.

2.7. PROJECT CHARACTERISTICS

After discussing project success factors and criteria used to assess the success in 2.4, this section aims to explore whether those project success influenced by any characteristics of the project. Characteristic is the inherent nature of the project, irrespective of the particular implementation or the environment, i.e. as defined by the specification. Whilst success criteria are used to measure success factors after project completion, project characteristics that provide a view of the status or quality of the project can be estimated prior to starting of the project or during the execution of the project (Wohlin et al. 2000).

McFarlan (1981) suggested that success factors vary widely according to project characteristics. Wohlin & Mayrhauser (2000) shared the same view, by stating that success is influenced by many project characteristics. Youker (1999) classified project characteristics into nine groups: size, duration, sector, geographic location, number of workers involved, cost, complexity, urgency, and organizational design. However, from the literature, it is difficult to find a common stance among the researchers about the project characteristics that influence the success factors of the project.

As there are verifying perception of the project success due to different understanding (see 2.3), the application of project characteristic while assessing the project success factors would make it even more confusing if this concept is not properly understood. In a simple explanation, the intention of the researcher to introduce this project term is to find out whether differences in inherent nature of the project, such as geographical location, could influence the affect of certain success factors, although reviews of the literature (e.g. Wohlin & Mayrhauser 2000) indicate that it is not an easy task, as the project characteristics is usually not obvious, make it difficult to measures. The other problem is that, depending on objective of particular researches carried out, some project characteristics could also be treated as success factor.

As mentioned in 2.7, there is no common understanding among project management authors about standard project characteristics. Different authors (e.g. McFarlan 1981, Youker 1999, Wohlin & Mayrhauser 2000) have different sets of projects characteristic. As far as the project being studied is concerned, part of the following characteristics, if not all believed to relevant.

2.7.1. The Stakeholders Interest and Influences

As discussed in 2.6.1.1, different stakeholders have different priority in the project, and each of them wants the project to be implemented according to their requirement. However, in the actual project management practice, it is rarely that the requirement of each stakeholder could be fulfilled. Since each of them has different interest and different influence depending on their power, they might influence the project to suit their needs. As far as project management is concerned this kind of move is not favourable. Proper management of their power and interest is important. As different projects have different stakeholders, one project might different from the others in managing the stakeholder.

2.7.1.1. Analysing Power and Interest in Projects

A wide range of people and organisations might claim to have an interest in the outcome of a project. Shenhar et al. (1996) emphasise that if a project is to be perceived as successful, then the stakeholders must be satisfied. However, according to these authors, since this encompasses a wide range of people, they have different priorities and may not all be equally satisfied, but at least they should be satisfied in some degree, or in the majority. Problem arise when powerful stakeholder interfere the project to suit their priority. It is a task of project management team to analyse and manage the stakeholder so that project could be implemented smoothly. Analysing the stakeholders is made for two purposes. Firstly, it is carried out to get their views about the project, including their requirements. Secondly, the purpose is to manage them throughout the life cycle of the project. As mentioned in 2.6.1.1, it is essential to identify those stakeholders who can affect the project, and manage their differing demands through good communication and consultation in the early stage of the project.

A fundamental purpose of analysing stakeholders is for the project management team to convert stakeholder interference attempts on the project into positive contributions (Achterkamp & Vos 2007). There are two alternatives in gathering and organising the stakeholders' view; it is either through large numbers of representation or small number of delegation (JISC 2005) as summarise in Table 2-8. The table shows the comparisons between representation and delegation in contributing their views.

Both approaches have advantages and disadvantages. From the project manager's point of view, it is more helpful to assess the evaluation of a project's outcome by individuals and organisations participant so that a wider range of views would be covered (Liu & Walker 1998). However, if time is particularly constraining in defining the project, a delegation route, i.e. a small team of delegation authorize to undertake work on behalf of the bigger community is more appropriate.

Table 2-8: Representation vs. delegation of the stakeholders

Approach	Advantages	Disadvantages
<u>Representation</u> Attempts to take in the full range of views, interest groups and organisational units as part of the full decision making process. Characterised by democratic, committee-type decision-making.	• Covers full range of views • An obvious route to gain widespread acceptance of decisions	• Involves people who may have limited knowledge of the subject area • Slows decision-making • Can result in compromises which don't really represent 'best fit' in any particular area
<u>Delegation</u> Delegates responsibility to those identified as being best suited to the job	• Work carried out by those with appropriate skills and knowledge • Permits project to move forward more rapidly	• Acceptance relies on trust in those delegated - may be an alien approach in the education culture • Needs care to ensure that all relevant issues are properly understood and covered

Source: JISC (2005)

Managing various stakeholders throughout the project life span is a more challenging task by project management team, as they might influence the project implementation. Some of them are powerful enough to change the earlier decision made by the respective authority. Stakeholders' power in projects management is referred to as the way they affect the project in case of a conflict and the possibility that it can increase by cooperating with others (Andersen et al. 2004). The best way to overcome the problem is by managing them properly. Different authors suggest different ways of categorizing the stakeholders in order to analyse their power and interest. Johnson and Scholes (1999) used 'power' and 'interest' as parameters to divide stakeholders into four grids as in Table 2-9. Managing each group of stakeholders could be prioritised by their power over manager's work and their interest in the project.

Table 2-9: Power and interest grid for stakeholder prioritization

Power	Interest: Low	Interest: High
High	*Keep satisfied*	*Manage closely*
Low	*Monitor (minimum effort)*	*Keep inform*

Source: Johnson and Scholes (1999)

JISC (2005) introduced a more flexible way of categorizing project stakeholders with a description as shown in Table 2-10. The category of certain stakeholders in one might be different from the other project, depending on ownership and type of the project. However, those two methods are not exhaustive; different organizations or different project teams may have their own types of characteristics of stakeholders.

2.7.1.2. Multiple Priorities

A successful project should have all stakeholders' taken into consideration (Olander & Landin 2005). However, it is normal in every project that stakeholders see their interests from their own viewpoint and often do not fully appreciate the interests of the other stakeholders (Finzi et al. 2005). Especially in construction projects, there are numbers of stakeholders, frequently with various opposing interests. Working with a multi-stakeholder project is not an easy task for two reasons. Firstly, as mentioned in 2.6.1.1, it is difficult to satisfy everybody who involved in the project. Secondly, they tend to influence the project to suit their needs or the role they play in the project (Kolltveit & Grønhaug 2004). Working in environment of multiple stakeholders with diverse points of view is often difficult (Turner 1993). Lack of consensus among stakeholders is among the reasons project not achieving the earlier set goals (Salustri 2002).

Table 2-10: Stakeholders' characteristics

Categories	Description	Examples
Strategic	Determining the strategy which this system underpins - may sponsor the project	Federal Government, Central agencies, Project owner
Managerial	Executes managerial control over elements of the system being implemented	Project owner, Project Manager
Operational	Is involved in operating the system or parts of it	Statutory authorities, Local authorities, Contractors, Suppliers
Direct Influence	Is directly affected by outputs of the system but is not engaged in inputting to it	Local politicians, End users
Indirect Influence	Is only indirectly affected by the system if at all	The community, The public

Adopted from: JISC (2005)

Managing stakeholders, i.e. the process of identifying the key stakeholders and wining their support, is one of the crucial skills that project manager and project management team should have (Johnson & Scholes 1999). While the requirements of those groups of stakeholders with prominent voice need to be entertained, the needs of those who could have a legitimate interest but no real voice, such as the end users should also be considered. Proper meetings may be a suitable forum where project management team and project stakeholder can communicate and exchange their view. Managing stakeholders should be a continuous process, involving communication and consultation throughout the project. The challenge is doing so in a cost effective manner that does not absorb too many resources and enables constructive input whilst avoiding unnecessary specification change. The best thing that the project manager can do is to make it possible for stakeholders with differing interests to work together so that there is a way of making a sustainable bargain between the stakeholders, along with a commitment to contribute (Finzi et al. 2005, Achterkamp & Vos 2007). The best time for this bargain to take place is during the early stage, before a detailed agenda is set and the cost involved for making changes is low (Kolltveit & Grønhaug 2004).

The level of influence from different stakeholders depends on level of power they have (Finzi et al. 2005), whereby power is derived from the nature of their organisation or their position, whether it is formal or informal (SDD 1995). The ability to influence the project by each stakeholder may varies depends on category of power they have (Wideman 1990, Andersen et al. 2004). Agencies or officers who control budgets are among the stakeholders that hold formal power, while those who have personal connections to ruling politicians are among the informal forms of influence (SDD 1995). The statutory authorities, such as water authority or electricity authority have a very important role in construction project. As they have certain power, it is beneficial for the management team to give them early information of any proposed development plans and work closely with them thereafter for their guidance (Kwakye 1997). Local authorities also have a vital control in many construction projects. In the UK, the Act of Parliament granted local authorities the power to control the planning permission for the execution of construction projects in their area of jurisdiction (Kwakye 1997). In Malaysia, the Local Government Act 1976 together with Town and Country Planning Act empowered the local authorities to undertake a wide range of functions including planning authority for their respective area of authority (Yaakup 2002).

Labourers may not have executive power to interfere the project, but the workforce has a very important role to make sure the project is completed successfully. Kwakye (1997) defined labourers in construction project as those who work as contractor's employees which include the site operative, site staff, and operative off site producing component for use on the project.

2.7.2. Contract Award Methods

Contracting is recognised as one of the important project characteristics that greatly affecting the project success factors (Westerveld 2003). This section will discuss two issues related to contract, i.e. the project delivery method and the contract award procedure. Various methods of project delivery method are used in public sector construction projects, namely design-build, design-bid-build, construction management, management contracting, build-lease-transfer and build-operate-transfer. Traditionally, design-bid-build is widely used as construction project contracting delivery method (Yean et al. 2003).

However, this delivery method is proven inadequate in meeting the public sector requirements and expectations of finishing the projects on time and within budget (Kartam et al. 2000). As a result, alternative methods, such as build-operate-transfer and design-and-build are being used by public sector to overcome the drawbacks of the design-bid-build (Al-Reshaid & Kartam 2005). Build-operate-transfer is usually associated with privatisation project while design-and-build is generally related to public funded project. Since the programme being studied adopted design-and-build, this project contracting delivery will be discussed in detail.

Design-and-build is better than the other delivery methods (Yean 2003, Al-Reshaid & Kartam 2005) in two ways. Firstly, there is only one party responsible for the development of the project, thus reduce the inter-personnel communication problem within the project organisation. Another advantage of design-and-build is in time saving; it is a result of some overlapping of planning and execution stages. For instance, the contractor does not have to wait for the architect to completely finish his or her design job before starting construction work as both of them work within the same party; this overlapping can result in time saving.

The design–and-build method is workable if the project has a combination of a good project management team and a competitive contractor. The project manager must be knowledgeable, equipped with an established control mechanism, without burden of other projects, and has an adequate power to act immediately. However, it is difficult to have this luxury in public sector project; there is often a stricter bureaucracy and less independence for project managers. At the same time, contractor must have adequate facilities, sufficient skill workers, and financially strong. To get the best contractor, the organisation must establish a strong award procedure.

There are numbers of contract award procedure such as open tender, restricted tender and direct-negotiation, each of which is useful in different condition. In other word, not all approaches apply to all conditions (Søreide 2006). Although design–and-build is a popular alternative project-delivery method, it is usually not awarded according to the conventional public tendering regulations (Al-Reshaid & Kartam 2005). Usually, only selected contractors are considered for the project through direct-negotiation, which usually resulted in a higher project cost compared to the same project delivered trough the other method (Søreide 2006). This is especially in the case where the contractors impose some unnecessary items into project specification, knowing that there is no competitor. In addition, as emphasised by Jenssens (1991), there is an issue of responsibility and claim of the product design. If the contract needs to be terminated for whatever reason during project execution, it is difficult for the project owner to claim the design property as it is belongs to the contractor.

The situation is even worse if the contractor and those in power, usually politician conspiring each other to manipulate the tender process (Della-Porta & Vannuci 1999); in most case, it end up with contract awarded to the contract through direct-negotiation. The most common reason to rationalise this kind of practise is to speed up the project implementation for the benefit of people. Eventually, huge wastes of public money happen, rather than an uttered political will to improve welfare for people.

2.7.3. Project Size

The project size should be formally determined once a project has been approved and funded (Government of Tasmania 2005). This kind of practice is ideal in the sense that the programme size, espceally number of projects, should be tailored according to available resources. However, in the case where the size is already predetermined, as in the programme being studied, the decision-makers should determine the available resource including project fund accordingly. Besides project fund, the other resources – human and material – should also sufficient. As mentioned in 2.6.1.4, resources assessment is crucial; if the resources is insufficient, trade it off with completion time is necessary.

In order to make sure that the large-scale programme can be carried out smoothly, all procedures should be appropriately elaborated especially in the tender documents. However, Søreide (2006) warns that there is no guarantee that high price spent would end up with equivalent quality as the procedures can be manipulated in many ways although procurement procedures are generally well elaborated in large infrastructure contracts compared to smaller ones. The best alternative is to divide the large-scale programme into a smaller phases, each of which consisting of reasonable numbers of project and tender them out separately at different time so that to reduce competition for resources.

Extensive scale project need an experience project manager, expert in every aspect of the project, to make sure that the programme complete as planned (Andersen et al. 2002). Competitive contractors with skill workers are also crucial to make sure the project run smoothly (Assaf 2002). If those prerequisite could not be fulfilled, the programme needs to be reduced into reasonable size or staggered into manageable phases. Otherwise, a massive waste of public resources could happen beyond anybody's control (Søreide 2006).

2.8. SUMMARY

The traditional approach of measuring project success using time, cost, and quality as simple criteria is inaccurate and inadequate. Projects need to be judged against a more complex set of criteria, recognising that different stakeholders have different priorities. Normally, set of success factors that are judged using the same criteria are grouped under particular dimensions. Project may affected by different factors at different time.

Based on its life span, project can be divided into two segments; project process and product. Evaluating project success should cover factors in both segments of the project. Evaluating factors during the project process would verify the project management success, while evaluating factors related to the project product would judge the product success.

While it is possible to identify various factors that influence success, the key factors that contribute to the project success can vary between projects. Success of a particular project could be different from the others, depending on the different project characteristics that influence those success factors. While some project characteristics are under control, the others might be beyond the control of any members of the project team. Controlling project characteristics is important in determining the direction or anticipating the outcome of the project.

CHAPTER 3:

THE MALAYSIAN SCHOOL COMPUTERISATION PROGRAMME

3.1. OVERVIEW

In Malaysia, the use of ICT in education was introduced in 1992 (Hassan 2001, Chan 2002, Yunus 2007). The main function of ICT in schools was not only to promote computer literacy but also to enhance teaching and learning. There were various programmes brought in by various divisions under the MOE; among the programmes were *Myschoolnet*, Computer in Education, and Smart School (Chan 2002, Ngah & Masood 2006). However, impact of abovementioned programmes was diminutive, as there were lack of coordination between respective divisions and insufficient amount of fund allocated for. The SCLP is the first programme implemented with the aim to cover all government-funded schools in Malaysia. Ironically, Malaysia is one the world's leading producer of computer processors which means it should have the capability to furnish all schools with computer facilities even better than most of the developed nations (Theaker 1997).

3.2. PRESSURE FOR CHANGE

Due to developments in information and communication technology, the world has become borderless (Chan 2002), where the impact of events in one place is felt almost simultaneously around the world. The repercussions of social, political or economic events are no longer affecting only those within the society or a few adjacent societies but to the whole world. Toffler (1971) identified this sentiment more than 30 years ago by warning people that in order to survive, individuals must become more adaptable and capable than ever before.

3.2.1. Education in Malaysia

Malaysia provides 11 to 13 years of free schooling and officially Malaysian children begin primary school education at age 7 (see Table 3-1). Enrolment rate in primary schools is up to over 95%, while the enrolment rate in the secondary schools recorded more than 85%. Detail information about the Malaysian public school enrolment from 2003 to 2006 is shown in Table 3-2. Besides those schools, there are international schools and expatriate schools; these schools are readily available to cater for the academic needs of international students or children of expatriates in Malaysia, at the primary as well as secondary level of education (MOE 2006b).

Table 3-1: School level of Malaysian education system

Level	Age	Duration (years)	Examination
Pre-school education (optional)	5-6	2	
Primary	7-12	7	UPSR
Lower secondary	13-15	3	PMR
Upper secondary	16-17	2	SPM
Post-secondary/ Pre-university	18-19	2	STPM/ Matriculation

Source: MOE (2006b)

The Malay language is used as medium of instruction at all levels in Malaysian education, except for international schools where English is used as the teaching medium. However, starting from the academic year 2003, English has been adopted as a medium to teach the subjects of science and mathematics in order to provide opportunities for students to use the English language and therefore increase their proficiency in the language (MOE 2002b). This move is also intended to prepare children for a better understanding of computer literacy, given that English is widely used as a medium in ICT including most of the websites.

Table 3-2: Enrolment in Malaysian public school

Year	Primary School	Secondary School	Total
2003	3,069,111	2,071,077	5,140,188
2004	3,120,886	2,156,215	5,277,101
2005	3,137,280	2,217,879	5,355,159
2006	3,136,641	2,228,066	5,364,707
2007	3,167,775	2,253,383	5,421,158

Source: MOE (2008)

Recently, the education system in Malaysia has changed rapidly and the government has taken every effort to integrate the technology into the education system. The Minister of Education, as reported by Bernama (2005), emphasised that students' skill in information and communications technology and its integration in education is neither an option nor an essential add-on, but are essential both as a means of delivery of education and as the subject of study.

3.2.2. Change in Teaching Approach

There are claims (Hassan 2001, Chan 2002) that the use of ICT in Malaysia has developed rapidly, parallel with the other sector - banking, telecommunication, transportation, entertainment etc. With the aspirations to become an industrialized nation by year 2020 through a long-term strategy Vision 2020 (Mohamed 1991), Malaysia has made an enormous effort to improve and develop ICT literacy so that its young generation will not left behind in the digital divide. This is in line with

Malaysia's national philosophy of education (MOE 2005a), which calls for developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious. With the existence of 'borderless world', students from one school can access vast amounts of information in other schools worldwide through global communication. These new approaches to teaching and learning practices, through the integration of the technology into the school environment, make the learning process more interesting.

The first ever school computerisation programme was launched in 1992 involving 60 secondary schools throughout the nation. Through the programme known as Computer in Education, the MOE focused it on the teaching of the computer as an additional subject, not as a teaching aid to teach other subjects (Hassan 2001). After that, there were numbers of school computerisation programmes, initiated and handled by various divisions in MOE (Hassan 2001, Yunus 2007), with various names as mentioned in 3.1.

Despite numbers of ICT programme implemented and claims that ICT has developed rapidly (Hassan 2001, Chan 2002), study by Theaker (1997) indicates that ICT has had little impact into the education, and as a result, the computer literacy among children was still low. Zaman (1998) estimated that only 20% of the 4.2 million schoolchildren in Malaysia have some understanding of computer applications, such as word processing, using spreadsheets, and using some educational courseware. What are the problems faced by the earlier Malaysia's computerisation programmes?

According to Ngah and Masood (2006) those programmes were introduced only in a few selected public schools in major cities, thus benefited only small numbers of students. As the cost to have such a programme is relatively high, other schools were left without any proper computerisation programme except for private schools, which initiated their own programmes (Chan 2002). Lack of coordination between those divisions made the situation even worse, as there was no common syllabus for those schools involved. Those programmes would not be sufficient to produce ICT skills required by the country. ICT usage among the higher institutions' lecturers and students, however, has grown faster, as those institutions have their own programmes. According to Zaman (1998), level of ICT literacy among those groups is very promising, that is, above 80%.

Realising the deficiency in school computerisation programme, the Malaysian government has been working hard at consolidating various ICT programmes such as the smart school, the supply of projectors and notebook computers to schools, the broadband connections to schools, and the school computer laboratory (Bernama 2005). Compared with the previous ones, these programmes cover a wider range of public schools.

After furnishing schools with enough facilities, there was another issue arise. Even though all teachers are expected to be computer literate when all the primary and secondary school are fully furnished with computers (Chan 2002), in the actual fact it is not as easy. Preparing teachers to take charge of those facilities is the other big challenge (Reznich 1996) faced by the MOE. Preparing children to be ICT literate is even easier; once teaching and learning processes in schools are conducted using computers, all schoolchildren will become ICT literate (Theaker 1997).

3.3. FACILITATING CHANGE

Due to high demand to furnish all public schools with ICT facilities in order to prepare future generation to be ICT literate, the government had introduced smart school programme. Before implementing this programme nationwide, 90 pilot projects were launched in 1997 at 90 selected schools. The programme aimed at transforming the educational system with the strategy of changing the culture and practices of Malaysia's primary and secondary schools, from memory-based learning to an education that stimulates thinking, creativity and caring, and caters to individual differences and learning styles (Chan 2002). Table 3-3 points out the imminent paradigm shift from conventional school to smart school system (MSC-COMM 1998).

Table 3-3: Comparison between conventional school and smart school

Conventional Schools	Smart Schools
• Teacher-centred learning process	• Student-centred learning process
• Catering to the average	• Suited to individual styles and capabilities
• Rigid	• Flexible
• Classroom as world	• World as classroom
• Island	• Networked community
• Examination driven	• Curriculum driven
• Learning as chore	• Learning as fun
• Teacher is sole knowledge dispenser	• Teacher is guide by the side / facilitator

Source: MSC-COMM (1998)

Chan (2002) reports that all of the 90 pilot project schools were fully networked and linked to each other, besides 1,494 courseware titles as teaching materials. In terms of management, each school were equipped with a computerised and integrated smart school management system, a help desk, a data centre, trained teachers and skilful IT coordinators (Chan 2002, UNESCO 2005). This programme seems to be very promising in fulfilling the demand for the future. However, after some revisions based 90 pilot projects, the government was of the opinion that the programme is not feasible to be implemented to all schools as the cost is too high and beyond the government's normal expenditure. As shown in Table 3-4, the total cost for the 90-school pilot projects is MYR300,000,000 (about GBP47,021,944). That means, average cost for each school, excluding the long term maintenance cost, is MYR3,448,276 (about GBP547,345).

Table 3-4: The smart school integrated solution components and cost

Smart School Integrated Solution (SSIS) Components	Cost in Malaysian Ringgit (MYR)	Approximate Cost in British Pound (GBP)
• Teaching-Learning Materials (*Bahasa Melayu*, English Language, Science, and Mathematics)	92,443,742	14,673,610
• Smart School Management System	31,366,872	4,978,869
• Technology Infrastructure (IT and non-IT equipment, Local Area Network, Wide Area Network, communications)	65,921,874	10,463,790
• Training in the use of the various components of the SSIS	2,113,380	335,457
• Support services (Help Desk, preventive maintenance and corrective maintenance)	17,851,177	2,833,520
• Project Management, Business Process Reengineering, Systems Integration	90,302,955	14,333,802
TOTAL	300,000,000	47,619,048

Source: UNESCO (2005)

There were more than 9,000 government-funded schools in Malaysia (see Table 3-5). It is apparent that the figure could create a high financial burden to the government. The Prime Minister himself announced that apart from those 90 pilot projects, the government decided not to proceed with the implementation of such programme in the near future (UM 2003). Moreover, according to him, it was almost impossible to convert all existing school into smart schools within a short period.

Table 3-5: Public school in Malaysia

Year	Primary Schools	Secondary Schools	Total
2003	7,504	1,902	9,406
2004	7,562	1,976	9,538
2005	7,601	2,028	9,629
2006	7,616	2,047	9,663
2007	7,623	2,058	9,681

Source: MOE (2008)

A cheaper approach is necessary so that the allocation for ICT facilities can be distributed to all schools nationwide and all children can fairly benefit. With a more realistic project cost and targeted for all government-funded schools (MOE 2000), the computer laboratory programme is a better alternative.

3.4. COMPUTER LABORATORY PROGRAMME: A BETTER APPROACH

As an alternative to the high cost smart school programme, government had initiated another ICT programme in 1999, known as the School Computer Laboratory Programme (MOE 2000, Chan 2002). The TOR of the programme (MOE 2000) reveals that physical element of the project was divided into three components – construction of laboratory building, supply of furniture, and supply of ICT equipment.

Beside the physical element, there was an academic element, which covered teachers training and syllabus preparation; although it will not be included in this research, a brief discussion on this element is useful. No matter how up-to-date the physical element is, it would not be well functioning without proper syllabus and skilled teachers to facilitate it (Ngah & Masood 2006). Figure 5-1 shows the important components in the SCLP.

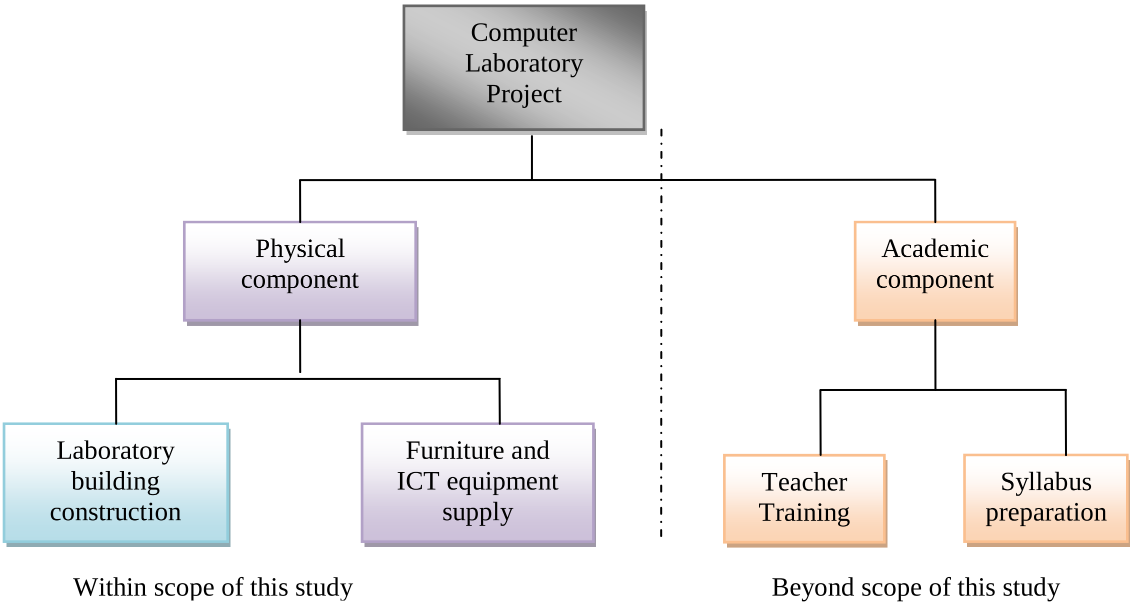


Figure 3-1: Components of the Computer Laboratory Project

3.4.1. Physical development

As mentioned in 1.2, the implementation of computer laboratory programme was staggered into several phases. The first phase of the programme was started in year 2000, three years after the introduction of smart school pilot projects. The project terms of reference for phase-1 (MOE 2000) showed that, there were three categories of computer laboratories, namely Model 1, Model 2 and Model 3. Each model was different from the others in size, depending on student population in the particular school. Detail of each model is shown in Appendix 5. In accordance with the size, the cost per unit for each model also varied; ranging from MYR165,000 (GBP26,190) for Model 1, MYR215,000 (GBP34,127) for model 2, and MYR400,000(GBP63,492) for model 3.

This figure shows that, the SCLP is much cheaper compared with the smart school project; the cost per unit for Model 3, the biggest model of computer laboratory, is 88.4% cheaper than cost per unit for a smart school project. Even though the facilities provided by computer laboratories were not as luxurious as those provided by smart schools were (see 3.3), it was more practical, suiting the government budget, so that the facilities could be distributed fairly among schools all over the country. This is the first big step ever taken by the Malaysian government to furnish the ICT facilities to all schools throughout the country. Appendix 5 shows a brief specification of computer laboratory project. The second phase of the programme, which started in 2002, retained the same specification with a minor adjustment (MOE 2002a). The only major change was in Model 3 building design; from single-storey building to double-storey building but the floor area remain the same.

3.4.2. Academic development

As one of the major objectives of the SCLP is to facilitate the academic needs, it is incomplete if it is not discussed here although this element is not covered by this empirical research. The discussion touches two aspects, namely teachers training and syllabus preparation.

3.4.2.1. Teachers Training

Teacher training task is separate from physical development of the programme. The terms of reference (TOR) of the project, does not include teachers training as part of project scope, except for brief training of how to operate the ICT equipment by the contractors or suppliers. The contractor's job completed once the project handed-over to the owners, except for repair of any defects during six-month defect liability period.

Whilst physical development of the project is under the jurisdiction of Development and Procurement Division, teacher training task is the responsibility of Teacher Training Division (MOE 2005b). However, in terms of product utilization, there is a need for cooperation between those two divisions in order to make sure that the objectives of the project could be achieved. The overall success of the project is judged with both physical and functional success In this regard, teacher's training in ICT is crucial to ensure that teachers and pupils as the users would get full benefit from the product of the computer laboratory programme.

One of the big challenges in the implementation of ICT in education is computer anxiety (Reznich 1996). There is a barrier between teachers of different 'generations', whereby the 'older' teachers have a higher level of computer anxiety as compared to their 'younger' colleagues. This situation is not related to age (Gressard & Loyd 1985, Yang et al. 1999) but more related to experience (Anderson 1996, Whitley 1996). This is true in Malaysia because the 'young' generation teachers gained the computer experience through the ICT lessons that has been incorporated into the new curriculum of teacher's training (MOE 1999), while their 'older' counterparts did not have such training.

Proper training will help teachers to reduce computer anxiety (Fletcher & Deeds 1991, Yang et al. 1999) and avoid major barrier to the computer and related equipment (Birkenholz & Stewart 1991). As ICT technology is growing very fast, the experienced teachers must always ready to prepare themselves for this change. Knowledge and experience from training make the teachers more confident in the classroom and computer laboratory. In order to prepare teachers to increase the effectiveness and knowledge in order to fulfill the needs, the MOE has conducted two types of ICT courses, that is pre-service and in-service programmes to fulfill three main objectives as follows (MOE 1999):

- to train teachers of high calibre in sufficient numbers to fulfill the requirements of all pre-school, primary, secondary, vocational and technical schools within the national education system;
- to constantly upgrade the knowledge, competence and efficiency of trained teachers and lecturers in both academic and professional areas; and
- to work towards developing teacher training colleges to become centres of professional development in teacher education.

Teachers' training is an ongoing process (MOE 1996) and inherent with the progress of the physical development. To cater for the rapid change in ICT technology, which has become a major mode in teaching-learning process in Malaysia recently, the curriculum of teachers training needs proper revision from time to time.

3.4.2.2. Syllabus Preparation

Record shows that ICT inputs such as personal computers have been introduced to schools in Malaysia since the late 1980s but during the early stage these technologies were more for remedial and enrichment activities (MOE 1999), as computer was a luxurious facilities. Due to rapid changes in the use of ICT technology, knowledge in this area is no longer a special subject but it is necessary for all schoolteachers. The use of computer-aided learning in schools has developed quickly in recent years (Hawkridge 1995). This approach appeared as an effective teaching-learning medium due to its ability to present content in a variety of ways and features.

However, no matter how sophisticated the system is, it remains as a tool and will not take over the teachers' function. Despite dozens of educational software packages designed to enhance the curriculum, the teachers' role is still dominant. For instance, the computer and software will not be able to provide the specific learning needs of the student. In the project being studied, the preparation of syllabus and guidelines for subjects to be taught in the computer laboratory is under jurisdiction of Curriculum Development Centre, Ministry of Education.

3.5. SUMMARY

Despite the country's status as the leading producers of computer processors, ICT usage in Malaysian schools in the early 1990's was low due to several reasons. The organised use of ICT in education had been initiated by several divisions in the MOE since 1992 through various programmes. Lack of coordination among those divisions ended up with little impact on the education system. The sophisticated smart school project could not be implemented nationally due to its high cost. The SCLP is the best option to fulfil the needs in Malaysian teaching and learning process.

CHAPTER 4:

RESEARCH METHODOLOGY

4.1. OVERVIEW

This chapter starts with exploring and organising the relevant previous studies by various researchers, particularly discussed in Chapter 2, to get the basic idea of conducting the research. The whole idea illustrates in theoretical framework, which is used as research guideline. This chapter also outlines the approach of data collections, type of collected data, justification of data sources, and steps taken to maintain the validity of data and analysis techniques.

4.2. RESEARCH PARADIGM: QUANTITATIVE AND QUALITATIVE APPROACH

Paradigm is a basic belief system or worldview that guides the investigator upon which the research is conducted and ultimately dictates the approach to data collection and analysis (Guba & Lincoln 1994). It should be recognised as early as initial stage of the research (Carson et al. 2001) for three reasons (Easterby-Smith et al. 1991): i) to guided the researchers to understand the overall components and procedures of research to be carried out, ii) to help the researchers recognise the correct design that work well in solving research problems, and iii) to assisted the researchers identify and construct designs that may be beyond their experiences. Qualitative and quantitative are two paradigms that often used in conducting research (Creswell 2003) to provide a useful mean to classify different methods of social research (Bryman & Bell 2003) including data collection (Bryman 2004).

Quantitative research usually emphasises quantification in collection and analysis of data (Bryman 2004), involving measurement of causal relationships between variables based on testing of theory (Denzin & Lincoln 2000). The aim is to determine whether the predictive generalisations of the theory hold true (Creswell 2003). This approach implies verification-oriented, confirmatory, and particularistic methodological idea of positivism about the nature of social reality and methods, whereby reliability is critical (Bryman 2004).

In contrast, qualitative research is normally emphasises words rather than numbers in collection and analysis of data (Bryman 2004). This approach involved the use of a variety of empirical materials in the socially constructed nature of reality with the intimate relationship between the researcher and subject being studied (Denzin & Lincoln 2000). Qualitative methods are appropriate for the researchers who desire to deeply understand complex social phenomena (Yin 1994). This method typically stresses more on the process in explanation of complex phenomenon (Bryman 2004). Compared with quantitative research, less attention is given to the final result in the qualitative research. The focus of qualitative research is in probing the real situations in order to provide much greater depth of understanding through eliciting data, which consists of detailed descriptions of events, situations and interactions between people and things, rather than predictions of the subject under investigation (Miles & Huberman 1994, Glesne 1999, Creswell 2003). Table 4-1 summarized the differences between the quantitative and qualitative approaches based on assumptions, purpose approaches, and the researchers' role.

Table 4-1: Features of quantitative and qualitative research

	Quantitative	**Qualitative**
Assumptions	• Social facts have an objective reality; • Primacy of method; • Variables can be identified and relationships measured; • Etic (outsider's point of view);	• Reality is socially constructed; • Primacy of subject matter; • Variables are complex, interwoven, and difficult to measure; • Emic (insider's point of view);
Purpose	• Generalizability; • Prediction; • Causal explanations;	• Contextualization; • Interpretation; • Understanding actors' perspectives;
Approach	• Begins with hypotheses and theories • Manipulation and control; • Uses formal instruments; • Experimentation; • Deductive; • Objective; • Component analysis; • Seeks consensus, the norm; • Numbers and statistics form of data; • Abstract language in write-up;	• Ends with hypotheses and grounded theory; • Emergence and portrayal; • Researcher as instrument; • Naturalistic; • Inductive; • Subjective; • Searches for patterns; • Seeks pluralism, complexity; • words, pictures or objects form of data; • Descriptive write-up;
Researcher Role	• Research with subjects; • Researcher knows in advance of what he/she is looking for; • Detachment and impartiality (Researcher is independent from that being researched); • Objective portrayal.	• Research with informants; • Researcher may only know roughly in advance of what he/she is looking for; • Personal involvement and partiality (Researcher interacts with that being researched); • Empathic understanding.

Source: adopted from Glesne (1999), Miles & Huberman (1994)

In this study, the qualitative paradigm is adopted as most of the studied factors happened in the past. Research with the informant is more appropriate rather than with the subject. However, after considering pragmatic matters, it is not possible for this research to adopt qualitative method as the only approach. The qualitative method is suitable to those groups with smaller number of respondents, as meeting them individually to get data through interview is the best approach to get insightful illustration of the studied case based on their experience. However, for the groups with a large number of respondents, quantitative approach is more suitable as it is impossible to interview sufficient number of them within the limited time available. Nonetheless, a small number of the respondents could be selected at random for interview to get their valuable insight to support the quantitative data obtained through questionnaires. Interviewing a small sample of the questionnaire respondents would also enable researcher to test the validity of the questionnaire data.

4.3. RESEARCH ORGANISATION

This research falls under qualitative paradigm. According to Denzin & Lincoln (2000), qualitative research can be defined as ‘multi-method’. However, based on the nature of the project, it was not possible to get data for this research by a single method. For that reason, this research utilized both qualitative and quantitative approaches to make it more credible. In addition, this dual approach enabled the validity of the data to be tested in a form of triangulation (Bryman & Bell 2003, Oka & Shaw 2003). The triangulation is perhaps a useful tool for qualitative research (Seale 1999). Figure 4-1 shows the organization of this research.

4.3.1. Action research

Due to my involvement in the programme being studied and the possibility that the findings of this research would reflect the future project implementation, the study has adopted some elements of action research. However, as applying action research needs to fulfil certain criteria, which are beyond the scope of the current research, the adoption of this approach will be applied with some limitations.

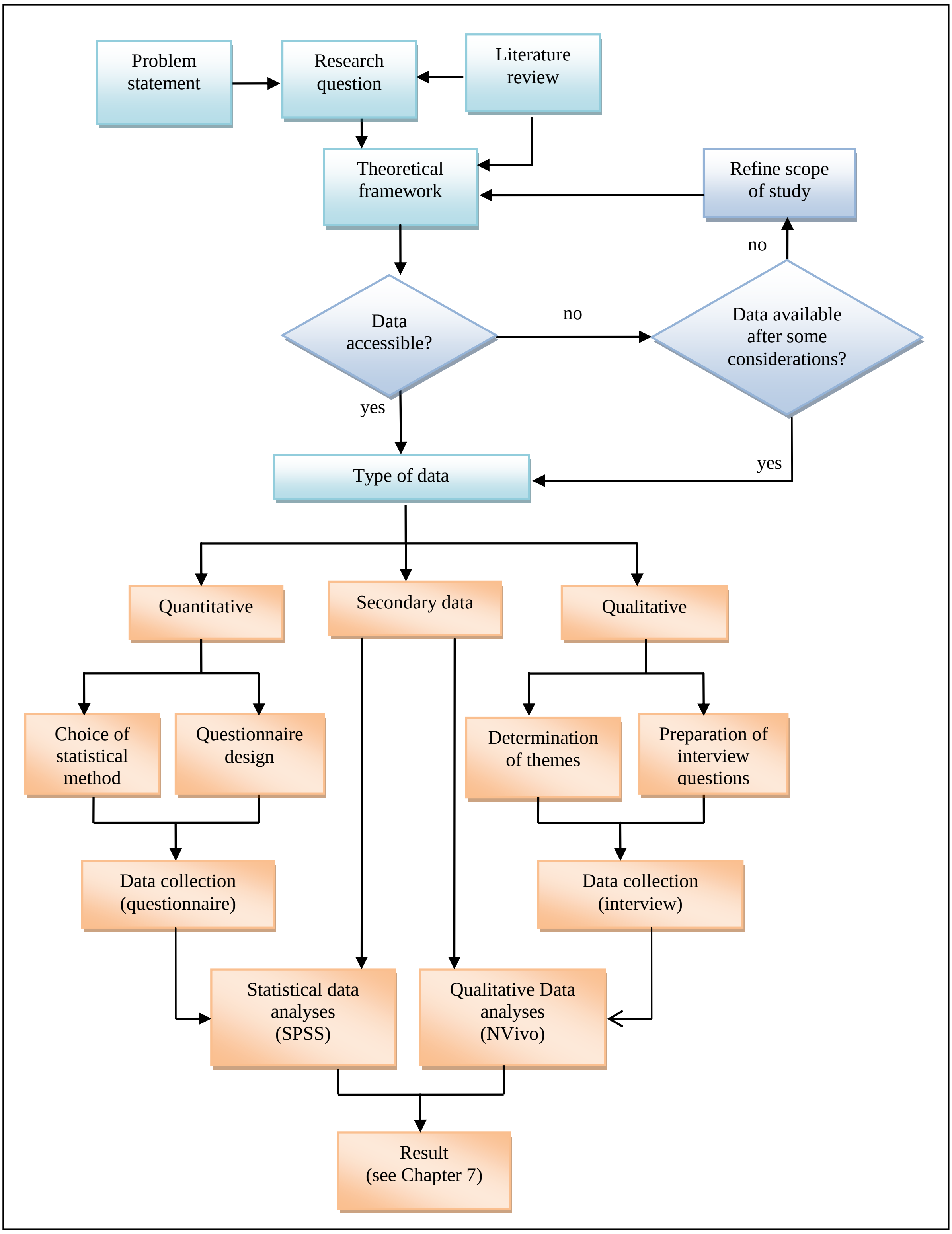


Figure 4-1: Research organisation

The purpose of applying action research is to help explain the researcher's role in the project. According to Dick (2005, personal communication), action research itself can be regarded as a methodology. Dick (1999) described action research as a family of research methodologies which pursue action (or change) and research (or understanding) at the same time. It is usually in the form of cyclic, whereby action and critical reflection taking place in turn. The reflection is used to review the previous action and plan the next one. The adaptation of action research flow, particularly in the project being studied, is as shown in Figure 4-2.

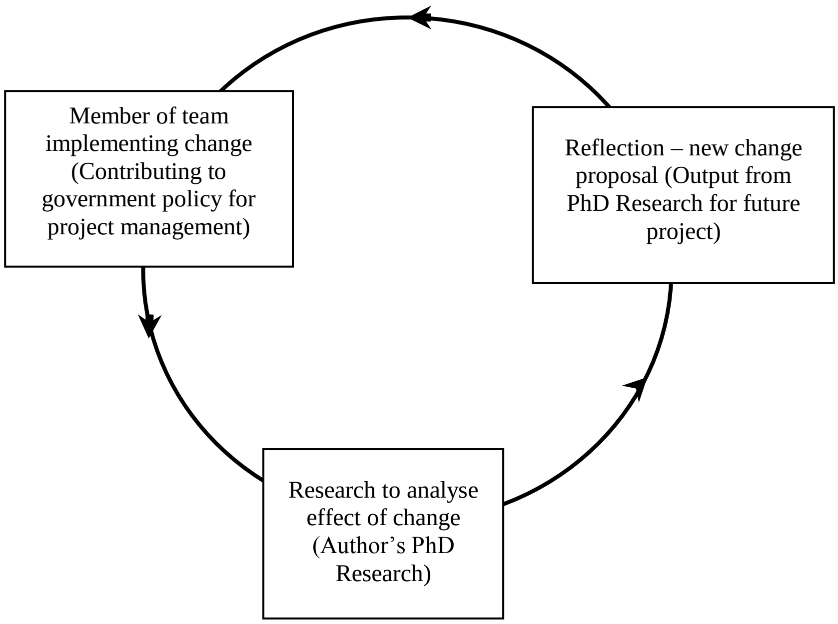


Figure 4-2: Application of action research

Since its primary focus is on solving real problems, action research is used in real situations, rather than in contrived experimental studies (O'Brien 2001). According to this author, as action research is carried out in real-world circumstances, and involves close and open communication among the people involved, the researchers must pay close attention to ethical considerations in the conduct of their work. One of the ethical considerations is to maintain the anonymity of all the participants. Winter (1996) describe this as action research principles. List of action research principles that need to be fulfilled by the researchers in order to be regarded as such is shown in Table 4-2.

Table 4-2: Action research principles

▤	Make sure that the relevant persons, committees and authorities have been consulted, and that the principles guiding the work are accepted in advance by all.
▤	All participants must be allowed to influence the work, and the wishes of those who do not wish to participate must be respected.
▤	The development of the work must remain visible and open to suggestions from others.
▤	Permission must be obtained before making observations or examining documents produced for other purposes.
▤	Descriptions of others' work and points of view must be negotiated with those concerned before being published.
▤	The researcher must accept responsibility for maintaining confidentiality.

Source: Winter (1996)

Action research is regarded as a value-based, i.e. committed to promoting changes through research (Miller & Brewer 2003). Particularly in this research, SCLP is real-world circumstances, representing the Malaysia's public sector project. The finding of this research could be applied to the other public sector project in the future. The action research circle of this study is as shown in Figure 4-3.

However as far as this study is concerned, there are some limitations in applying the action research approach. This is because I am not in the capacity to ensure that there will be continuity. From the three component of the circle shown in Figure 4-3, my involvement is only in 'analysing the effect of the change', while in the other two components, my role is nominal. Whether suggestions from the finding of the current study would be apply into further project management practice would depend on the policy maker. The detail of the limitation can be described as follows:

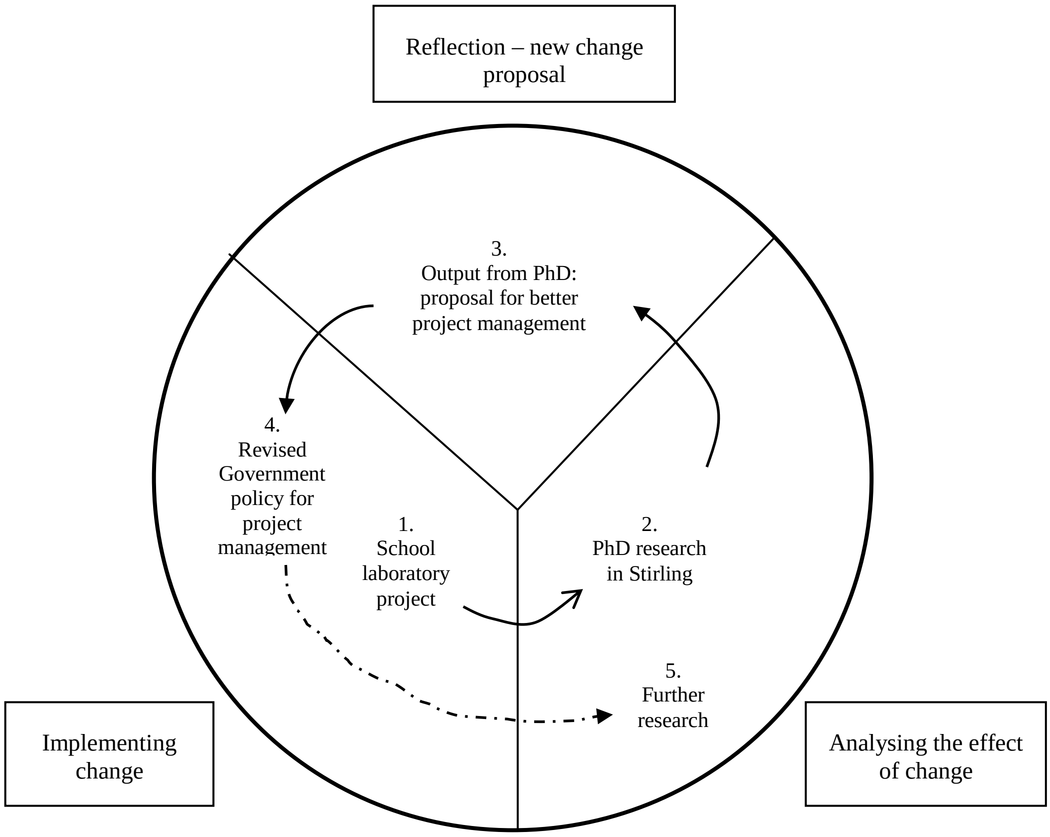


Figure 4-3: Action research circle of the studied project

- As of now, I am not in the capacity to ensure that the finding of this PhD research would reflect the future project management in Malaysia. The best I could do is to make suggestion to the relevant authorities.

- There is no guarantee that I will be immediately reappointed to handle similar projects after completing the PhD research;

- It is difficult to get participation from the whole set of important stakeholders who involved in such project, especially the contractors, sub-contractors and the suppliers due to some commercial confidential. If any of those parties preferred not to participate, I must respect their wishes.

Based on those limitations, it is difficult to fulfil some of the major principles of action research suggested by action research expert such as Winter (1996) as listed in Table 4-2. However, some of the basic ideas of action research would be adopted as a strategy in conducting this research, and in the subsequent further study.

4.3.2. Theoretical Framework

Discussion about criteria used to measure the project success has taken place in the earlier chapter (see 2.3.2). The literature reviews also elaborate the concept of the project management success and the product success (see 2.3.1) and incorporate them with the project life span (see 2.5). This research is carried out to explore the success factors that have bearing on the project and affecting the project product. To have a clear and comprehensible framework for this empirical study, a distinction between project success and project management success (de Wit 1988, Cooke-Davies 2002) is emphasised. The second important distinction is to distinguish between project management success and product success (Baccarini 1999). Project management success is measured during the project process while the product success was measured in relation to the output. Figure 4-4 shows the framework of the study; project success is a combination of project management success and the product success.

4.3.2.1. Extending and combining the LFM and the BB models

This framework was developed by adopting and enhancing the LFM model (see 2.3.1), proposed by Baccarini (1999) with some adaptations. While project management success and product success were clearly distinguished, project life cycle was not clearly mentioned in Baccarini's model, except for dividing the whole project into four stages known as inputs, outputs, purpose and goal. Project life cycle (PMI 2004, Wideman 2004) is important to be integrated into this model so that the whole project could be defined more precisely.

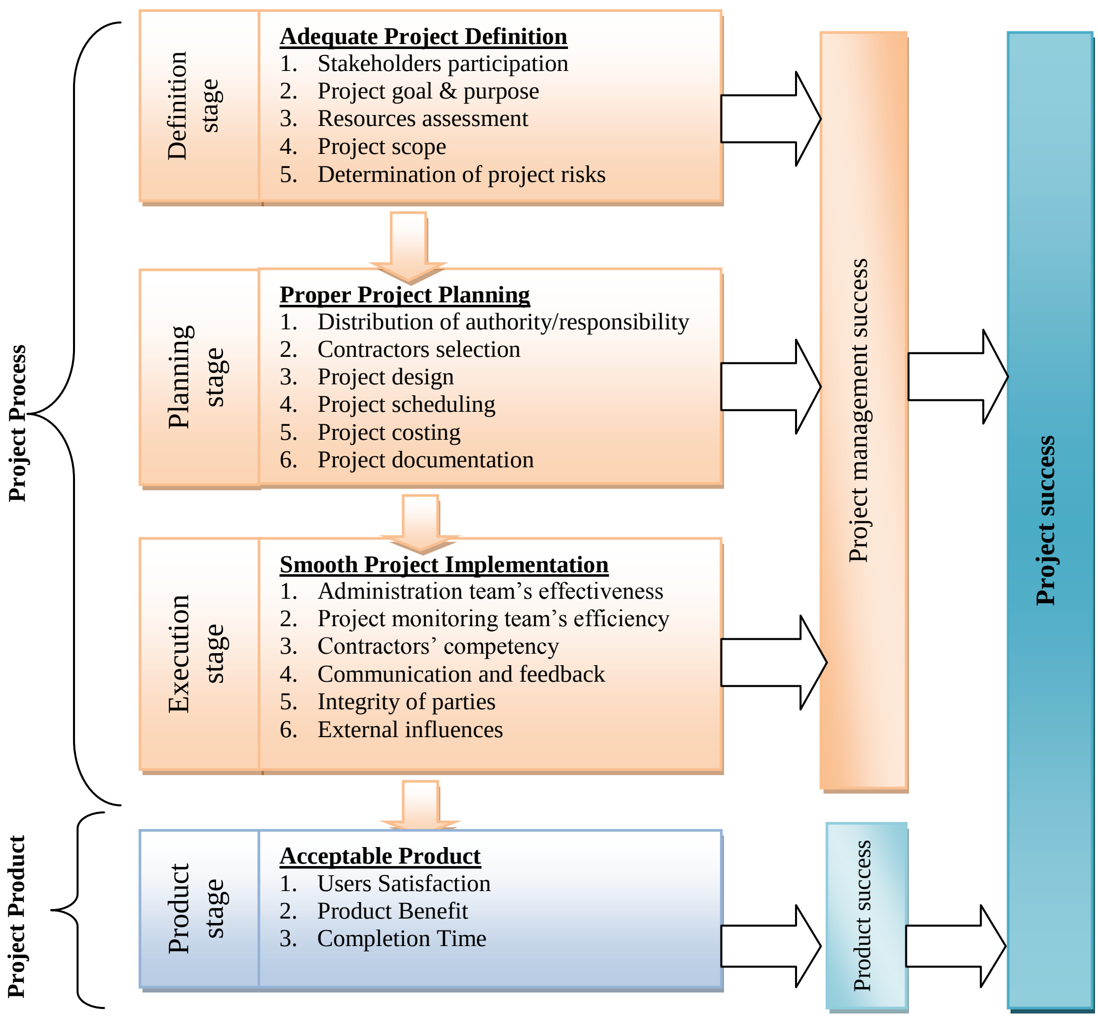


Figure 4-4: Theoretical framework

To enhance this framework, the building block of project life cycle model introduced by Lim and Mohamed (1999) was incorporated into it. Their model had clearly acknowledged the project life cycle but it was lacking in that it did not mention the separation between project management success and product success. Combination of these two models is complementing each other, and established the framework of this research as shown in Figure 4-4.

4.3.2.2. Incorporating success factors

The framework of this study is designed in such a way that it is flexible enough to allow some adjustment and new insights could be drawn into it during the process of investigation. The introduction of the new insights does not mean to challenge explicitly the existing theoretical conceptions but it could be consider as complement to those established ones. As different factors influence the success of different kind of project (Shenhar et al. 2002), some project characteristics may unique to one particular project but may not affecting the others. This research has determined 17 factors that believed to have certain affect to the project management success and grouped them into three dimensions: adequate project definition, proper project planning and smooth project implementation. Study also identified three project's product success, which are grouped into one dimensions, known as acceptable product.

4.3.3. The Studied Factors

The aim of this study is to verify factors that contribute to the project success. In 2.3.1, it has been mentioned that project success is a combination of project management success and product success. A review of the literature (refer to 2.6) identified numbers of factors that contribute to project success. After detail consideration, including pragmatic reasons related to the studied project, 17 potential project management success factors and three product success factors, as recorded in

Table 4-3, have been identified. The cross references in this table provides the background justification of each factor, while a data type shows how data for each factor were obtained. To judge the contribution of those factors to the success of the project, four success criteria have been identified (see Table 4-3). Three of the criteria were to judge the success factors of project management, while another one criteria was to verify the success factors of the product. Detail discussion on the criteria used to judge the project success has been discussed earlier in 2.4.

Table 4-3: List of studied factors

	Life-span	Success criteria (Dimension)	Success factors	Data type	Cross references
Project Management Success	Definition	1. Well Defined#	1. Stakeholders participation	I	2.6.1.1
			2. Project goal and mission	I	2.6.1.2
			3. Resource assessment	I	2.6.1.4
			4. Project scope	I	2.6.1.2
			5. Project risk	I	2.6.3.1
	Planning	2. Proper Planned#	1. Authority & responsibility distribution	I	2.6.2.1
			2. Contractor selection	I	2.6.2.2
			3. Design	I, D	2.6.2.3
			4. Scheduling	I, D	2.6.2.4
			5. Costing	I, D	2.6.2.5
			6. Documentation	I	2.6.2.6
	Execution	3. Smooth Implementation	1. Administrators effectiveness	I, Q	2.6.3.1
			2. Supervising team efficiency	I, Q	2.6.3.1
			3. Contractors competence	I, Q	2.6.3.2
			4. Communication and feedback	I, Q	2.6.3.3
			5. Integrity	I, Q	2.6.3.4
			6. External influences	I, Q	2.6.3.5
Product Success	Product	4. Product Acceptance	1. Users Satisfaction	I, Q	2.6.4.1, 3.4.1
			2. Product Benefit	I, Q	2.6.4.2, 0
			3. Completion Time	I, D	2.6.2.4

Q-questionnaire; I-interview; D-document

For a full case study specific factors, see Appendix 9

This study also determined whether the project success influenced by various project characteristics. It has been mentioned in 1.2 that the studied programme was divided into two phases and six zones. Comparisons were made between those phases and zones to verify whether the project implementation has significantly influenced by certain project characteristics. Comparison between phase-1 and phase-2 of the programme meant to verify the impact of different approaches of project award to the project implementation. In phase-1, the contractors were awarded a large volume of projects, while in phase-2 each contractor was awarded with only a single project.

However, to the management side, the burden in phase-2 was more than in phase-1, as they have to manage more contractors and more documents. At the same time, a comparison made between zones was meant to verify the different in geographical location of the project. Different zones have different status of development and different socio-economy.

4.3.4. Selection of the Case Study

The selection of SCLP as case study was based on the fact that this programme is one of the biggest Malaysian public sector projects in terms of numbers of sites. This study involved multi-site, comprises vast number of projects and widely spread throughout the country. Besides that, the implementation of this programme involving a large amount of government expenditure. It is a focused programme and thought to have strategic important as ICT is a priority area and received special attention from the government. The rationale of studying this programme is particularly strong; despite those exceptional effort, it appeared to be one of the most controversial programme in Malaysia (UM 2005, UM 2007). The factors leading to the controversy of this programme has yet to be studied.

Although SCLP involves only one programme administratively, there are two noticeable different methods of project award, distinguished by phase-1 and phase-2. Both phases of the programme are also divided by six geographical zones, which difference each other in certain project characteristics. Moreover, the whole programme consists of 3,106 projects, that is, 1,932 in phase-1 and 1,174 in phase-2. This research involves both investigating the high level SCLP as two comparable case studies of phase-1 and phase-2, and comparing experiences between the individual laboratories, employing a very large sample of similar projects, though with some distinguishing variables.

The analyses were performed using a mixture of qualitative approaches and standard statistical tools to explore relationships between the questionnaire responses, and also the secondary data. However, a multi-criteria approach was adopted to develop a hierarchy of variables and their relative weights. "Expert" opinion was used to attribute these weights so that summary measures could be produced (e.g. user satisfaction was reflected in the responses to several different questions but this approach provided a single summary measure). This approach both eased and structured the handling of the data, and permitted the use of more parametric tests.

4.4. DATA COLLECTION

This research utilised both primary and secondary data. Primary data refer to information obtained firsthand by the researcher on the variable of interest for the specific purpose of study, while secondary data are those gathered from sources already existing (Sekaran 2003, Diamantopoulos & Schlegelmilch 1997). Table 4-4 summarised various forms of data obtained from primary and secondary resources.

Table 4-4: Data collection approach

Data sources	Data type	Data form
Primary data	Quantitative	questionnaire
	Qualitative	interview
Secondary data	Quantitative	Various type of documents related to the project, including softcopy
	Qualitative	

As mentioned in 1.7, this research utilised both quantitative and qualitative approaches in organising data. Data were obtained through questionnaires and interviews, whereby the respondents comprise those who involved in the projects. Table 4-5 listed 10 groups of respondents that involved in the programme being studied. The planner, the financier, the owner, and the supervisor were involved in the overall spectrum of the programme. Their number is small and best suited the qualitative approach using interviews (Cohen et al. 2000, Gillham 2000b). A qualitative approach was also suitable for phase-1 contractors and phase-2 suppliers, which consist of small number of respondents.

In contrast, the remaining two groups – phase-2 contractors and users – consist of large number of respondents, thus, questionnaire is more appropriate (Gillham 2000a). Apart from questionnaire, data from those two groups were also obtained through interview. Gathering secondary data is more straightforward. The data, which consists of both quantitative and qualitative types of data, were obtained from the relevant parties in various forms of documents.

Table 4-5: Group of respondents and data gathering methods

Agency	Respondents group	Respondent involvement in project	Data collection method		
			Questionnaire	Interview	Document
1. Economic Planning Unit (EPU)	planner	overall		x	x
2. Ministry of Finance (Treasury)	financier	overall		x	x
3. Ministry of Education (MOE)	owner (ministry level)	overall		x	x
4. State Education Department (SED)	owner (state level)	big group		x	
5. District Education Office (DEO)	owner (district level)	big group		x	
6. Project Management Consultant (PMC)	project supervisor	overall		x	x
7. Phase-1 contractor	contractor	big group		x	
8. Phase-2 contractor	contractor	individual	x	x	
9. The Phase-2 supplier	supplier	big group		x	
10. Schools (teachers)	user	individual	x	x	x

overall – means the respondents' view is for the overall programme
big group – means the respondent's view is for certain numbers of projects
individual – means the respondent's view is for the particular project

4.4.1. Questionnaire

Questionnaire is the most appropriate method to obtain data from two groups of respondents – phase-2 contractors and teachers – because of the large numbers involved. Since both groups (see Table 4-5) are involved in different stages of the project and different factors being studied, two sets of questionnaires need to be prepared. Set A, answered by the phase-2 contractors aimed to capture their point of views for six project management factors, particularly during the project execution. Set

B questionnaire investigated the teachers' opinions about seven product factors of the project, particularly their satisfaction and the benefits of the project.

4.4.1.1. Questionnaire construction

Both sets of questionnaires deployed Likert-style close-ended questions. All variables in the questionnaire (see Table 4-3) were measured with a 6-point Likert-rating scale, either in positive or negative order, except for demography questions. Malhotra and Birks (1999) believed that the Likert scale is an itemised rating scale because the category of each scale is numbered or described, while Burns (2000) regards Likert-scale data as equal interval. In this study, the particular variables were measured using several items (see Table 4-6). This method of questionnaire construction is similar to that of Clason and Dormody (1994), who suggested that variables of interest should be measured with aggregation of numbers of items rather than using a single question.

Table 4-6: Variables and number of items for questionnaires

Set	Variables (success factors)	No. of items
Set A	1. Administrators effectiveness	4
	2. Supervising team efficiency	6
	3. Contractors competence	7
	4. Communication and feedback	3
	5. Integrity	3
	6. External influences	4
Set B	1. User satisfaction	28
	2. Product benefit	8

The data mapping as shown in Appendix 9 was employed to make sure that all studied factors and items were covered. This mapping also integrates the weighting applied to each level of data: level 1 for items, level 2 for factors, and level 3 for dimensions. This weighting system will be utilised in the Multi-criteria decision analysis (will be discussed later in this chapter). Each question of the questionnaire represented a particular item. Several items would form a factor. Finally, numbers of factors forms a dimension. This mapping is intended to help in ensuring that no unintentional duplication or missing of each factor and items.

Adopting suggestion made by Gillham (2000a) as shown in Table 4-7, the construction of questionnaires in this study was made as respondent-friendly as possible. Both sets of questionnaires were initially constructed in English, and later translated into the language of native speaker, Malay, as some of the respondent might not understand English.

Table 4-7: Guideline for constructing questionnaire

- Make each question easy to understand, and put it as simple as possible,
- Use very plain language;
- Apply a variety of question type and answer styles to avoid boredom, and to avoid the respondents from losing their concentration;
- Avoid routing which can confuse the respondents and make them lose concentration;
- Minimise the writing required from respondent; if it is vital, make the demands simplest possible;
- Avoid too many topics even though omitting them can be a very painful decision.

Adopted from: Gillham (2000a)

The translation process followed the approach proposed by Fayers & Machin (2000) which involved two-stage translation. Firstly, the original questionnaire in English was translated into target language, Malay by the native speaker who was also fluent in English. Secondly, the translated version was translated back into English by another native speaker fluent in both languages. The result of the forward-backward translation was then compared with the original, and adjustments made until the researcher was satisfied that the two corresponded. The original (English version) of questionnaires (set A and set B) are recorded in Appendix 10, while translated versions (Malay version) of questionnaires are contained in Appendix 11.

4.4.1.2. Validity of tests

In conducting research, it is important that the measuring of concept being researched is reasonably certain (Sekaran 2003). In other words, validity is the extent to which a test measures what it claims to measure and not something else. This concern is known as validity, and it can be determined by applying a validity test. There were several types of validity test used by the social scientist researcher to verify the goodness of measure; several authors (Diamantopoulos & Schlegelmilch 1997; Sekaran 2003) divide validity testing into three main categories: content validity, criterion validity, and construct validity. As indicated by Diamantopoulos & Schlegelmilch (1997), validation is normally a complicated process and demands empirical investigation; depending on the type of validity concerned, different evidence is required in those investigations. Table 4-8 summarises the assessment approach for each type of validity.

As far as this study is concern, two of the types of validity as listed in the table are applicable. Firstly, the content validity, that is, to measure the degree of correspondence between the items selected to constitute a summated scale and its conceptual definition. Content validity, sometimes also known as face validity, is the judgement to which the criteria adequately measured the concept (Sekaran 2003). It needs an agreement between expert and/or non-expert judges as to the suitability of the measure. The role of expert is to examine whether the items cover the entire realm of the construct being measured (Zikmund 2000). This is because, the selection of item to construct the sets of scale that intended to measure a construct is subjective, and there is no statistical criterion for assessing the degree of content validity (Diamantopoulos & Schlegelmilch 1997).

Table 4-8: Type of validity and assessment approaches

Type	What is measured?	Description	Procedure
Content validity	Does it adequately measure the concept?	The extent to which a measure appears to measure the characteristic it is supposed to measure	Subjective assessment of the appropriateness of the measure for the task.
Criterion validity	Does it differentiate in a manner that helps to predict a criterion variable?	The extent to which a measure can be used to predict an individual's score on other characteristics (the criterion).	Examination of the relationship between the measure and a criterion.
Construct validity	Does it tap the concept as theorised?	The extent to which a measure behaves in a theoretically sound manner.	Investigation of the relationships between the measure concerned and measures of the other concept/ characteristics within a theoretical framework.

Adopted from: Diamantopoulos & Schlegelmilch (1997), Sekaran (2003)

In this study, the content validity was assessed by seeking views from experts in project management, which included active practitioners and academicians in the area of project management, who were based in Malaysia. Based on their comments and recommendations, changes were made to the questionnaire to remedy the vague statements and eliminate unnecessary or redundant terms. Furthermore, a pilot test was run to examine each item once again, before the real data collection exercise.

Secondly, the construct validity, that is, the measure to confirm an association of related items generated from a theory based on constructs. It was meant to test how well the results obtained from the use of the measure fit the theories (Sekaran 2003). Construct validity can be divided into two sub-categories: convergence validity and discriminant validity. The first sub-category is related this study. Convergent validity is the extent to which the scale of the same particular construct correlates each other's in the similar direction. In other words, all the items within the same construct show homogeneity. Conversely, discriminant validity is referred to the extent to which a measure is distinct from unrelated measures. In this case however, discriminant validity is not relevant as the concepts, that is, the foundation of the constructs (in this study, 'factors') has been predetermined, and the items were rearranged in accordance to those particular concepts.

Both types of validity were assessed using factor analysis to verify the relationships between items comprises of several individual questions that formed the concept, and foundation of a summated scale. Content validity is assessed using confirmatory factor analysis, while construct validity were deduced using exploratory factor analysis.

4.4.1.3. <u>Reliability</u>

Reliability refers to the consistency of a measure (Diamantopoulos & Schlegelmilch 1997, Sekaran 2003). A measure is considered reliable if it would give the same result after repeated testing (Trochim 2001). According to this author, reliability and validity are closely related. The best constructs are those with both reliability and validity. In other words, a questionnaire construct is perceived to be good if it is consistent (reliable) and accurate (valid).

Trochim (2001) suggested four approaches in evaluating reliability. The first one known as inter-rater reliability; the method that is also known as inter-observer reliability is used to assess the degree to which consistent estimates of the same phenomenon given by different raters. The second method known as test-retest reliability is used to assess the consistency of a measure from one time to another. The third method, parallel-forms reliability, is used to assess the consistency of the results of two tests constructed in the same way from the same content domain. The fourth method that is known as internal consistency reliability used to assess the consistency of results across items within a test.

4.4.1.4. Respondents

The questionnaire's respondents were unique to project as mentioned in Table 4-5. There were two groups, which are directly associated with a project. They were the phase-2 contractors, and the users. As the phase-2 contractors consist of small-scale contractors, which were awarded a single project each, their view is important as it reflected the whole story of the a particular project.

The users were the group who utilised the facilities of the computer laboratory, i.e. the output of the project. The users consist of the schoolteachers and the schoolchildren. The schoolteacher respondents consist of the teachers, the headmaster (primary schools), and the principals (secondary schools) who provide other points of view for particular projects. The other users, the schoolchildren, represented by their teachers as it is difficult to arrange for the schoolchildren to answer the questionnaire, especially those from the primary schools. Assuming that their teachers aware at the needs of their students, the constructs of students' perspective were incorporated into the teacher's questionnaire, that is, set B.

4.4.1.5. Sampling

Determining the appropriate sample starts with identifying the population. Fink (1995) describes a sample as a portion or a subset of a larger group, the population; a good sample is a miniature representative version of the population, that is, should represent all the characteristics of the population. Therefore, results of analysis of that particular sample will reflect the whole population. Diamantopoulos and Schlegelmilch (1997) emphasise that, unless the sample has been drawn probabilistically, the use of inferential statistics is not legitimate, since it makes use of the sampling error concept, which cannot be assessed where non-probability sampling methods are employed.

The population of this study was the SCLP projects, comprising both first and second phase of the programme. The sampling covered all six zones within those two phases of the programme (as described in 1.2). This research adopted stratified random sampling with proportional allocation (Sekaran 2003). Through this probability sampling method, the programme phases and zones were predetermined to make sure that each of those stratified groups were represented. Random sampling was then made within those stratified groups. The unit of analysis of this quantitative part was individual-project.

One of the major issues in any discussion about sampling is the size of sample (Bryman 2004). A large sample size provides a greater accuracy in the findings (Burns 2000), a higher significance level, and statistical power of the test (Forza 2002). However, it is not applied to all cases; there are suggestions (Burns 2000, May 2001, Bryman 2004) that sample size is not necessarily the major consideration in designing the research method, as long as it fulfilled the basic requirements. According to Bryman (2004), the decision about sample size is not a straightforward one as it depends on numbers of considerations: so there is no definitive answer. After considering all those factors, this study aimed to get at least 30 samples for each proportion (see Table 4-9). These minimum numbers are used as a guideline while conducting survey. The actual number of respondents and response rate for each stratified group will be discussed in Chapter 5.

Table 4-9: Sample size

Zone	No. of Sample	
	Phase-1	Phase-2
Zone 1	30	30
Zone 2	30	30
Zone 3	30	30
Zone 4	30	30
Zone 5	30	-
Zone 6	-	30

Note:

- These are numbers of samples planned to be collected, not the actual numbers of samples collected. The actual number collected will be discussed in Chapter 5.
- Zone 5 is without phase-2, while Zone 6 is without Phae-1

Based on guidelines from most of the statistical literature (Burns 2000, May 2001, Sekaran 2003, Bryman 2004), this sample size is enough in fulfilled the requirement for such research. VanVoorhis and Morgan (2001) propose rules of thumb for sample size for particular statistical analysis (Table 4-10), which suggested that different statistical procedures require different numbers of sample size. Based on this guideline, the sample size planned to use in this research is sufficient to be treated as parametric. The pragmatic issues that effected this consideration were time and resources for conducting the study. Bryman (2004) emphasises that in most cases, consideration in determining sample size was related to time and cost. In this study, I was allowed to be in Malaysia for a maximum of three months to complete the whole process of data collection, which included organising the survey using questionnaire, conducting interviews and gathering secondary data.

Table 4-10: Rules of thumb for sample size selection

Statistical analysis	**Minimum size**
Chi-square	5 per cell
t-test, ANOVA, MANOVA	30 per cell
Factor analysis	50 – 100
Multiple regression	50 – 300

Source: vanVoorhis and Morgan (2001)

4.4.1.6. Questionnaire Distribution

As mentioned in 4.4.1.5 above, the unit of analysis was project. As each project was allocated to a school, it was named after that respective school. However, in order to make sure that all schools remained anonymous in this research, a code was assigned to identify each project. Since part of this study involved the test of the relationship between data from set A questionnaire (to be answered by teachers) and set B questionnaire (to be answered by contractors), both sets from the same project need to be merged. In order to make the merging possible, each set A questionnaire was given a serial numbers before it was distributed so that it could be recognised when it come back. The same serial number was assigned to set B questionnaire, whereby each number unique to a particular contractor. However all respondents remained anonymous as the researcher did not disclose their identity.

As described in 4.4.1.5, this research adopted a stratified random sampling with proportional allocation, where the programme phases and zones were fixed so that each of those stratified group were represented. After recognising the 10 stratified groups (see Table 4-9), both sets of questionnaires were distributed to the respondents with the assistance of State Education Departments (SED) of that respective zones.

The rationale behind the distribution of the questionnaires through SED was to get the respondents to regard it as important matter. Schools are under the SED's jurisdiction and by sending the questionnaire through SED, a high rate of return could be expected. SED officers also have a good rapport with the contractors as both parties worked closely during the project implementation. Both sets of questionnaire were distributed together with an A4 size envelope so that the respondents could return it without being viewed by anybody else before reaching me. That means all respondents remained anonymous, encouraging an honest response from each of them. A covering letter was attached to each questionnaire to inform the respondents about the background of the research. In the letter, it was emphasised that their answers to the questionnaire were strictly for research purposes and their identity would not be revealed in any way. The purpose is to courage them to answer the question with honesty.

Prior to the distribution of questionnaires, I have briefly explained to the respective SED officers on the modus operandi of the questionnaire distribution. In order to make sure that the research worked as planned, their co-operation was required. First, they were required to record the serial number on each questionnaire before handing it to particular respondents. Secondly, they were required to make sure that the questionnaires returned by the respondents remained in the sealed envelope, and nobody was authorised to open it except for me. The emphasis on the anonymous return of the questionnaires ensured an honest response from each respondent. Despite that complexity in data organisation exercise, I am committed to achieve as high ethical standards as possible in conducting this research. All respondents remained anonymous, as I would not disclose their identity.

4.4.2. Interviews

While questionnaire is the most suitable method to obtained data from a large number of respondents but this approach is lacking in some features. One of the limitations is that it does not allow the interaction between the researcher and the informants. An interview is more appropriate in obtaining more information needed. Rogers & Bouey (1996) conclude that the most utilized data collection method in qualitative research studies is the interview, while Gillham (2000b) emphasises that interview provides some flexibility to cope with the unpredictable nature of subject being examined. Among the considerations are as shown in Table 4-11.

Table 4-11: Considerations for interview

- Small number of people involved;
- People were accessible;
- Most of the question were ‘open’ and required an extended response with prompts and probes;
- Anyone was key, and could not afford to lost any;
- The material was sensitive in character so that trust was involved;
- Anonymity was not an issue, though confidentiality might be;
- Depth of meaning was central, with only some approximation to typicality;
- Research aims mainly required insight and understanding.

Source: adopted from Gillham (2000b)

Lack of a common terminology in project management discipline (PMI 2004) is one of reasons that required direct interaction between the researcher and the informants. Through interview, the researcher has an opportunity to pose probing question or use additional question prompts as the need arose (Cohen et al. 2000). A face-to-face interview gives respondents a chance to ask the interviewer for clarification of the question as well as a fair chance to elaborate their answers.

4.4.2.1. The Preparation of Interview Questions

Face-to-face interviews with all 10 groups of respondents listed earlier in Table 4-5 was carried out in April - June 2006. As guidelines in conducting the interviews, the interview questions were prepared with the aim to cover all the studied factors. However, different group of respondent have different role in the project so four sets of interview questions has been prepared. The contents of all four sets of interview questions are contained in Appendix 12. To make sure all studied variable were captured in the interview, all question in the interview were mapped as shown in Appendix 9.

Set 1 was used to interview the respondents of five groups: planner, financier, and owner/administrator (three administrative levels). These five groups of respondents consist of government officers who represent their agencies – the EPU, the Treasury, and the MOE – which, most of the time worked closely as a big unit. Set 2 was prepared for the respondents of supervising team, which played the role of project monitoring and supervision. The third set was prepared for phase-1 contractor and phase-2 contractors. That set was also used to interview suppliers. The fourth set was designed particularly for users, which consists of schoolteachers who utilised the product of the project. Translation was not required for the interview questions because I conducted the face-to-face interview myself. Both English and Malay could be used alternately, depending on which language was better understood by the respondents.

4.4.2.2. The conduct of interview

A semi-structured interview was used in this study to allow the researcher to exchange ideas with the respondents more freely. The questions aimed at obtaining their evaluation, comments, and recognition of the project based on their own experiences in managing or utilising the product of the project. In order to avoid bias or leading the interviewees in giving their answers, the interviewer kept the questions as open-ended as possible. Asking the same open-ended questions to all interviewees facilitated easier analysis and comparison. The interview records were transcribed using word processing software, *MS Office Word* and each individual interview was given a unique code so that it can be easily traced. The code contained information about respondents' category and respondent number, but their anonymity is maintained.

4.4.3. Secondary data

In addition to primary data, a number of other sources of data were used. The secondary data are indispensable (Sekaran 2003) as the data were prepared genuinely based on day-to-day tasks. The data were normally prepared by established organisations; thus, they are reliable and of a high quality (Bryman 2004). The advantage of secondary data is in saving cost and time. Even though Sekaran (2003) suggests that secondary data can have the disadvantage of becoming obsolete, that is not the case in this study; since it examined past events. However, since the data were prepared by the other parties, the disadvantage might be in lacking of familiarity (Bryman 2004) that possibly led to misinterpretation by the researcher.

The data can be in various forms (Sekaran 2003), from annual reports to archived documents. In this study, secondary data also consists of letters, programme progress reports, programme financial report, desk officer database, and contract documents. The data were obtained from relevant parties that were involved in the programme, in either hardcopy or softcopy. Secondary data analysis may entail either qualitative (e.g. Heaton 2003, Heaton 2004) or quantitative methods (e.g. Dale et al. 1988, Curwin & Slater 2002).

4.4.4. Observation

Observation is the other form of data collection utilised for this research. Watching and listening to an interaction or phenomenon as it takes place (Kumar 1999) is the basis used in collecting data in this approach. Sekaran (2003) suggests that observation is potentially important as the first stage, before researcher would proceed to the next step. In this study, observation had already made based on researcher's previous experience in this projects and the purpose of this kind of data was to support the other data obtained by the other means. Personal observation is not used as main resource as it could lead to biases in interpreting observed subject (Malhotra and Birks 1999). For these reasons, this approach is not listed as one of the main data collection approach in Table 4-4. The advantage of this method is that, it could determine the real motivations, attitudes and knowledge that underlie the respondent's behaviour (Bryman 2004), rather than purely researcher's interpretation.

4.5. DATA ANALYSES

Based on the nature of data collected, they can be categories into three groups: questionnaire data, interview data, and secondary data. As shown in Table 4-4, questionnaires data are mainly quantitative data, data from interviews are qualitative, while secondary data are both quantitative and qualitative.

4.5.1. Quantitative Data Analyses

The individual computer laboratory is the unit of analysis in analysing the quantitative data. The quantities data come from three sources - primary data from the set A questionnaires, primary data from the set B questionnaires, and secondary data. They were merged to provide complete set of quantitative data. The data were analysed statistically using the computer software SPSS.

4.5.1.1. Choosing the correct test

A major challenge faced by researchers in dealing with quantitative data is to determine the correct statistical test for each hypothesis. The choice is influenced by various factors (Diamantopoulos & Schlegelmilch 1997). Two of the factors – sample type and sample size - have been discussed earlier in 4.4.1.5. The other two factors, which are of the concern of this research, are level of measurement and distribution of population. These factors are important to determine the statistical testing protocol, either parametric or non-parametric. This protocol is prerequisite before deciding the statistical test to be use.

4.5.1.1.1 Parametric versus non-parametric

The intention of most of the researchers is to conduct statistical test using the parametric protocol, as it is more powerful than the non-parametric (Hair et al. 1998). The choice between these two is made based on three fundamental considerations (Burns 2000), i.e. data should be normally distributed and data must be equally interval. Data that not fulfilled any of those assumptions should be tested using non-parametric (Forza 2002). The third requirement is related to the level of measurement. As mentioned by Diamantopoulos and Schlegelmilch (1997), the higher the level of measurement (the more powerful testing), the more sophisticated the possible analysis. Four main levels of measurement consist of ratio, interval, ordinal, and nominal. Only data from the first two categories are valid for parametric test, while the other two are suitable for non-parametric tests.

It has been mentioned in 4.4.1.1 that both sets of the questionnaires used in this study comprises of Likert-style questions with scale range from 1 to 6. Data derived from Likert style questions would usually be analysed using non-parametric tests. However, with aggregation (also referred as summation) of a number of separate independent items, the result is approximately continuous and parametric tests is justified. Burns (2000), Likert-scale data can be assumed as equal interval. Each question represented a specific item; and summation of several items formed a particular variable. Thus, the value of the variable is approximately continuous; as such, each variable could be treated as an interval variable and could be tested using parametric option. Clason and Dormody (1994) suggest that the data comprising of the aggregation of Likert-type items is more meaningful, rather than analysing it individually. According to them, especially in the case of using parametric procedures to analyse the data, it is more accurate if a group of Likert-type item measuring the same parameter were summated to provide approximately normally distributed data. That means the more items (questions), the more discrete the data would be.

4.5.1.1.2 Multiple Criteria Decision Analysis (MCDA)

In adopting summative scales, the other question arose - whether to assume that all the individual Likert-type item simply carries the same weighting? In making decisions, summating without reflecting the priorities of the different contributing factors could lead to inappropriate conclusions (Brugha 1999). To provide a path out of this dilemma, multi-criteria decision analysis (MCDA) was adopted.

The studied factors comprise of multiple variables with numbers of hierarchal levels, whereby each of them carried different importance in contribution to the success of the project. To recognise the existence of those multiple factors and the difference in their contribution to the outcome of the project, this research will use MCDA. Through these procedures, decision problems are divided into smaller more understandable parts, analyzing each part, and integrating the parts in a logical manner to produce a meaningful solution (Malczewski 1997). A more meaningful solution can be constructed by analysing those smaller parts and integrating them in a reasonable manner.

There are many approaches of applying MCDA. One of the approaches, which is most simple and most widely used (Malczewski 1997) is known as simple additive weighting (SAW). This approach was computed using a formula as shown below (Malczewski, 1997, Belton & Stewart 2002). For each alternative i, a weighted average score is computed as:

$$V_i = \sum_{j=1}^{n} w_j \, r_{ij}$$

where w_j = weight for criterion j; r_{ij} = transformed score for alternative i^{th} on criterion j^{th}

To develop the criteria tree, that is, the criteria hierarchy of MCDA, a computer programme *V.I.S.A*[8] was used. The weighting value (w_j) for each criterion was acquired

[8] VISA is acronym for Visual Interactive Sensitivity Analysis. This computer software is copyright © 1986-99 Valerie Belton and Visual Thinking International Limited. This Windows® based software is equipped with extensive facility for visual interactive

from experts and practitioners who have a wide experience in that particular field. Their inputs were obtained through ‘weighting form’ created using MS Office Excel® containing each criterion (item, factor, and dimension) studied. Mean value for each criterion was calculated by dividing the total value with number of respondents (experts/practitioners). The mean weighting for each criterion is shown in Appendix 9. While the score value (r_{ij}) for each particular criterion was the value obtained through the data collection exercise

4.5.1.2. One sample t-test

The one-sample *t*-test compares the mean score of a sample to a known value (Diamantopoulos & Schlegelmilch 1997). Usually, the known value is a population mean. This test is only valid for parametric data, that is, the dependent variable is normally distributed with at least an interval data set. The null hypothesis is that there is no significant difference between the sample mean and the population mean. In this study, the one-sample *t*-test is utilised to test whether a sample mean (actual value) significantly differs from a hypothesized value (expected value). The aim is to find out the performance of each factor. The expected value is 3.5, based on the scale of scale used in the questionnaires, that is, the Likert-scale from 1 to 6.

4.5.1.3. One-way ANOVA

This statistical test is designed to verify whether the groups formed by the categories of the independent variable are similar. It is also known as one-factor ANOVA. The null hypothesis is that k groups have equal means in the population ($\mu_1 = \mu_2 = \ldots = \mu_k$), where

sensitivity analysis, which enables decision makers to explore the implications of changing or differing priorities and values. VISA's attractive features are useful in facilitating decision maker to make a precise decision. The criteria tree developed with VISA is as in **Appendix 8** k is the number of means being compared. The alternative hypothesis is that at least one mean is different from the others. It does not indicate which group may differ, only that the groups are not all the same; additional analysis is required to identify the group or groups that are difference (Diamantopoulos & Schlegelmilch 1997). If one of the groups different from the others, then it can be concluded that the independent variable has an effect on the dependent variable.

In this study, a one-way ANOVA was used to test differences in six dependent variable, which consists of administrator effectiveness, supervising team efficiency, contractors competence, communication and feedback, integrity, and external influences against independent variable comprises six different zones of the programme.

4.5.1.4. Two -way ANOVA

This is the appropriate test to use when several ordinal level measures need to be compared to one another (Diamantopoulos & Schlegelmilch 1997). The null hypothesis is the same as in one-way ANOVA. However, two-way ANOVA is used to test two factors simultaneously. In addition to those main effects, this test also verifies the interaction effects (Dancey & Reidy 2004). The main effects referred to separate effect of each independent variable averaged over all levels of other variables. That means, it provides an individual effect of each independent variable separately. Interaction effects specifically refer to the joint effect of two or more independent variables on a dependent variable. An interaction effect takes place when the effect of an independent variable on the dependent variable depends on the level of another independent variable. In this study, a two-way ANOVA was used to test differences in six dependent variables, which consists of building, furniture, ICT Equipment, benefit to students, benefit to teachers, and completion time against two independent variables comprises *zones* and *phases* of the programme.

4.5.1.5. Linear Regression

The ANOVA test is useful to determine whether project success factors vary significantly between the six different zones and two different phases of the programme. However, this analysis is lacking in the sense that it does not predict the direction and the magnitude of the linear relationship between dependent variables. To solve the problem, a linear regression analysis needs to be carried out (Hair et al. 1998). The degree of relationship between a variable dependent (criterion) and independent variables (predictor) were calculated using this formula (Tabachnick & Fidell 2001):

$$Y_i = \alpha + \beta X_i + \varepsilon_i$$

where Y_i = *ith* observed value of Y; α = Y intercept; β = slope;, X_i = *ith* observed value of X; and ε_i = an observational error.

Note:
X is the independent variable; Y is the dependent variable; intercept (α) is the expected value of Y when X is 0; slope (β) is the amount by which the expected value of Y increases when X increases by a unit amount; k is number of variables.

Besides measuring the effect of single criterion, linear regression also has the ability to test the combined effects of several independent variables on the dependent variable, which is known as *multiple linear regressions*. The purpose of regression analysis is to predict the dependent variable with a set of independent variables (Hair et al. 1998, Allison 1999). *Multiple linear regression* is not only able to describe the degree of relationship between a single dependent variable (criterion) and several independent variables (predictor) but also the direction of relationship, whether negative or positive effect.

The extension to multiple in dependent variables is (Hair et al. 1998, Tabachnick & Fidell 2001):

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \varepsilon$$

where Y is the predicted value on the dependent variable, a is the intercept (the value of Y when all the X values are 0), X is the various independent variables, and β is the coefficients assigned to each of the independent variables during regression.

The predictive power of the regression model is estimated using coefficient of multiple determinations, R^2. This value that measure of the goodness of fit of the model, that is, how well the regression line approximates the real data points. The value could range from 0 to 1; the closer this is to 1, the greater the explanatory power of the regression equation, and therefore the better the prediction of the dependent variable (Hair et al. 1998). Adding more variables to the model, even those with a very small contribution could improve the R^2 value.

Some researcher using R^2-adjusted rather than R^2 in the interpretations of explanatory power as it is a less biased measure for the variance explained by the model. R^2-adjusted is a measure of fit which take into account the number of independent variables and the sample size. Unlike R^2 which increased by adding more predictor variables to the model, R^2-adjusted R^2 may decrease if variables are entered in the model that do not add significantly to the model fit (Hair et al. 1998).

4.5.1.6. The statistical package software

The statistical data analysis becomes easier with the utilisation of computer packages. In this study, two packages helped in managing and analysing statistical data: Microsoft Office Excel 2007 (MS Excel) and Statistical Package for the Social Science for Windows version 15 (SPSS). MS Excel was used for data entry, sorting, coding, and rearranging so that the data set is in order before analysis. SPSS is sophisticated software used by the social scientists and other professionals for statistical analysis. This software provides a large array of programmes such as *ANOVA*, *t*-Test, and regression statistical analysis; has been considered as the most widely and generally used comprehensive statistical computer package available (Sekaran 2003, Bryman 2003). For this reason, I have chosen this software as a statistical programme for data analyses in this study. Data were analysed using SPSS after importing them from MS Excel. Tests that have been used to analyse the data were as discussed in 4.5.1.3, 4.5.1.4, and 4.5.1.5 above.

4.5.2. Qualitative Data Analysis

Based on the nature of data collection methods, there are two categories of qualitative data. Firstly, the primary data obtained through semi-structured face-to-face interview. Secondly, the secondary data, which consists of documents related to the project, either in the form of printed materials, archived documents, or electronic copy (compact disk). The interviews aimed to cover all pre-determined themes, which in the context of this study referred to project success factors, based on questions prepared in those four sets (4.4.2.1). However, depending on the respondents' answer, the follow-up question might be required for the particular main questions. Given the response received from the interviewees, the interviewer might ask the follow-up questions in a different order from the preset questions (Gillham 2000b). The intention of the interviewer in the follow-up questions is to get clarification of unclear answers given by the interviewees for the earlier questions. The more important goal is to gain more insights in certain matters from the respondents. At the same time, the respondents have the opportunity to get clarification if they did not understand the question. In addition to interviews, the qualitative data also consists of various documents (as mentioned in 4.4.3). Those data were important to support the statements given by the respondents or to confirm points that the respondents could not recall during the interviews such as exact date of certain events.

As mentioned in 4.4.2.2, the interview records were transcribed using word processing software, *MS office Word* and each individual interview was given a unique code so that it can be easily traced but the respondents' anonymity is maintained. These qualitative data were analysed using computer software *NVivo 7*. The analysis process began with importing the *MS office Word* format of interview transcripts into *NVivo 7*, followed by nodding, coding, and sorting the theme. The nodes were rearranged based on predetermined themes as in the interview questions, except for outstanding information pointed out by the respondents during the interviews. However, all outstanding input from respondents that are not within those predetermined themes is still treated as important data for the research. The qualitative secondary data were also recorded and analysed the same way as interview data.

4.5.3. Triangulation

Most of the social scientists authors (Russek & Weinberg 1993, Bryman & Bell 2003, Oka & Shaw 2003, Miller & Brewer 2003, Tashakkori & Teddlie 2003) agree that the use of multiple methods to triangulate and to verify theory is the best way of achieving valid and reliable data. Triangulation is the use of more than one approach or source of data in the study of a social phenomenon so that findings may be cross-checked to get regularities (O'Donoghue & Punch 2003, Bryman 2004, Altrichter et al. 2008). According to Creswell (2003) who use the term 'mixed method' to refer to the same approach, this procedure was also developed to fulfil the need to help researchers create understandable designs out of complex data and analysis.

There are several reasons for researchers to apply the mixed method; one of the reasons is to make the findings more credible and reliable (Creswell 2003, Oka & Shaw 2003) by utilizing all possible sources of data. In the cases where the data sources consist of various types of data, single method is not possible. For data sources which represented by big population, questionnaire would be more suitable (Gillham 2000a). On the other hand, when small number of respondents represents data sources, a qualitative approach through interview is often the best option in obtaining data (Cohen et al. 2000, Gillham 2000b). Those different categories of data, which were not uniform each other could not be analysed the same way. Data from questionnaires were normally quantitative and analysed using statistical method based on specified hypothesis, while qualitative interview data were analysed using qualitative analysis to answer particular research questions. The results of the analyses were then merge to get a wider scope, in the process called triangulation which finally gives a more detail and balance picture of the situation (Altrichter et al. 2008).

4.6. ISSUES IN CONDUCTING RESEARCH

Although all effort had been taken to ensure that the research going on smoothly according to normal procedure, there were some hurdles this study needed to deal with. However, the limitation, does not affect the overall quality and validity of the reseach. This section discusses related issues in organising this research, including the limitation and ethical consideration.

4.6.1. Limitation in Field Study

There were some constrains while conducting this research, especially during the data collection exercise. Short time given and high cost incurred for data collection were big constraint for this research. I have only three months to complete the whole exercise of data collection. Due to time constraints, data for some projects success factors discussed in the literature review could not be explored. For instance, the public utility authorities and statutory authorities were two important parties, which involved in the programme but I could not afford to interview them due to time constraints and difficulty to get suitable schedule. Since the research required data from all zones, I have to spend pocket money to travel throughout the country. Neither the sponsor nor the university allocated fund for data collection. The data collection process needed at least two visits to each zones; first visit was to distribute the questionnaire through SED and second visit was to collect the returned questionnaire. To optimise the cost, I conducted interviews with relevant respondents in the respective zone during the visits.

Restriction due to confidentiality and data protection is the other constrains. The requirement to protect government confidentiality, makes some of the data could not be explicitly displayed and discussed. One of the big challenges in conducting this research is to explore the data source of the programme being investigated. Due to official reasons, some data were classified as confidential and not accessible. For instance, some information about important decisions, such as action plans to overcome the problems of the project would not be released before particular action has been taken. The same problems faced while seeking data from contractors and suppliers. For commercial reasons, contractors and suppliers did not reveal the important information, such as arrangement between main contractors and their sub-contractors. As the contract agreement of the project is between government and respective contractors, any arrangement made by contractors with their sub-contractors and suppliers were beyond the control of any government agency and inaccessible. The contractors' and suppliers' identity were not disclosed. They were identified only by code. Due to that reason, any information related to them, such as zones where they carried out the project were also identified only with code, as real naming might reveal the contractors' identity.

The other difficulty faced by interviewer was in obtaining proper and accurate data during interview. Some of the respondents could not recall facts and figures about the programme as part of the process happened in the past. The matter was even worse in the case where some of the officers-in-charge have been transferred to the other agencies or had retired. The new officers offer lack of knowledge about the history of the project. The best data from each group of stakeholder were those with combination of various levels of management; from junior to senior level management. Responses from agency's top management or senior officers were crucial in some high level decisions or policies, while responses from desk officers are important in obtaining detail about operational works. However, that was not the case for all agencies. While some of them were very responsive and cooperative in answering the questions, the others were very busy and it was difficult to get their time for interview. As an alternative, the junior officers were asked to replace them and respond to the interview. Junior officers, or typically referred to as desk officer, may have lots of day to day process experiences to be shared but they may not aware of important high level decisions or policies.

4.6.2. Ethical Considerations

I have given my full commitment in achieving the best ethical standards while conducting this study. As far as this study is concern, there are two issues related to ethical standard. The first, and most fundamental one, is the willingness of the respondents to participate. Prior to that, they were given some briefing about the background and the purpose of this study. This is especially for each of interview respondents. For the questionnaire respondents, brief information about the programme was given through covering letter.

The second ethical commitment is related to respondents' privacy. Despite their input is crucial, they were given opportunity to refuse from answering particular question,. The probing question during the interview does not mean to force them giving something confidential but a normal practice of interview in digging as much information as possible. Prior to that exercise, they were assured that their identity would not be disclosed for whatever reason. Even for questionnaire, the respondents have freedom to leave any question unanswered if they found the question sensitive to them. they were reassured about the anonymity.

4.7. SUMMARY

This empirical case study was conducted under a mainly qualitative paradigm. However, after considering some pragmatic issues, this research also adopted quantitative approach especially in data collection and analysis. There were two sources data; primary data obtained through survey questionnaires and semi-structured face-to-face interviews, while secondary data resourced from various documents related to the programme. Analyses of data utilised both quantitative and qualitative analysis methods. The quantitative data were statistically analysed using *SPSS version 15* for four testings: one-way ANOVA, two-way ANOVA, one-sample t-test, and multiple linear regression. The secondary data were analysed using *NVivo 7*, based on predetermined themes in accordance with the project success factors under investigation.

CHAPTER 5:

ANALYSIS OF QUESTIONNAIRES AND QUANTITATIVE DATA

5.1. OVERVIEW

In the preceding chapter, the rationale behind the utilization of both qualitative and quantitative research methods in this study has been explained (see 4.5.3). This chapter discusses the quantitative component of data analysis, mainly for examining the last two stages of the project life cycle – the project execution and the project product. The quantitative data for this research were obtained through two sets of questionnaires (see 4.4.1), namely set A and set B. In addition, the quantitative data were also in the form of secondary data, which consists of data for project completion time (hereafter will be referred as set C).

Four statistical testings, as has been discussed earlier in 4.5.1.2 through 4.5.1.5, were used to analyse the quantitative data. The aim of this chapter is to report the quantitative analyses and their results. The interpretation of the results will be discussed in Chapter 7 where both analyses - quantitative analyses from this chapter and qualitative analyses in Chapter 6 - will be triangulated.

5.2. DATA ORGANISATION

As mentioned in 4.4.1.5, the unit of analysis was the computer laboratory project. Data obtained from three sources were merged to represent particular unit of analysis. Data from set B (answered by teachers) and set C (secondary data) covered both phase-1 and phase-2 of the programme, while data from set A (answered by phase-2 contractors) covered only phase-2 of the programme; the nature of the studied projects required the equivalent data for contractors in phase-1 to be collected through interview, which will be analysed in Chapter 6.

5.2.1. Data Collection Procedure

Foreign researchers conducting research in Malaysia should follow General Circular No. 3/1999 titled *Regulations for the Conduct of Research in Malaysia*. This regulation also applied to Malaysian researchers domiciled overseas. Researchers are permitted to start the research only after receiving approval from the Malaysian government through the EPU. Besides ensuring that the results of the researches are beneficial to the country, the purpose of this regulation is to monitor researches that are sensitive in nature in order to protect the nation's image and safeguard the national interest (EPU 2006). The application was submitted to the EPU three months before the data collection exercise. The permission was granted in the form of letter of approval and research pass as in Appendix 15.

5.2.2. Preparing Data for Analyses

It has been mentioned (see 4.4.1.5) that this research recognised 10 stratified groups, based on phases and zones. Data for each unit of analysis comprises three set of data, two of which obtained through questionnaires (see 4.4.1). Set A data were used to examine six factors of project management success during the project execution stage, while Set B and set C data were meant to examine three product success factors in the product stage.

For each zone in the first phase, 100 set B questionnaires were distributed, while for the second phase, 150 set A and 150 set B for each zone were distributed. For phase-2, set A and set B data for each unit of analysis need to be merged; after taken into consideration the possibility of difficulty to get enough matching, a bigger number of questionnaires were distributed in phase-2 compared with phase-1. Table 5-1 shows the distribution of number of returned questionnaire and response rate for each stratified group. Although high response rate was expected as the questionnaires were distributed through SED, some of the the questionnaires were returned late. The figures shown in Table 5-1 were excluded numbers of respondent who returned the questionnaires to the SEDs after I have came back to the UK. Despite that, number of collected samples for all stratified group were greater than expected (Table 4-9). Data from set A, set B, and set C were merged to establish the complete set of data for each unit of analysis. These data were used to test four hypotheses in the quantitative analyses.

Table 5-1: Distribution of returned questionnaires

Zone	**No. of Returned Questionnaire (response rate)**	
	Phase-1	**Phase-2**
Zone 1	31 (31.0%)	37 (24.7%)
Zone 2	33 (33.0%)	46 (30.7%)
Zone 3	32 (32.0%)	39 (26.0%)
Zone 4	37 (37.0%)	32 (21.3%)
Zone 5	39 (39.0%)	-
Zone 6	-	31 (20.7%)
Total	**172**	**185**

Note: for phase-2, only units of analysis (schools) with both sets of questionnaires returned are counted.

It has been mentioned in 4.4.1.1 that both sets of the questionnaires used in this study had employed Likert-style questions with scale range from 1 to 6. Each question represented a specific item and summation of several items formed a particular variable, which in this case is a particular project success factor. The raw data were managed using *MS Excel*, which included data entry, error checking, and data sorting. *MS Excel* was also used to calculate the value of summation for each variable after weighting was applied to each item using MCDA approach, as has been mentioned in 4.5.1.1.2. Finally, a statistical analysis package *SPSS for Windows* (see 4.5.1.6) was used to import and analyse the data. The study emphasised on four hypothesis testings: *one-way ANOVA*, *two-way ANOVA*, *One Sample t-Test*, and *Multiple Linear Regression*.

5.3. HYPOTHESES 1: INFLUENCE OF PROJECT CHARACTERISTICS TO THE PROJECT MANAGEMENT SUCCESS

These analyses were conducted to compare six project management factors between zones using a *one-way ANOVA*. Geographical location differentiated the six zones of the SCLP in various project characteristics including status of development, basic infrastructure such as road and communication systems, and socio-politic. A comparison between zones was carried out to verify whether the differences in those project characteristics gave certain impact to the project success. Unfortunately, comparison between phases could not be carried out as there are no statistical data for project management success factor in phase-1 (see 5.2).

This part of quantitative analysis dealt with data from set A questionnaire. Therefore, the result reflects the phase-2 contractors' view. Six factors were used to examine the project management success during the project implementation, the factors are: 1) administrator's effectiveness; 2) supervising team's efficiency; 3) contractors' competence; 4) communication and feedback; 5) integrity; and 6) external influences. The items used to test each factor, and weightings used to aggregate the responses are contained in Appendix 9**.**

5.3.1. Project administrator effectiveness

The term project administrator referred to the project director and his subordinates, which consists of officers from the MOE including those of SEDs and DEOs. Their performance was evaluated based on four items: 1) their good conduct of bureaucracy and cooperation in handling project administration matters, 2) their knowledge about the project, 3) their strength compared to the volume of the project, and 4) their commitment to the project.

The null hypothesis for this test is:

H_1a: There was no significant difference in project administration effectiveness between zones.

A comparison between zones was carried using a *one-way ANOVA* test. The result of the test as shown in Table 5-2 indicates that there was no significant difference between the zones for administrator effectiveness, which means that the contractors from all zones have the same opinion about the effectiveness of the officers in charge of the programme. The result suggested that performancewise, the officers who were in charge of the programme did not differentiate or discriminate any zones in carrying out their duty.

Table 5-2: One-way ANOVA to compare administrator effectiveness between zone

	Sum of Squares	df	Mean Square	F	Sig.
Between Zones	4.26	4	1.06	0.857	0.491 ^
Within Zones	223.65	180	1.24		
Total	227.91	184			

N=185; ^ not significant

5.3.2. Project supervisor efficiency

The supervising team is a group of people, who monitored the project progress, supervised the contractors, and advised the project director about the implementation of the projects. In this programme, they were also known as the PMC. The performance of this project stakeholder in this programme was assessed based on six items: 1) adequate number staffs, 2) adequate facilities, 3) time taken by the them to respond when their advice or assistance required, 4) their level of knowledge and skill in the project they supervised, 5) frequency of their visit to the site along the project implementation, and 6) their commitment to the project.

The null hypothesis for this test is:

H_1b: There was no significant difference in supervisor's efficiency between zones.

A *one-way ANOVA* test (Table 5-3) showed a significant difference between zones for the project supervisor's efficiency (F=5.239, p<0.01). The result suggested that the PMC performance was significantly different in at least one of the zones from the phase-2 contractors' point of view.

Table 5-3: One-way ANOVA to compare supervisor efficiency between zone

	Sum of Squares	df	Mean Square	F	Sig.
Between Zones	20.85	4	5.21	5.239	0.001 ***
Within Zones	179.11	180	1.00		
Total	199.96	184			

N=185; *** p<0.01

A post hoc test using *Duncan Homogenous subset* (Table 5-4) categorised Zone 2, Zone 1 and Zone 4 in the same group, while Zone 3 and Zone 6 were grouped in the other subset. The result indicated that the PMC performed better in supervising the contractors for Zone 2, Zone 1, and Zone 4 compared with those in Zone 3 and Zone 6. That means, different geographical area and infrastructure affected the performance of the project supervising team.

Table 5-4: Duncan homogenous subset for supervisor efficiency by zone

Zone	N	Subset for alpha = 0.05	
		1	2
Zone 2	46	3.61	
Zone 1	37	3.68	
Zone 4	32	3.78	
Zone 3	39		4.24
Zone 6	31		4.47
		0.49	0.71

5.3.3. Contractor's competence

It has been mentioned earlier (refer to 1.2) that in the second phase of the programme, only a single project was awarded to each contractor. This analysis meant to evaluate contractors' competence in the phase-2 of the programme. There might be an element of bias when the data from the questionnaires answered by the contractors were used to evaluate themselves but the information was useful to trace their preferences throughout phase-2 of the programme. The information was also important in order to compare with the phase-1 contractor. Their performance was evaluated based on seven items: 1) number of years since the formation of the company, 2) number of projects constructed within 5 years before this project, 3) contract value of all projects constructed within five years before this project, 4) the company's paid-up capital during the award of this project, 5) number of onsite workers, 6) capability of the contractors to compete, and 7) ability to make profit from the project.

The null hypothesis for this test is:

H_1c: There was no significant difference in contractors' competence between zones.

A *one-way ANOVA* test was conducted to compare the performance of the contractors between the five zones. The result (Table 5-5) did not indicate any different significantly for the contractors' performance between zones. The results of the tests concluded that the standard of contractors in term of competency for all five zones of phase-2 projects was same. That means the differences in geographical location did not affect the contractors' competence.

Table 5-5: One-way ANOVA to compare contractors competence between zone

	Sum of Squares	df	Mean Square	F	Sig.
Between Zones	1.48	4	0.37	0.606	0.659 ^
Within Zones	109.95	180	0.61		
Total	111.43	184			

N=185; ^ not significant

5.3.4. Communication and feedback

A good relationship among those who involved in the project implementation is very important to make sure that the project runs smoothly. It needs to be accompanied by a good flow of information from one party to another which consists of direction, update of project progress, and feedback of the project constraints. The ability of the parties who received the information to understand and translate it into further action is critical. The next step would be the action taken to fulfil the project needs. A good trouble-shooting mechanism is required so that all these steps can be fulfilled. These four items were used to measure the success of communication and feedback factor.

The null hypothesis for this test is:

H_1d: There was no significant difference between zones for level of communication and feedback among parties involved in the project.

A *one-way ANOVA* test (Table 5-6) showed that there is no significant different between zones. This result suggests that contractors from all the five zones share the same opinion about the level of communication and feedback among the parties involved in the project. This included the relationship among all the parties, flow of information from one party to the others, and meeting conducted to discuss and troubleshoot the project.

Table 5-6: One-way ANOVA to compare communication and feedback between zone

	Sum of Squares	df	Mean Square	F	Sig.
Between Zones	8.29	4	2.07	1.745	0.142 ^
Within Zones	213.70	180	1.19		
Total	221.99	184			

N=185; ^ not significant

5.3.5. Integrity

Integrity is a sensitive issue; thus data for this topic could not be obtained straightforwardly by simply asking direct questions to the respondent. It is unethical to ask sensitive question such as ‘who was involved’ directly to the respondent as it might have legal implications. To ask the respondent indirectly of the occasion at which questionable ‘activity’ took place is good enough to provide some evidence. Three items were used to organise input about this topic: 1) get project through proper channel; 2) get all approval straightforwardly; 3) follow all rules and regulations. Weighting for each item is included in the appendix 9.

The null hypothesis for this test is:

H_1e: There was no significant difference between zones for the integrity of the parties in the project.

A comparison between zones conducted using *one-way ANOVA* showed that integrity of people in phase-2 projects was not different significantly (Table 5-7). It means that level of integrity for all five zones in phase-2 projects was not different each others from the phase-2 contractors' point of view. The non-parametric test, *Kruskal-Wallis* was also explored since the aggregation of only three items might be thought insufficient to justify the use of a parametric test. However, the *Kruskal-Wallis* test showed the parallel result with the *one-way ANOVA.*

Table 5-7: One-way ANOVA to compare integrity between zone

	Sum of Squares	df	Mean Square	F	Sig.
Between Zones	3.91	4	0.98	0.794	0.531 ^
Within Zones	221.58	180	1.23		
Total	225.49	184			

N=185; ^ not significant

5.3.6. External Influences

External influences referred to any circumstance, which are beyond the control of any project authority. In this programme, four items were identified to have some impact to the project success. Those four items are: 1) interference from irrelevant but influential parties, 2) unpredictable environment, 3) unforeseen site problem, and 4) economic climate. Those four items and their weightings are summarised in Appendix 9.

The null hypothesis for this test is:

H_1f: There was no significant difference between zones for the external influences of the project.

Comparison between zones was conducted using a *one-way ANOVA* test. The result of the test showed that external influence was not significantly different among the five zones in phase-2 of the programme (Table 5-8). It means that, from the phase-2 contractors' point of view, level of external influences for all five zones in the second phase projects was not different each other.

Table 5-8: One-way ANOVA to compare external influences between zones

	Sum of Squares	df	Mean Square	F	Sig.
Between Zones	3.44	4	0.86	0.702	0.592 ^
Within Zones	220.62	180	1.23		
Total	224.06	184			

N=185; ^ not significant

5.3.7. Summary of Hypothesis 1

Table 5-9 summarised the results of Hypotheses I, that is, comparisons between zones for six project management success factors. Hypothesis H_1a to Hypothesis H_1f represented six factors of project management's success - administrator effectiveness, supervising team efficiency, contractor competence, communication and feedback, integrity, and external influence. Except for the project supervising team efficiency (H_1b), there was not enough evidence to conclude that the project management factors were different according to different zones.

This results suggested that differences in geographical location did not interfere with the administrator's effectiveness; the contractors' competence; communication and feedback among parties; the integrity of various stakeholders; and project external influences. The only project management factors that statistically proved to be influenced by project characteristics related to the different location of project sites was supervising team's efficiency.

Table 5-9: Summary of Hypotheses 1 results

Hypotheses	Factors Tested	Result of One Way *ANOVA*(Phase-2)
H_1a	Project administrators effectiveness	^
H_1b	Project supervising team efficiency	***
H_1c	Contractors competence	^
H_1d	Communication and feedback	^
H_1e	Integrity	^
H_1f	External influence	^

*** $p<0.01$
^ not significant

5.4. HYPOTHESES 2: INFLUENCE PROJECT CHARACTERISTICS TO THE PRODUCT SUCCESS

The aim of these hypotheses was to make comparisons between zones and between phases for six product factors. Beside comparisons between zones to verify the affect of different locations (as mentioned in 5.3), these hypotheses also made comparison between phases, that is, to verify whether the project characteristics related to contract award mechanism had significantly affected the project. Phase-1 projects were different from phase-2 projects in the contract award approaches. These analyses comprise of data from set B and set C of the questionnaire, which cover both phases of the programme. The tests for comparisons between zones and between phases were conducted using *two-way ANOVA*. Compared with Hypotheses 1, testing of these hypotheses was made using sub-items so that the more accurate result could be obtained.

5.4.1. Users' Satisfaction

There were three components of this factor - the building, the ICT equipment, and the furniture – each of which has been given different weighting. Those three components were used as items to evaluate the user satisfaction. The building component carried the highest weighting, that is, 54% compared to 13% of furniture and 33% of the ICT components. Within each items there were sub-items which also carried different weighting. Detail of the items under each factor and weight carried by each item are contained in Appendix 9.

5.4.1.1. <u>The laboratory building</u>

Five sub-items were used to test the users' satisfaction of the building: 1) quality and durability, 2) finishes and decoration, 3) layout and design, 4) air-conditioner and lighting, and 5) three-phase electricity wiring. After assigning weighting, all five sub-items of the building were aggregated to provide a summary measure.

The null hypothesis for this test was is:

H_2a: There was no significant difference between phases and between zones in users' satisfaction for laboratory building.

This hypothesis meant to compare users' satisfaction for laboratory building among zones as well as between phases of the programme. The hypothesis testing was carried out using a *two-way ANOVA* test. The results of the test (Table 5-10) demonstrated that there were significant differences between phases ($F = 4.3$, $p < 0.05$) and between zones ($F = 2.3$, $p < 0.05$) for the users' satisfaction. However, there is no significant deference in phase-zone interaction for users' satisfaction.

Table 5-10: Two-way ANOVA (phases and zones) for user satisfaction (building)

Source	Sum of Squares	df	Mean Square	F	Sig.
PHASE	4.89	1	4.89	4.3	0.039 **
ZONE	12.99	5	2.60	2.3	0.046 **
PHASE * ZONE	3.09	3	1.03	0.9	0.438 ^
Error	394.52	347	1.14		
Total	3319.56	357			

N = 357
Mean = 2.86 (overall), 2.97 (phase-1), 2.75 (phase-2)
** p<0.05; ^ not significant

The results of this test provided enough evidence to conclude that the level of satisfaction for the computer laboratory building was different among the users of the two phases. That means, projects built in phase-2 were better accepted by the users (mean = 2.75) compared to those built in phase-1 (mean = 2.97). These results also demonstrated that the users from different geographical location accepted laboratory buildings differently.

Post-hoc test carried out using *Duncan Homogenous Subset* (Table 5-11) has divided the six zones into two subsets ($\alpha = 0.1$). The above results suggested that computer laboratory buildings in Zone 2 were the best in satisfying users, while buildings in Zone 3 and Zone 4 were of the lowest in terms of user's satisfaction.

Table 5-11: Duncan homogenous subset for user satisfaction (building) by zone

Zone	N	Subset for alpha = 0.1	
		1	2
Zone 2	79	2.645	
Zone 6	31	2.716	2.716
Zone 1	68	2.721	2.721
Zone 5	39	2.802	2.802
Zone 3	71		3.076
Zone 4	69		3.079
Sig.		0.499	0.122

5.4.1.2. The furniture

The furniture was measured by aggregating 10 sub-items, each of which assigned a different weight. The study covers the whole furniture supplied to the computer laboratory buildings as listed in the contract agreement for both phases of the programme. Those 10 sub-items were: 1) supervisor table; 2) supervisor chair; 3) teacher table; 4) teacher chair; 5) student table; 6) student chair; 7) LCD projector's trolley; 8) steel cabinet; 9) pigeon box; and 10) printer table. Weight carried by each sub-item is shown in Appendix 9.

The null hypothesis for this test is:

H_2b: There was no significant difference between phases and between zones in users' satisfaction for furniture.

A *two-way ANOVA* was used to compare the users' satisfaction for furniture among the phases and among the zones. The results (Table 5-12) show that there were significant differences between phases ($F = 4.3$, $p < 0.05$) and between zones ($F = 2.3$, $p < 0.05$) for users satisfaction over the furniture. However, there is no significant difference in phase-zone interaction for users' satisfaction. The result demonstrated that level of users' satisfaction for computer laboratory furniture of phase-1 was different from phase-2. The furniture in phase-2 (mean = 2.65) satisfied the users better than those in phase-1 (mean = 2.98). The result also suggested that the users from different geographical location have different level of satisfaction for computer laboratory furniture.

Table 5-12: Two-way ANOVA (phases and zones) for user satisfaction (furniture)

Source	Sum of Squares	df	Mean Square	F	Sig.
PHASE	24.176	1	24.18	33.53	0.00 ***
ZONE	61.596	5	12.32	17.08	0.00 ***
PHASE * ZONE	4.619	3	1.54	2.135	0.1 ^
Error	250.217	347	0.72		
Total	3030.183	357			

N = 357
Mean = 2.77 (overall), 2.98 (phase-1), 2.65 (phase-2)
*** $p<0.01$; ^ not significant

Post-hoc test carried out using *Duncan Homogenous Subset* test as shown in (Table 5-13) grouped the six zones into three subsets ($\alpha = 0.1$). Zones 1, 2 and 5 were grouped in the first subset, followed by Zones 6 in the second subset, and Zones 3 and 4 in the last subset. The results indicate that computer laboratory furniture in 1, 2, and 5 were most satisfying the users, while those in Zones 3 and 4 were of the lowest in user satisfaction. The above trend of user's satisfaction over the furniture is consistent with that for the computer laboratory building, whereby Zone 3 and 4 were of the bottom group.

Table 5-13: Duncan homogenous subset for user satisfaction (furniture) by zone

Zone	N	Subset for alpha = 0.1		
		1	2	3
Zone 1	68	2.38		
Zone 2	79	2.39		
Zone 5	39	2.45		
Zone 6	31		2.74	
Zone 3	71			3.18
Zone 4	69			3.25
Sig.		.726	.101	0.68

5.4.1.3. The ICT equipment

There were thirteen sub-items used to form the ICT equipment item. As in building and furniture, each sub-item also carried different weighting based on their importance. The weighted sum of all sub-items formed the aggregate value of the ICT equipment. The thirteen sub-items were: 1) computer and components; 2) printer; 3) scanner; 4) modem; 5) network; 6) digital camera; 7) LCD projector; 8) server; 9) internet connection; 10) internet performance; 11) software; 12) compiled user manual; and 13) training.

The null hypothesis for this test is:

H_2c: There was no significant difference between phases and between zones in users' satisfaction for ICT equipment.

A *two-way ANOVA* was conducted to test the difference between phases and between zones. The results (Table 5-14) show a significant differences for both comparisons, that is, between phases ($F = 36.77$, $p < 0.01$) and between zones ($F = 12.65$, $p < 0.01$) for ICT equipment. From the result, it can be demonstrated that level of users' satisfaction for ICT equipment of phase-2 of the programme (mean = 2.83) is better than the users of phase-1 (mean = 3.27). To verify the difference between zones, a post-hoc test were carried out using *Duncan Homogenous Subset*. Table 5-15 shows the result of the test.

Table 5-14: Two-way ANOVA (phases and zones) for user satisfaction (ICT equipment)

Source	Sum of Squares	df	Mean Square	F	Sig.
PHASE	26.14	1	26.14	36.77	0.00 ***
ZONE	44.97	5	8.99	12.65	0.00 ***
PHASE * ZONE	4.76	3	1.59	2.23	0.1 ^
Error	246.72	347	0.71		
Total	3590.99	357			

N = 357
Mean = 3.05 (overall), 3.27 (phase-1), 2.83 (phase-2)
*** p<0.05; ^ not significant

The result, again seems parallel with the building and the furniture component. It suggested that Zones 1, 2 and 5 were grouped at the top, while Zones 3 and 4 were grouped last. From this test output, it can be concluded that the ICT equipment in Zones 1, 2 and 5 were the best in satisfying the users, while those in Zones 3 and 4 were of the worst.

Table 5-15: Duncan homogenous subset for user satisfaction (ICT equipment) by zone

Zone	N	Subset for alpha = 0.1			
		1	2	3	4
Zone 1	68	2.65			
Zone 2	79	2.78			
Zone 5	39	2.86	2.86		
Zone 6	31		3.11	3.11	
Zone 3	71			3.25	3.25
Zone 4	69				3.53
Sig.		0.248	0.151	0.425	0.08

5.4.2. Product Benefit

Data for the project benefit were obtained from the set B of the questionnaires which were answered by the teachers as the users. Two items were studied under this factor, namely the benefit to the student, and the benefit to the teacher. In terms of importance to the project, each sub-item has a different weighting as shown in Appendix 9.

5.4.2.1. <u>Benefits: the students' perspective</u>

As mentioned in 4.4.1.4, it was difficult to arrange for the students to answer the questionnaire, especially those from the primary schools. Thus, the constructs of students' perspective were incorporated into the teacher's questionnaire with the assumption that the teachers knew the needs of their students. Three sub-items were examined under this studied factor. The first sub-item was the response from the users whether the facilities in computer laboratory has improved the student knowledge and skill in computer literature. The second sub-item was their opinion about development of student skill in ICT related subjects, while the third sub-item was the user opinion about the attraction of the ICT facilities for the students in exploring more information.

The null hypothesis for this test is:

H_2d: There was no significant difference between phases and between zones in benefit of the project to the students.

A *two-way ANOVA* test was performed to compare the product benefit for students among zones and between phases. The result of the test (Table 5-16) appeared to be not significantly different for both comparisons. That means there was not enough evidence to support any difference between zones and between phases; the users of all zones and phases sharing the same opinion about the benefit of the computer laboratory to students.

Table 5-16: Two-way ANOVA (phases and zones) for project benefit (student)

Source	Sum of Squares	df	Mean Square	F	Sig.
PHASE	1.89	1	1.89	2.31	0.13 ^
ZONE	6.77	5	1.35	1.66	0.14 ^
PHASE * ZONE	4.01	3	1.34	1.64	0.18 ^
Error	283.61	347	0.82		
Total	3219.37	357			

N = 357
Mean = 2.86 (overall), 2.91 (phase-1), 2.82 (phase-2)
^ not significant

5.4.2.2. Benefits: the teachers' perspective

Four sub-item were used to measure this item: 1) improves teaching & learning in ICT related subject; 2) improves teaching and learning in non-ICT subjects; 3) creates interesting medium for teaching and learning; and 4) improves efficiency in classroom management. Summary of these sub-item and weighting for each of the item are as in Appendix 9**.**

The null hypothesis for this test is:

H_2e: There was no significant difference between phases and between zones in benefit of the project to the teachers.

A *two-way ANOVA* test was conducted to compare the product benefit for teachers between phases as well as between zones. The results of the test demonstrate that there is no significant difference for sources tested (Table 5-17). In other words, the users of all phases and zones were of the same view, that is, the benefits of the project product to the teachers were similar throughout the country.

Table 5-17: Two-way ANOVA (phases and zones) for project benefit (teacher)

Source	Sum of Squares	df	Mean Square	F	Sig.
PHASE	1.91	1	1.91	1.93	0.17 ^
ZONE	3.92	5	0.78	0.79	0.56 ^
PHASE * ZONE	3.84	3	1.28	1.29	0.28 ^
Error	343.42	347	0.99		
Total	3499.05	357			

N = 357
Mean = 2.97 (overall), 3.03 (phase-1), 2.90 (phase-2)
^ not significant

5.4.3. Completion Time

The comparison between zones and phases for this factor was conducted using data from set 3. Project completion time comprises two components: completion of construction component and completion of supply component. However, it is difficult to distinguish between the two as some of the projects are not appeared to have accurate data for that, especially in phase-1 where both components were carried out by the same contractor. In this research, the completion time is calculated from the project starting date[9] to the handing-over date.

The null hypothesis for this test is:

H_2f: There was no significant difference in project completion time between phases and between zones.

The results of a *two-way ANOVA* to examine the difference in completion time between phases and between zones (Table 5-18), indicate that there is a significant different between phases ($F=47.12$, $p<0.01$) as well as between zones ($F=4.90$, $p<0.01$). The result suggests that the phase-2 projects took shorter time to complete (mean = 577)

[9] Contractually, the project started one week after the issuance of the letter of acceptance (LoA).

compared with the phase-1 projects (mean = 796). That means, different approaches of project implementation had an impact on the project's completion time. The distribution of completion time for the projects in phase-1 and phase-2 are illustrated in Figure 5-1 and Figure 5-2 respectively.

Table 5-18: Two-way ANOVA (phases and zones) for completion time

Source	Sum of Squares	df	Mean Square	F	Sig.
PHASE	3879725	1	3879725	47.12	0.00 ***
ZONE	2018329	5	403666	4.90	0.00 ***
PHASE * ZONE	1271232	3	423744	5.15	0.00 ***
Error	28571325	347	82338		
Total	202493869	357			

N = 357
Mean = 683 (overall), 796 (phase-1), 577 (phase-2), 638 (Zone 1), 584 (Zone 2), 770 (Zone 3), 764 (Zone 4), 747 (Zone 5), 598 (Zone 6)
*** p<0.01

Table 5-18 also demonstrates that there was a significant difference between zones for completion time. A post-hoc test using *Duncan Homogenous Subset* test (Table 5-19) has divided the six zones in two subsets. Zones 2 (mean = 584), Zones 6 (mean = 598), and Zones 1 (mean = 638) were grouped in one subset, while Zones 5 (mean = 747), Zones 3 (mean = 770), and Zones 4 (mean = 794 days) were grouped in the other subset. This result suggests that the computer laboratories in Zone 2, Zone 6 and Zone 1 completed faster than those in Zones5, Zones 3 and Zones 4.

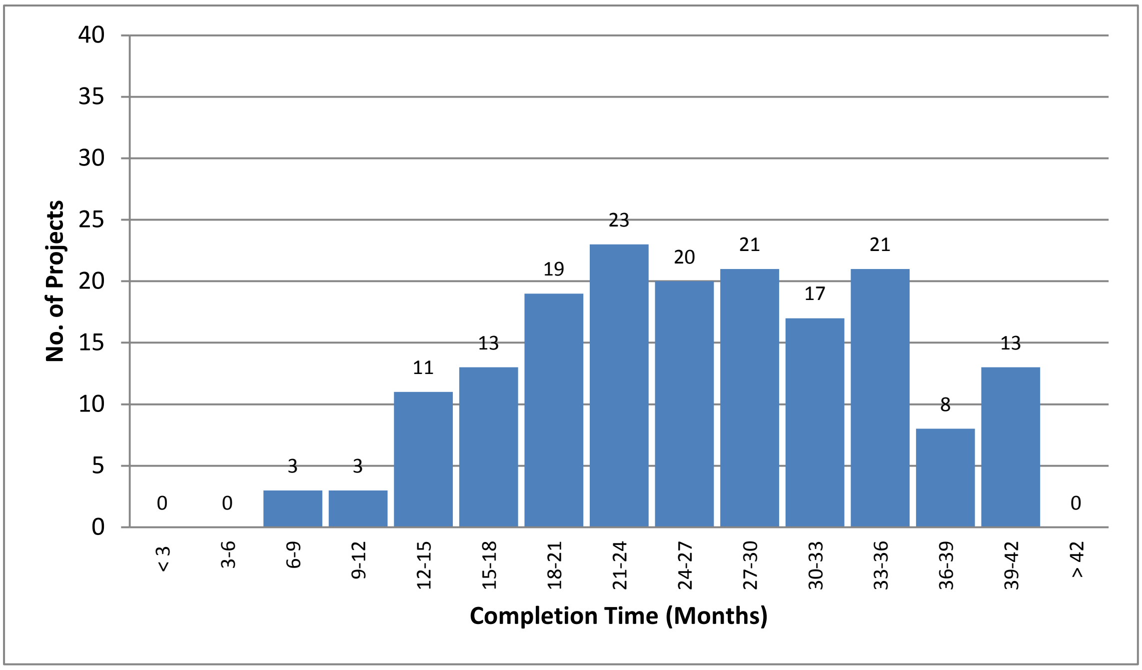


Figure 5-1: Distribution of project completion time in phase-1

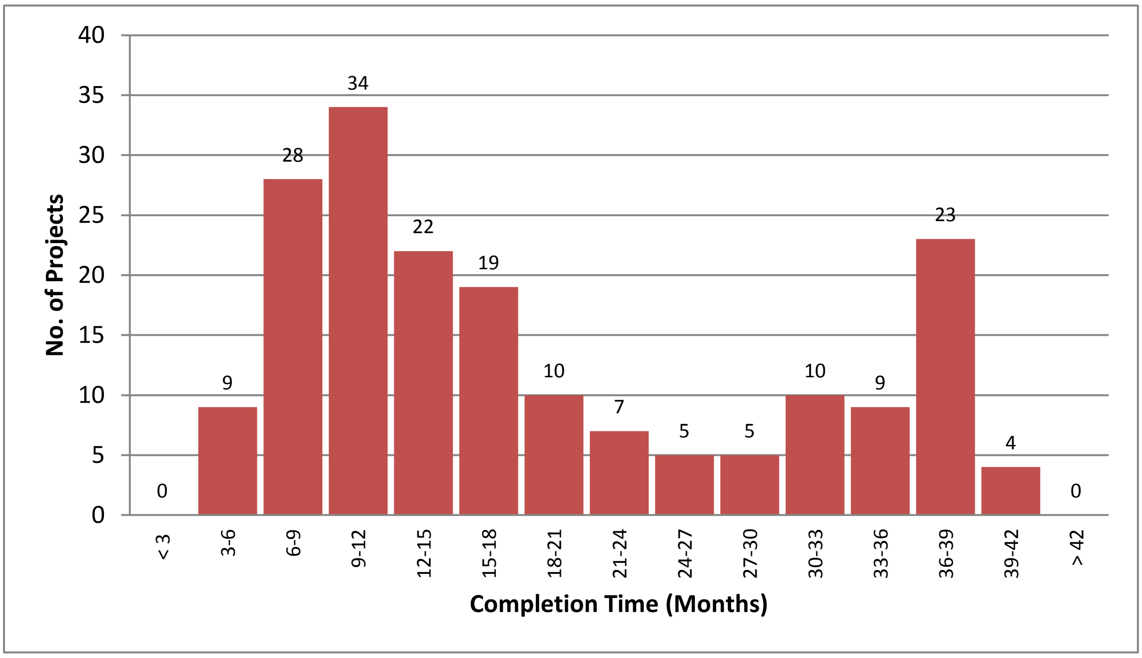


Figure 5-2: Distribution of project completion time in phase-2

Table 5-19: Duncan Homogenous subset for completion time by zone

Zone	N	Subset for alpha = 0.1	
		1	2
Zone 2	79	584	
Zone 6	31	598	
Zone 1	68	638	
Zone 5	39		747
Zone 3	71		770
Zone 4	69		794
Sig.		0.502	0.628

The result of a *two-way ANOVA* (Table 5-18) also indicated that there is a significant difference among phase-zone interaction. To have an accurate and more meaningful comparison between zones, the completion time for phase-2 was tested separately from phase-1. This is because phase-1 and phase-2 of the programme were implemented at different times and using different approaches (see 1.2). A *one-way ANOVA* test was performed to determine the difference between zones for phase-1 and phase-2 separately. The result of the test has confirmed that there was a significant difference ($F=12.318$, $p<0.01$) for phase-1, as shown in Table 5-20. The result demonstrates that Contractor A and Contractor B were better than Contractor C, Contractor D and Contractor E. Using the same test to compare among zones in phase-2 alone turned out to be insignificant.

Table 5-20: One-way ANOVA (phases and zones) for project completion time (phase-1)

	Sum of Squares	df	Mean Square	F	Sig.
Between Zones	2,456,175.1	4	614,043.8	12.43	0.00 ***
Within Zones	8,250,589.2	167	49,404.7		
Total	10,706,764.3	171			

N = 172
*** $p < 0.01$

In the first phase, the contractors took a longer time to start the project. The earliest projects completed were between 6 and 9 months after the project started. Even though the projects in this phase progressed slowly, it steadily reached the mode at 21-24 months. The reason for the phase-1 projects to start slowly was the main contractors were responsible for many schools. They needed longer time for mobilisation, which included the appointment of sub-contractors, before starting the projects.

Conversely, there were separate contracts for each school in phase-2; thus, the competent contractors could start their work immediately and managed to complete the project early. There were projects completed as early as between 3 and 6 months, and reach the mode being between 9 to 11 months. Despite performing well during the earlier stages, the performance of phase-2 was not consistent as there were some projects took long time to complete (see Figure 5-2) and formed another mode at 36-39 months. The bimodal distribution for phase-2 was observed in all zones except for zone 5 (there was no phase-2 project in zone 5). The graphs in Figure 5-3 indicate that the capability of phase-2 contractors could be divided into two groups. The competent contractors managed to complete the project earlier, while the less competent contractors took longer time to complete the project.

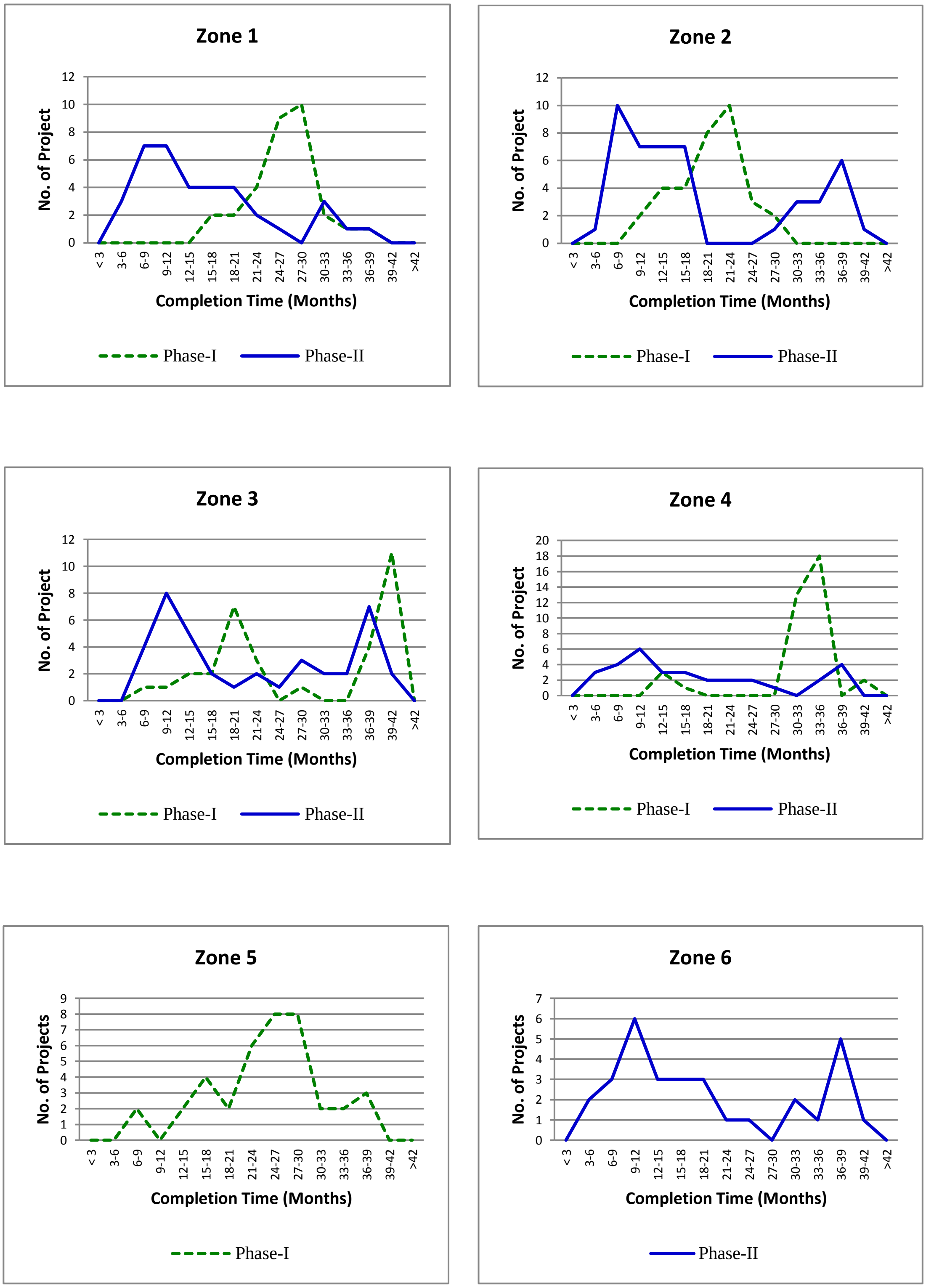


Figure 5-3: Trend of project completion time by zones

5.4.4. Summary of Hypothesis 2

The results of Hypotheses 2, that is, comparisons among zones and between phases for six product success factors are summarised in Table 5-21. Hypothesis H_2a to Hypothesis H_2c represented factors of user satisfaction. Hypotheses H_1d to H_2e were the testing of the factors for the product benefit, while Hypotheses H_1f was to verify the project's completion time.

Table 5-21: Summary of Hypothesis 2 results

Hypotheses	Factors Tested	comparison		
		zones	phases	phase-zone interaction
H_2a	Satisfaction to building	*	**	^
H_2b	Satisfaction to furniture	***	***	^
H_2c	Satisfaction to ICT equipment	***	***	^
H_2d	Benefit to the students	^	^	^
H_2e	Benefit to the teachers	^	^	^
H_2f	Completion time	***	***	***

*** p<0.01; ** p<0.05; * p<0.1; ^ not significant

The results of these test produced enough evident to recognise that users of one geographical location did not share the same level of satisfaction for the product of the project with the other users of the other location. The result also indicated that projects delivered at different time affected the level of satisfaction among the users. The same trend can be seen for the project completion time, which means that time taken to complete the project is varied according to geographical location and method of project award. However, results of H_1d and H_2e showed that the users shared the same views for the product benefit regardless of location and time of delivery of the project. There were no significant different between phase-zone interaction except for completion time, whereby a test showed the significant different between zones within phase-1 projects.

5.5. HYPOTHESES 3: PROJECT PERFORMANCE

The *one-way ANOVA* tests in Hypotheses 1 compared the studied variables among zones, while the *two-way ANOVA* tests in Hypotheses 2 identified significant differences between phases and zones for various project success factors. However, comparing zones and phases did not significantly demonstrate the degree of performance for each success factor under investigation. Further test was undertaken to explore the magnitude of the differences.

As mention in 4.5.1.2, this study aimed to identify the performance of all studied factor in order to verify their contribution to the project success. A *One Sample t-Test* was carried out to explore the performance of each factor by comparing the actual mean with the expected mean. It has been mentioned earlier (4.4.1.1) that all variables in the questionnaire were measured with a 6-point Likert-scale (1 to 6), whereby 1 indicates the best and 6 describes as the worst. With that rating, the mean value of 3.5 was assumed. That means, the studied factors with the real value significantly higher than 3.5 (expected value), would be regarded as low performer, while factors with real value smaller than 3.5, would be considered as a high performer. This test was carried out for the last four dimensions (see Table 4-3). For the first two dimensions, this test could not be performed as there no quantitative data available.

5.5.1. Smooth Project Implementation

A *One Sample t-Test* was conducted over six factors: 1) administrator effectiveness, 2) supervising team efficiency, 3) contractor competence, 4) communication and feedback, 5) integrity, and 6) external influence. This test only applied to phase-2 because the equivalent data for the same factors from phase-1 were collected through qualitative approach.

The null hypothesis for this test is:

H_3a: The performance (actual mean) of project implementation was equal to 3.5 (expected mean).

The test results (Table 5-22) demonstrated that the actual means were significantly bigger than expected mean for three studied factors: supervising team efficiency ($t = 5.59$, $p<0.01$), contractor competence ($t = 1.72$, $p<0.1$), and integrity ($t = 1.73$, $p<0.1$), while for communication and feedback the actual mean was significantly smaller than expected mean ($t = -11.49$, $p<0.01$). However, actual means were not significantly different from expected mean for administrator effectiveness, and external influence.

Table 5-22: One-sample *t*-Test to estimate project performance (phase-2)

	N	Actual Mean	Expected Mean	Mean Diff	t	df	Sig.	
Administrator	185	3.39	3.50	-0.11	-1.40	184	0.16	^
Supervisor	185	3.93	3.50	0.43	5.59	184	0.00	***
Contractor	185	3.60	3.50	0.10	1.72	184	0.09	*
Com m& feedback	185	2.57	3.50	-0.93	-11.49	184	0.00	***
Integrity	185	3.64	3.50	0.14	1.73	184	0.08	*
External influence	185	3.58	3.50	0.08	0.96	184	0.34	^

*** p<0.01; * p<0.1; ^ not significant;
Note: lower number indicated higher performance, vice-versa

The above results provided enough evidence to believe that communication and feedback among the parties was the only project management success factor that contributed to the success of the programme being research. Conversely, supervising team, contractor, and integrity contributed bad impact to the project. At the same time, project administrator and external influence contributes neither bad nor to good impact to the project.

5.5.2. Acceptable Products

5.5.2.1. Completion Time

This test was carried out to verify project completion time. As stipulated in the LoA, project completion time was calculated from seven day after the date of LoA to the date of project handover. Based on LoA, phase-1 contractors were given six months to complete the project, including the supply components. Phase-2 contractors were given three months to complete the construction work. However, neither the MOE nor the PMC managed to provide accurate complete data that clearly stated construction completion date, supply completion date and handover date. The complete and accurate data available only stated starting date and handover date. With the assumption that another three months was required by the supplier to complete supply components, a 6-month completion time was assumed for the purpose of this test. Thus, 6-month (183-day) was used as the test mean for completion of both phases.

The null hypothesis for this test is:

H_3d: The project was completed within expected time (183 days).

For both phases of the programme, the results of *One Sample t-Test* (Table 5-23) demonstrate that the expected means of 183 days project completion time were significantly different ($p<0.01$) from actual mean.

Table 5-23: One-Sample t-Test to estimate the project completion time

	N	df	Actual Mean	Test Mean	Mean Diff	t-value	Sig.	
Phase-1	172	171	796	183	613	32.15	0.00	***
Phase-2	185	184	577	183	394	15.85	0.00	***

*** $p<0.01$; ^ not significant
Note: lower number indicated higher performance, vice-versa

From the results, there was enough evidence to reject the null hypothesis and conclude that the project had not completed around 183 days as targeted. This is applied to both phases of the programme. So how were they completed? The results showed that actual mean of completion time was 796 days ($t = 32.15$, $p<0.01$) for phase-1 and 577 days ($t = 15.85$, $p<0.01$) for phase-2; which means that the typical projects in both phases were completed much later than targeted time. The issue is whether targeted completion is reasonable.

5.5.2.2. User Satisfaction

In 5.5.1, analysis was made for each factor, using items in within factors. However, for this dimension the test was carried out for item using sub-items to a more accurate interpretation. Three items, i.e. 1) laboratory building, 2) furniture, and 3) ICT equipment were tested using a *one sample t-test* to verify the level of user satisfaction. This test covered both phase-1 as well as phase-2 projects.

The null hypothesis for this test is:

H_3b: The user satisfaction (actual mean) of project's product was equal to 3.5 (expected mean).

Results of the test (Table 5-24) recommend that actual means were significantly smaller than expected mean for all three studied factors: building ($p<0.01$), furniture

($p<0.01$), and ICT equipment ($p<0.01$) for phase-1 projects. The same result also showed in the phase-2 projects.

Table 5-24: One-sample *t*-Test to estimate the user satisfaction

	N	Actual Mean	Test Mean	Mean Diff	t	df	Sig. (2-tailed)	
Building phase-1	172	2.98	3.50	-0.52	-6.18	171	0.00	***
Building phase-2	185	2.74	3.50	-0.76	-9.99	184	0.00	***
Furniture phase-1	172	2.97	3.50	-0.53	-7.46	171	0.00	***
Furniture phase-2	185	2.54	3.50	-0.96	-13.64	184	0.00	***
ICT phase-1	172	3.27	3.50	-0.23	-3.49	171	0.00	***
ICT phase-2	185	2.81	3.50	-0.69	-9.92	184	0.00	***

*** $p<0.01$; Note: lower number indicated higher performance, vice-versa

The above result gave enough evident to reject the null hypothesis and concluded that the user acceptance of all three components of the project - laboratory building, furniture, and ICT equipment - was good for both phases of the projects. Since user satisfaction was used to measure the product success, it was concluded that all three contributed to the project success.

5.5.2.3. Product Benefit

The *One sample t-test* was carried out to verify the level of benefit of the project's product to the students as well as the teachers. This test covered both phase-1 as well as phase-2 of the project's product.

The null hypothesis for this test is:

H_3c: The product benefit (actual mean) of project's product was equal to 3.5 (expected mean)

The results of *One sample t-test* for both phase-1 and phase-2 of the programme (Table 5-25) showed that actual means were significantly smaller than expected mean for both studied factors: benefit o the students ($p<0.01$), and benefit to the teachers ($p<0.01$).

Table 5-25: One-sample *t*-Test to estimate the product benefit

	N	Actual Mean	Test Mean	Mean Diff	t	df	Sig. (2-tailed)	
Student benefit phase-1	172	2.94	3.50	-0.56	-9.84	171	0.00	***
Student benefit phase-2	185	2.82	3.50	-0.68	-8.67	184	0.00	***
Teacher benefit phase-1	172	3.03	3.50	-0.47	-7.27	171	0.00	***
Teacher benefit phase-2	185	2.92	3.50	-0.58	-7.17	184	0.00	***

*** $p<0.01$;

<u>Note</u>: lower number indicated higher performance, vice-versa

The above result gave enough evident to reject the null hypothesis and concluded that products of the project are beneficial to both the teachers as well as the students. Like user satisfaction, the product benefit also used to measure the project success. Thus, the result suggested that product of the project contributed to the project success.

5.6. HYPOTHESES 4: ASSOCIATION BETWEEN FACTORS

These statistical tests were conducted using *Linear Regression* analysis (see 4.5.1.5). The aim of undertaking these tests is to quantify the strength of association between project management factors (independent variables) and product factors (dependent variable). In the cases where one criterion is affected by numbers of predictors, *Multiple Linear Regression* was used. The predictors were the project management factors, which consist of project administrator effectiveness, project monitoring team efficiency, contractor competence, communication and feedback, integrity, and external influences; while the dependent variables were the product output consists of user satisfaction, project benefit, and completion time. Completion time is unique in this test; besides being tested as dependent variable, completion time was also tested as independent variable to examine its possible impact on the other product outputs.

5.6.1. User Satisfaction and Project Management Factors

These tests aimed to identify the association between six factors of project management and user satisfaction. The user satisfaction used in this test is the aggregate value for building, furniture, and ICT equipment after applying weight to each of the factors (see Appendix 9).

The null hypothesis for this test is:

H_4a: The users' satisfaction was not affected by the project management factors.

The results of the *multiple linear regression* test as presented in Table 5-26 suggest that there was a significant relation ($F=3.72$, $p<0.01$) between user satisfaction and the six project management factors. However, the association was relatively weak ($R^2=0.112$), which means that only 11.2% of the total variation in user satisfaction affected by those six project management factors. From the result, it can be concluded that user satisfaction was significantly related to the performance of supervisor ($\beta=0.204$, $t=2.48$, $p<0.05$), and communication and feedback ($\beta=0.196$, $t=2.96$, $p<0.01$). However, the other four factors – administrator, contractor, integrity, and external influence - were not significantly related.

Table 5-26: Regression: predictors of user satisfaction against project management factors

Regression analysis

	Sum of Squares	df	Mean Square	F	Sig.	
Regression	13.414	6	2.236	3.72	.002	***
Residual	106.878	178	.600			
Total	120.292	184				

Regression Coefficients

Variable	B	Std. Error	Beta	t-value	Sig.	
(Constant)	1.43	0.36	-	3.96	0.000	***
admin	-0.03	0.05	-0.035	-0.47	0.636	^
supervsr	0.16	0.06	0.204	2.48	0.014	**
contr	0.06	0.08	0.062	0.77	0.443	^
com&fb	0.14	0.05	0.196	2.69	0.008	***
integrt	0.03	0.06	0.044	0.59	0.556	^
ext_inf	0.01	0.05	0.020	0.28	0.781	^

R^2=0.112; Adjusted R^2=0.082
*** $p<0.01$; ** $p<0.05$; ^ not significant

Based on the model discussed in 4.5.1.5, user satisfaction can be predicted using this equation:

User satisfaction = 1.43 + 0.16(supervsr) + 0.14(com&fb)

Examining this model, it can be predicted that the value of user satisfaction will increase by 0.16 if the value of supervisor is increased by 1, when all other predictors are held constant. Similarly, the value of user satisfaction will increase by 0.14 if the value of communication and feedback is increased by 1, when all other predictors are held constant.

5.6.2. Product Benefit and Project Management Factors

These tests aimed to identify the association between six project management factors and product benefit. The measure of users satisfaction employed in this test is the aggregate value for benefit to students and benefit to teachers after applying the weighting (see Appendix 9).

The null hypothesis for this test is:

H_4b: The product benefit was not affected by the project management factors.

Table 5-27 presents the results of the *Multiple Linear Regression* test. The result suggests that there was a significant ($F=2.091$, $p<0.1$) but weak ($R^2=0.066$) relationship between product benefit and the six project management factors. Only 6.6% of the total variation in user satisfaction is affected by project management factors. The results also suggest that user satisfaction only significantly related to supervisor efficiency ($\beta=0.166$, $t=1.965$, $p<0.1$) and not significantly related to other five factors – administrator, contractor, communication and feedback, integrity, and external influence - in the present of the other variables.

Table 5-27: Regression: predictors of product benefit against project management factors

Regression analysis						
	Sum of Squares	df	Mean Square	F	Sig.	
Regression	11.454	6	1.909	2.091	0.056	*
Residual	162.520	178	0.913			
Total	173.974	184				
Regression Coefficients						
Variable	B	Std. Error	Beta	t-value	Sig.	
(Constant)	1.90	0.445		4.268	0.000	***
admin	0.06	0.067	0.074	0.961	0.338	^
supervsr	0.15	0.079	0.166	1.965	0.051	*
contr	0.11	0.103	0.088	1.076	0.283	^
com&fb	-0.09	0.066	-0.096	-1.283	0.201	^
integrt	-0.05	0.067	-0.057	-0.740	0.460	^
ext_inf	0.04	0.066	0.045	0.604	0.547	^

$R^2=0.066$; Adjusted $R^2=0.034$; *** $p<0.01$; * $p<0.1$; ^ not significant

Based on linear regression model as in 4.5.1.5, this regression can be explained by this equation:

Product benefit = 1.90+ 0.15(supervsr)

Examining this model, it can be calculated that the value of product benefit will increase by 0.15 if the value of supervisor is increased by 1, when all other predictors are held constant.

5.6.3. Completion Time and Project Management Factors

The aim of this test is to discover whether the project completion time is affected by the six project management factors. The null hypothesis for this test is:

H_4c: The project completion time was not affected by the project management factors.

To verify the influence of six project management factors to the project completion time, a *Multiple Linear Regression* was conducted. The result of the test (Table 5-28) demonstrated that those six factors significantly influenced the completion time of the project ($F=45.429$, $p<0.01$); the relationship was very strong ($R^2=0.605$), i.e. 60.5% of the total variation in completion time affected by those six project management factors.

From the result, it can be concluded that completion time was significantly related to all project management factors tested, i.e. administrator ($\beta=2.235$, $t=2.235$, $p<0.05$), supervisor ($\beta=6.634$, $t=6.634$, $p<0.01$), contractor ($\beta=0.324$, $t=6.065$, $p<0.01$), communication and feedback ($\beta=4.907$, $t=4.907$, $p<0.01$), and external influence ($\beta=0.186$, $t=3.827$, $p<0.01$), except for integrity, in the present of the other variables.

Based on model as has been explained earlier in 4.5.1.5, this regression can be explained by this equation:

Completion time = -967.72 + 33.85(admin) + 117.89(supervsr) + 140.69(contr) – 73.58(com&fb) + 57.00(ext_inf).

Using this model, it can be predicted that decreasing in the value of administration by 1, the project completion time will increase by 33.85 days, when all other predictors are held constant. Similarly, increasing the value of supervisor by 1, will increase the project completion time by 117.89 days, when all other predictors are held constant, and so on. In this case, actually, the target is to decrease the number of day (so that the project completion time factor) by decreasing the value of predators (based on Likert-scale data, the smaller the number the better it is). Contractor has the biggest affect (140.69) to the completion time, followed by supervisor (117.89), communication and feedback (73.58), external influence (57.00), and administrator (33.85).

Table 5-28: Regression: predictors of completion time against project management factors

Regression analysis

	Sum of Squares	df	Mean Square	F	Sig.	
Regression	12737653.5	6	2122942.25	45.429	0.000	***
Residual	8318113.6	178	46730.98			
Total	21055767.1	184				

Regression Coefficients

Variable	B	Std. Error	Beta	t-value	Sig.	
(Constant)	-967.72	100.601		-9.619	0.000	***
admin	33.85	15.151	0.111	2.235	0.027	**
supervsr	117.89	17.769	0.364	6.634	0.000	***
contr	140.69	23.196	0.324	6.065	0.000	***
com&fb	73.58	14.993	0.239	4.907	0.000	***
integrt	18.53	15.251	0.061	1.215	0.226	^
ext_inf	57.00	14.892	0.186	3.827	0.000	***

R^2=0.605; Adjusted R^2=0.592

*** p<0.01; ** p<0.05; ^ not significant

5.6.4. Users Satisfaction and Completion Time

These tests aimed to identify the association between project completion time and users satisfaction. If in 5.6.3 abovetime is the dependant variable, in this case time is the predictor.

The null hypothesis for this test is:

H_4d: The users' satisfaction was not affected by the project completion.

A *Linear Regression* test was conducted to verify the association between those two important factors. The result of the test is presented in Table 5-29 suggested there was a significant relation ($F=6.95$, $p<0.01$) between user satisfaction and the completion time. However, the association was relatively weak ($R^2=0.094$), which means that only 9.4% of the total variation in user satisfaction affected by completion time. From the result, it can be concluded that user satisfaction was significantly related to supervisor ($\beta=0.307$, $t=6.08$, $p<0.001$).

The effect of completion time to user satisfaction can be predicted using this equation:

User satisfaction = 1.43 + 0.001(completion time).

From this model, it was predicted that if the value of completion time is increased by 1 day, the value of user satisfaction would increase (base on the Likert-scale order, means increasing the 'dissatisfaction') by 0.001.

The result demonstrates that the effect of project completion time is relatively low to the users' satisfaction. Even a delay of 365 days would result in user's satisfaction changing by only 0.365.

Table 5-29: Regression: predictors of user satisfaction against completion time

Regression analysis

	Sum of Squares	df	Mean Square	F	Sig.	
Regression	24.291	1	24.291	36.95	0.000	***
Residual	233.376	355	.657			
Total	257.667	356				

Regression Coefficients

Variable	B	Std. Error	Beta	t-value	Sig.	
(Constant)	2.340	0.102	-	23.01	0.000	***
Time	0.001	0.000	0.307	6.08	0.000	***

Dependent Variable: User Satisfaction
R^2=0.094; Adjusted R^2=0.092
*** p<0.01

5.6.5. Product Benefit and Completion Time

These tests aimed to examine the association between completion time and product benefit.

The null hypothesis for this test is:

H_4e: The product benefit was not affected by the project completion time.

The result of the *Linear Regression* test as shown in Table 5-30, suggested a significant relationship (F=21.799, p<0.01) between product benefit and the project completion time. However, the association was relatively weak (R^2=0.58), which means that only 5.8% of the total variation in product benefit affected by completion time. From the result, it can be concluded that product benefit was significantly related to completion time (β=0.241, t=4.67, p<0.01).

Table 5-30: Regression: predictors of project benefit against completion time

Regression analysis

	Sum of Squares	df	Mean Square	F	Sig.	
Regression	15.083	1	15.083	21.799	.000	***
Residual	245.617	355	.692			
Total	260.700	356				

Regression Coefficients

Variable	B	Std. Error	Beta	t-value	Sig.	
(Constant)	2.473	.104		23.703	.000	***
Time	.001	.000	.241	4.669	.000	^

Dependent Variable: Product Benefit
R^2=0.058; Adjusted R^2=0.055
*** p<0.01

Based on model as has been explained earlier in 4.5.1.5, this regression can be explained by this equation:

Product benefit = 2.473 + 0.001(time)

Using this model, it can be predicted that the value of product benefit will increase (base on the Likert-scale order, means decreasing the 'benefit') by 0.001 if the value of completion time is increased by 1 day. The result shows that the effect of project completion time to the project benefit is relatively low.

5.7. SUMMARY

Four research hypotheses were tested. Hypotheses 1 was conducted to examine the effect of geographical location to the six factors of project management success: administrator effectiveness, supervising team efficiency, contractor competence, communication and feedback, integrity, and external influence. The results of *one-way ANOVA* tests suggest that geographical location affected the performance of the project supervising team but not affecting the other five factors.

Hypotheses 2 examined the affect of geographical location and approach of project award to the project output. A *two-way ANOVA* tested seven product factors. Results demonstrate that both geographical location and award approach influence users' satisfaction for three product – building, furniture, and ICT equipment. Both project characteristics also affected the project completion time. However, neither geographical location nor award approach affected the product benefit to the students as well as to the teachers.

Hypotheses 3 were tested using *one sample t-test* meant to find out the contribution of each factor to the project success. Out of six project management success factors, only one (communication and feedback) contribute to project success. Three factors (supervising team efficiency, contractor competence, and integrity) contribute to project failure, while two factors (project administrator and external influence) contribute neither to failure nor to success of the project. All project product factors (building, furniture, ICT equipment, benefit to students, and benefit to teachers), except for completion time, contribute to success factor.

Hypotheses 4 tested the association between various project success factors. The result shows that there was a strong relationship between project management success factors and project completion time.

CHAPTER 6:

ANALYSIS OF INTERVIEWS AND QUALITATIVE DATA

6.1. OVERVIEW

Whilst quantitative method discussed in the previous chapter has been regarded as a structured way of analysing research data, it is not applied to all circumstances (Gillham 2000b). Particularly in the research involving complex phenomena and happened in the past (Yin 1993), quantitative method alone is insufficient to represent the whole spectrum of the study (Creswell 2003). Thus, qualitative method is an important tool to overcome such a hitch, as it would provide a greater depth of understanding through valuable insights from people who have real experience in the programme being researched.

The advantages of qualitative methods, in particular through interview, have been discussed in 4.4.2. In this chapter, the qualitative method which included the process of obtaining data, the management of data, and the analysis of data is describes. The qualitative data consist of interviews with ten groups of project stakeholders, and secondary data, which consists of supporting documents, obtained from various sources. The interviews were conducted using pre-determined semi-structured interview questions. Whilst data from questionnaires, represent point of views of only two groups of stakeholders, data obtained through interviews reflected all main stakeholders of the projects. The main aim of this chapter is to compare between phases and between zones of the programme. Thus, phases within zones become unit of analysis.

6.2. DATA ORGANISATION

The data collection regulation for conducting research in Malaysia as mentioned in 5.2.1 also applied here. The face-to-face interviews with 10 groups of project stakeholders were carried out using four sets of interview questions (see 4.4.2.1), depending on group of stakeholders involved. Table 6-1 shows category of stakeholders, number of respondents for each category, and particular set of interview question used for each stakeholder category.

Table 6-1: List of stakeholder group and number of respondents for each group

Stakeholder category	Agencies	Number of respondents	Question set
1. Planner	EPU	3	Set 1
2. Financier	Treasury	3	Set 1
3. Ministry-level owner/ administrator#	MOE	5	Set 1
4. State-level owner/ administrator#	SED	5	Set 1
5. District-level owner/ administrator#	DEO	2	Set 1
6. Supervisor	PMC	2	Set 2
7. Phase-1 contractor	Phase-1 contractor	5	Set 3
8. Phase-2 contractor	Phase-2 contractor	3	Set 3
9. Supplier	Supplier	2	Set 3
10. User	Schools	8	Set 4
TOTAL		38	

The project ‘owner’ was also the project ‘administrator’; in this thesis, these two terms were used interchangeably. While the term project ‘owner’ is widely used throughout the project life span, ‘administrator’ is more specific to project implementation stage. Ministry, State, and District is the order of administrative level of the MOE from the highest to the lowest, whereby the lower answerable to the higher.

As mentioned in 4.4.2.1, Set 1 was used to interview the respondents of group 1 (planner), group 2 (financier), group 3 (ministry-level owner/administrator), group 4 (state-level owner/administrator), and group 5 (district-level owner/administrator). These five groups were the government agencies that worked together to fulfil the task as stipulated in their work charter. Set 2 was prepared for the respondents of group 6 (supervising team), that is, the PMC which played the role of project supervision. The third set is prepared for group 7 (phase-1 contractor), group 8 (phase-2 contractor), and group 9 (supplier). The fourth set was particularly for group 10 (user), who utilised the product of the project. Table 6-2 lists all the 38 respondents identified by their unique code, which will be used hereinafter to specifically refer to them individually. The table also records the agency they represent, and their position in the agency and date of interview.

Typically, the interviews started with pre-determined questions from the four prepared sets as a guideline. However, through the conversation, depending upon the responses received, the interview moved into the probing questions, which not necessarily in a given order. Probing questions were important in order to get clarification of certain issues and in gaining more insights from the respondents.

In addition to interviews, the qualitative data also consisted of secondary data, sourced from various documentations (see Appendix 13). Most of these secondary resources are classified document, which only accessible to authorised personnel. With the research pass (see 5.2.1), I was allowed by respective agencies to explore those documents for research purposes but copies of the documents were not allowed as thesis attachment. As mentioned in 4.5.2, the interview records were transcribed using *Microsoft Word* and analysed using *NVivo 7*.

Table 6-2: List of interviewees

	Respondent's code	Agency	Position	Interview date
1.	*EPU1*	EPU	Middle management	10/03/06
2.	*EPU2*	EPU	Senior management	17/03/06
3.	*EPU3*	EPU	Lower management	12/04/06
4.	*Treasury1*	Treasury	Middle management	09/03/06
5.	*Treasury2*	Treasury	Lower management	09/03/06
6.	*Treasury3*	Treasury	Senior management	12/04/06
7.	*MOE1*	MOE	Middle management	12/04/06
8.	*MOE2*	MOE	Lower management	21/03/06
9.	*MOE3*	MOE	Lower management	10/03/06
10.	*MOE4*	MOE	Middle management	13/04/06
11.	*MOE5*	MOE	Lower management	27/02/06
12.	*SED1*	SED	Senior management	06/04/06
13.	*SED2*	SED	Lower management	09/04/06
14.	*SED3*	SED	Lower management	13/04/06
15.	*SED4*	SED	Lower management	21/03/06
16.	*SED5*	SED	Lower management	25/03/06
18.	*DEO1*	DEO	Lower management	27/02/06
17.	*DEO2*	DEO	Lower management	03/03/06
19.	*PMC1*	PMC	Managing director	03/03/06
20.	*PMC2*	PMC	Project manager	19/04/06
21.	*Contractor(P1)1*	Phase-1 contractor	Project manager	06/03/06
22.	*Contractor(P1)2*	Phase-1 contractor	Project manager	10/04/06
23.	*Contractor(P1)3*	Phase-1 contractor	Senior project manager	20/03/06
24.	*Contractor(P1)4*	Phase-1 contractor	Project manager	29/03/06
25.	*Contractor(P1)5*	Phase-1 contractor	CEO	06/03/06
26.	*Contractor(P2)1*	Phase-2 contractor	Company director	13/03/06
27.	*Contractor(P2)2*	Phase-2 contractor	Project manager	27/03/06
28.	*Contractor(P2)3*	Phase-2 contractor	Company general manager	27/03/06
29.	*Supplier1*	Supplier	Senior management	24/03/06
30.	*Supplier2*	Supplier	Project manager	24/03/06
31.	*User1*	School	School deputy principal	04/04/06
32.	*User2*	School	Headmaster	28/02/06
33.	*User3*	School	Computer teacher	28/03/06
34.	*User4*	School	Headmaster	28/02/06
35.	*User5*	School	Computer teacher	02/03/06
36.	*User6*	School	Teacher	01/03/06
37.	*User7*	School	Headmaster	22/03/06
38.	*User8*	School	School principal	04/03/06

6.3. PROJECT DEFINITION

The interviews captured information about the process of defining the project from various project stakeholders. The data not only described the perceptions and experiences of the stakeholders based on their project participation but also their understanding of the concept of project definition. Their first-hand opinion and comment based on their real experience were very informative input. In addition, there were secondary data sourced from various documents to support those interview data. In line with theoretical framework (Figure 4-4), the interviews drew on five project success factors which were earlier predetermined as the main themes. The five themes were: 1) participation of the stakeholders, 2) project goal and mission, 3) resources assessment, 4) project scope, and 5) risk management.

6.3.1. Project Stakeholders and Their Participation

The stakeholders' roles and interests in project have been discussed while reviewing literature in 2.6.1.1. The preceding chapter (see 5.3.1, 5.3.2, and 5.3.3) has also briefly mentioned about the stakeholders of this project. To include as many groups of main stakeholders as possible is very important so that the data can represent wider points of view. The data also verified the extent of involvement of each stakeholder in the project.

6.3.1.1. <u>The stakeholders' participation</u>

Based on their role in the project, the 38 interviewees can be categorised into 10 groups of stakeholders: 1) planner, 2) financier, 3) ministry-level owner, 4) state-level owner, 5) district-level owner, 6) supervisor, 7) phase-1 contractor, 8) phase-2 contractor, 9) supplier, and 10) user. The first three groups were the government agencies, which in the context of this research, known as the project commissioners. Group 3, 4 and 5 were a hierarchal level of the agencies of the MOE. The officers at ministry level oversee the whole spectrum of the programme. Under the ministry there were 15 state level departments, known as state education department (SED), which administer the projects in their own state. Under each state, there were district level offices, known as district education office (DEO), the lowest in the hierarchy. For contractors, phase-1 and phase-2 contractors were isolated into two different groups, as they did not share some common characteristics. Group 7 was for phase-1 contractor, while group 8 was for phase-2 contractor.

Before discussing the contribution of each stakeholder during the project definition, it is essential to verify his or her involvement in the project definition committee. Views and comments from those who have personal experiences in the committee are vital to get a clear picture of the process. All stakeholders were asked with a preamble question:

"Were you part of this project during the initial stage?"

For this question, respondents are only expected to answer "*yes*" or "*no*" to determine their involvement during the early stage of the project. Table 6-3 summarised the responds from all 38 interviewees about their involvement. It is apparent that only three out of 10 groups of stakeholders involved in the project definition process. They are from the groups of project planner, project financier and ministry-level project owner.

The results of the interviews shows that, out of those six interviewees, only one from project planner and one from project financier had personal experience in the committee that defined the project. For the project owner, only those at ministry level acknowledged the involvement of their agency in defining the project; three of them acknowledged their personal experience. All project owner respondents at the state level and district level denied their involvement in any committee that discussed the project definition. All respondents from supervising team, contractor, supplier and user groups also declared that neither they nor their agencies were part of project definition team.

Table 6-3: Involvement and perception of stakeholders during project definition

Respondent's code[10]	Agency	Acknowledge Involvement		Understand the concept	Acknowledge the importance
		Personal	Agency		
1. EPU1	EPU	x	x	x	x
2. EPU2	EPU	o	x	x	x
3. EPU3	EPU	o	x	x	x
4. Treasury1	Treasury	o	x	x	x
5. Treasury2	Treasury	o	x	x	x
6. Treasury3	Treasury	x	x	x	x
7. MOE1	MOE	x	x	x	x
8. MOE2	MOE	x	x	x	x
9. MOE3	MOE	o	x	x	x
10. MOE4	MOE	o	x	x	x
11. MOE5	MOE	x	x	x	x
12. SED1	SED	o	o	x	x
13. SED2	SED	o	o	x	x
14. SED3	SED	o	o	x	o
15. SED4	SED	o	o	o	x
16. SED5	SED	o	o	x	x
18. DEO1	DEO	o	o	o	x
17. DEO2	DEO	o	o	x	x
19. PMC1	PMC	o	o	x	x
20. PMC2	PMC	o	o	x	x
21. Contractor(P1)1	Phase-1 contractor	o	o	o	x
22. Contractor(P1)2	Phase-1 contractor	o	o	x	x
23. Contractor(P1)3	Phase-1 contractor	o	o	o	x
24. Contractor(P1)4	Phase-1 contractor	o	o	x	x
25. Contractor(P1)5	Phase-1 contractor	o	o	x	x
26. Contractor(P2)1	Phase-2 contractor	o	o	o	x
27. Contractor(P2)2	Phase-2 contractor	o	o	o	x
28. Contractor(P2)3	Phase-2 contractor	o	o	x	x
29. Supplier1	Supplier	o	o	x	x
30. Supplier2	Supplier	o	o	o	x
31. User1	School	o	o	o	x
32. User2	School	o	o	o	x
33. User3	School	o	o	o	x
34. User4	School	o	o	x	x
35. User5	School	o	o	o	x
36. User6	School	o	o	o	x
37. User7	School	o	o	o	x
38. User8	School	o	o	o	x

x – yes; o – no

[10] From this chapter and onwards, this respondent's code will be use while referring to those particular respondents.

However, respondents from planner have a different opinion about the other groups' participation. Besides their role as the project planner, the EPU, which this group belongs to, was also the secretariat for the decision-making committee during the project definition stage. This secretariat identified and invited the other stakeholders to participate in the coordination meeting. The *EPU1* who involved in SCLP since the early stage disclosed that:

> *"...The project was initially a privatisation project but later the government decided to change it to direct-negotioation. The projects were awarded to the same contractors who submitted the privatisation proposal... the project scope remain the same as decided by the privatisation committee... All phase-1 contractors were part of the project since the beginning as they involved in the privatisation negotiation...". (EPU1)*

That means, apart from those three stakeholders that acknowledged their participation (Table 6-3), there were also representatives from phase-1 contractors. As far as phase-1 is concerned, the contractors were also the supplier (see 1.2) for the reason that the supply components of the project were packaged together with construction components; both components were awarded to the same contractor. The above statement supported by the other respondent of project planner, *EPU3* who mentioned:

> *"...normally, the company that propose the privatisation project will be invited to defend their proposal. In the case of this project, all of the companies who got the project were those who submitted the proposal...". (EPU3)*

Besides the phase-1 contractors, the supervisor was also part of the committee. The *EPU1* revealed that:

> *"Even though the PMC was not part of the committee during the privatisation negotiation, they came in when the project implementation approach changed from privatisation to design-and-build". (EPU1)*

As for state-level owner, district level owner, and user, their status was as described by planner, i.e. indirect involvement, based on the hierarchy in the owner's organisation. The lower level in the hierarchy takes commands from the higher level. With regard to that hierarchy, the ministry-level owner's view should also reflect view of the state-level owner; the district level owner and the user, which were under MOE jurisdiction. There were also representatives from the others government agencies, including Attorney General's Chambers (AGC), and the Department of Director-General of Lands and Mines (DGLM). However, the contribution from those two agencies was not prominent as there was no major issue on legal or land matter arose during the project implementation. The planner also has the other point regarding the involvement of stakeholders:

> *"Not all stakeholders were invited but most of them were represented; actually it is the better approach because you can avoid unnecessary disagreements... for instance MOE's voice should represent SED and DEO... and schools...". (EPU3).*

Surprisingly, two of the ministry-level owner respondents revealed a very important point about this issue. According to them, as far as MOE is concern, project planning is not that simple. It seems peculiar, as in the normal practice the project implementer is not the one that planned it. The planning role played by the Educational Planning and Research Division (EPRD) while the implementation role done by the Development, Privatisation and Supply Division (DPSD).

> *"The project planning in this ministry is quite different from the other agency. Planning part is done by EPRD. Only after the EPU approval, the projects go DPSD... the EPRD was not invited by the EPU in the discussion... if I am not mistaken, only officers from CDC attended...". (MOE1).*

> *"Project planning is EPRD's job. We in DPSD only implement what they have decided. It might seem quite odd that these related jobs being done by two different parties but it is true for all other education projects... except for this one... their view is quite relevant, at least they know about the previous computer projects...". (MOE3).*

According to them, the presence of EPRD is importance, at least to synchronise this programme with the other existing school computerisation programme. Their claims were proved by the list of invitees, which showed that the EPRD was not represented in any of the project definition committee. The only other division of the MOE which was represented in the committee, apart from DPSD, was the Curriculum Development Centre (CDC).

Those who acknowledged their involvement in the project since the beginning were the important sources of information, and were further asked with probing questions related to the project definition process. For those who were not part of the project yet during the initial stage, their views and comments were still important in gaining wider perception about the project definition process.

6.3.1.2. <u>Contribution to the project definition</u>

Eleven respondents from those three groups who acknowledged their agency's involvement were further asked with follow-up questions *"How do you find the process of defining the project?"*. This question aimed to get their response about the process of project definition. Depending on their response, they were further asked two probing questions: *"How did the committee respond to your views during the project decision-making process?",* and *"What were the problems (if any) faced by your agency during the project definition process?".* These questions were essential to determine the stakeholders' contribution in the project decision-making process. Their inputs to the project, particularly during this stage were critical. Besides that, it is important to identify whether the committee members faced any problem in defining the project. Table 6-4 summarised the answers from each respondents.

Table 6-4: Stakeholders' opportunity to contribute input during project definition

Stakeholders	Input		
	Opportunity to contribute	Time to prepare	Inputs considered
EPU1	Yes	Not enough	Yes #
EPU2	Yes	Not enough	Yes #
EPU3*	Yes	Not enough	Yes #
Treasury1	Heard that it wan inefficient	Not enough	No
Treasury2	Not sure	Not enough	No
Treasury3*	Yes but insufficient	Not enough	No
MOE1*	Yes but insufficient	Not enough	No
MOE2*	Yes but insufficient	Not enough	No
MOE3*	Yes but insufficient	Not enough	No
MOE4*	Yes but insufficient	Not enough	No
MOE5*	Yes but insufficient	Not enough	No@

Legend:
* - involved in the project since initial stage
# – but have to follow some pre-set criteria
@ - except for input for laboratory size based on number of students

All of the respondents, including those of project planner, shared the same view about the time given to complete the process, which was too short and not enough to prepare inputs. About the opportunity to express their views, all of the respondents except for planner, believed that their presence in the meeting was just to fulfil the quorum while they had little opportunity to contribute and just had to accept the decisions. Even though the project planner was of the opinion that the main stakeholders were represented by their agencies and all of them had equal opportunity to air their views in the committee, one respondent from financier and five respondents from owner who personally involved in the project since earlier stage, did not share the same opinion.

> *"... We realised that we did not have enough time ... but all main stakeholders participated or at least represented in the committee, and all of them had opportunity to talk...". (EPU1)*

> *"I was there but for nothing... we even did not have time to prepare input prior to the important decision...". (Treasury3)*

> *"...Short time given is one thing. There were other important thing; our important inputs were not considered by the committee. For instance, I personally stressed to the meeting that modification of existing classroom to convert it into ICT lab is cheaper, the cost saving can be channelled for ICT equipment which is more important... the idea never been considered by the meeting". (MOE1)*

> *"...the meeting was one-sided... they just convey the decisions that have been made somewhere else..". (MOE3)*

> *"...we suggested that ICT equipment is more important and should be given more priority... all our ideas were rejected except for our suggestion for three ICT lab models based on school size". (MOE5)*

On top of that, respondents from financier as well as from owner raised the problem of their views were not considered by the committee. Two of the respondents from the owner, *MOE1* and *MOE5* stated that one of their important suggestions to the committee that was never been considered was the suggestion to concentrate more on ICT equipment rather than spending such a large amount of funding on the building component. They were of the opinion that this approach could be implemented by altering the existing classrooms to convert them into computer laboratories, but the committee had rejected the idea. However, respondents from the planner have a different opinion while discussing this issue:

> *"... I must admit that some of the decisions had been earlier decided... the decision to have separate building rather than modifying classroom was because the project was originally planned to be implemented through the privatisation approach...". (EPU1)*

Based on privatisation approach, the contractor would be responsible to manage the building, the furniture, and the equipment after project delivery. Separate building would be more practical for the contractor to manage it as part of a build-operate-transfer approach. This explanation supported by two documents:

- Privatisation proposals from seven companies between March 1996 and May 1999;

- Minutes of 'Project Definition Committee' meeting, dated 18 February 2000, chaired by the EPU's Director-General.

- Project Term of References (before revision to cater changes from privatisation to design-and-build)

The only input from MOE, which was accepted by the committee, as mentioned by *MOE5*, was the suggestion to have three models of laboratories depends on the number of students.

6.3.1.3. <u>Perception of the project definition</u>

During the interviews, all stakeholders were asked about their perception and understanding of the project definition. Depending on their answers to this question, the interview followed up with probing questions to gain further information. All respondents in the planner and the financier group managed to explain the concept of project definition well. All five respondents from *MOE* understand the concept well but surprisingly not all respondents from *SED* and *DEO* were able to explain the concept when asked about it. Both respondents from supervising team also manage to explain the concept. Three *Contractor(P1)2*, *Contractor(P1)*, *Contractor(P1)5, Contractor(P2)3* and *Supplier1* also explained it well. Among the users, only one out of 10 managed to understand the concept when asked for the first time. Everybody acknowledged project definition as one of the important steps towards the successful project, but many did not understand the concept. Summary of the users' perception contained in Table 6-3.

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6.3.2. Project Goal and Mission

All respondents of the project commissioners had mentioned, *"to provide the ICT facilities to schools"* as a project goals. However, only two respondents from planners, two respondents from financier, and two respondents from project owners acknowledged the need "*to stimulate the economic growth"* as the other goal of the project, when asked initially. Without intention to lead them in answering the question but to refresh their memory, the interviewee were asked the supplementary question of how they perceived the project from the economic point of view. All respondents from planner and financier, and three from owner were then able to recall both project goals (in that document, it was mentioned as 'project objective'): 1) *"to provide the ICT facilities to all government funded schools"*, and 2) "*to stimulate the economic growth"*.

When asked about the project mission, *EPU1*, *Treasury2*, and *MOE2* mentioned *"to prepare school children with ICT knowledge"* as the project mission. The other respondents from the project commissioner either could not differentiate it from the project goal or did not recognise it as a long-term objective at all. The mission of the project as stated in project TOR is *"to ensure that the Malaysian future generation are well equipped with ICT knowledge to face the borderless world"*.

Although the rest of respondents – supervising team, contractor, supplier, and user – denied any involvement in the project definition process (see 6.3.1.1), this question was still offered to them. However, none of them managed to explain or differentiated it clearly as stated in the TOR of the project when asked for the first time. After the supplementary question, *PMC2, Contractor(P1)1, Contractor(P1)5, Supplier2, User3* and *User8* managed to recall (might be guess) the answer.

6.3.3. Resource Assessment

Throughout the interview, all respondents had mentioned three items – human resource, financial resource, and material resource – as critically important that should be studied before the project implementation. Out of those three items, human resources was the most frequently mentioned (30 times), followed by material resources (25 times), and the financial resources (20 times) mentioned by project commissioners. Table 6-5 records the distribution of responses by various stakeholders of the project. The users were not listed in the table as none of them was involved in the project during the pre-delivery stage.

Despite acknowledge that resources assessment was very important and should be discussed in detail by the decision-making committee, none of the respondents who represented project commissioner, including those who personally attended the meeting, could confirm that this project success factor had been on the main agenda or specifically discussed in any of the project definition meetings. As put by three of the respondents:

> *"I can't recall... I think this issue has not been discussed...". (EPU1)*
>
> *"Since I was not I the meeting, I am not sure whether it has been discussed... may be because of time constrain...cost-benefit analysis is actually important before starting any project...". (Treasury2)*
>
> *"...knowing the fact that such a short time given, I don't think such thing was discussed...". (MOE4)*

When asked for their opinion in the follow-up question, those who were involved personally in the project definition committee assumed that a sufficient study or forecast was not undertaken by any agency due to short time given by the government before the programme started.

Table 6-5: Responses about resources assessment

Stakeholders	Resources		
	Human	Financial	Material
EPU1	√	√	√
EPU2	√	√	√
EPU3	√	√	√
Treasury1	√	√	√
Treasury2	√	√	√
Treasury3	√	√	x
MOE1	√	√	√
MOE2	√	x	√
MOE3	√	√	√
MOE4	√	√	√
MOE5	√	x	√
SED1	√	√	√
SED2	√	x	x
SED3	√	x	√
SED4	√	√	√
SED5	√	x	x
DEO1	√	x	√
DEO2	√	√	√
PMC1	√	x	√
PMC2	√	√	√
Contractor(P1)1	√	√	√
Contractor(P1)2	√	√	√
Contractor(P1)3	√	x	√
Contractor(P1)4	√	√	x
Contractor(P1)5	√	√	√
Contractor(P2)1	√	x	√
Contractor(P2)2	√	√	x
Contractor(P2)3	√	√	√
Supplier1	√	x	√
Supplier2	√	√	√

√ – mentioned by the respondent
0 - never been mentioned by the respondent

6.3.3.1. Human resources

For human resources, three areas were identified as problematic, i.e. the labourers, the PMC site workers, and the government officers in charge of the projects. One of the owner respondents was openly criticised the decision-making committee:

> *"...the lack of labourer was a result of poor assessment of human resources...they just wanted the work to start; once started, everything was ours...". (MOE1)*

Without enough labourers, supervision would not make any different. Project supervisor, the party who supervised the contractors and monitored the progress of the project, shared some views about the competition for labourers. According to him:

> *"...thousands of computer laboratories being implemented simultaneously... very high competition for labourers among the contractors... majority of the labourer were Indonesian workers. Some of them come in illegally… the project facing a lot of problem when their workers being detain by the authorities...". (PMC2)*

> *"...our construction industry depends too much on the foreign workers for labourers... local people demand too high salary… in 2001 some of the projects here were abandoned for few months after the immigration rush the sites ...". (SED1)*

The owner at state and district level who were close to the sites also described the same problem. The matter even worse in some places where the same contractors constructing numbers of projects and sharing the same labourers. The workers have to move from one project to the others to fulfil the needs.

> *"...they used the same workers for many projects... once a project reaches certain progress, they moved the workers to the other project and work there until it reach the same stage, and so on...". (SED2)*

> *"...competition for labourers was worst after the MOE launch the phase-2 projects,.. this new phase used the same workers... the worst thing was that some of the phase-2 contractors were the phase-1 sub-con…". (SED5)*

The user, who indirectly observed the project everyday as it is located in the school compound, gave a clear scenario about the labourers.

> *"Most of them were Indonesian workers. Sometimes they disappeared for a quite long time and come back. Sometimes new set of workers coming...". (User4)*

A similar problem was also faced by government agencies, especially the MOE, as there insufficient officers to look after thousands of projects simultaneously. According to *MOE1*, they faced difficulties during project implementation as a small number of officers handling a huge numbers of projects:

> *"We have only four permanent officers and a contract officer to handle the thousands of projects. At the same time, those officers also required to take care of the other projects..." (MOE1)*

Lacking of the project supervisor's personnel who monitoring job on site was the other problem related to human resources. The *SED* and *DEO* respondents stated that the problem was even worse after the launching of the second phase of the computer laboratory programme. They were of the opinion that:

> *"... the PMC tried to make as much profit as possible by using the same set of workers for hundreds of project...". (DEO2)*

> *"The same workers were used for both phases of the project... they don't even have any local office. How come they cater the contractors' requirement and come immediately when called...". (SED5)*

The situation was aggravated as most of the onsite workers of the supervising team were inexperience and could not solve some of the problem. Contractor is the party that most effected by lacking of supervisor's onsite personnel. One of the phase-2 contractors, who believed that he should get more supervision, concluded that:

> *"... They want to make profit as much as possible. Most of the onsite engineers are just graduated, so they pay them low; and of cause they had lack of experience; sometimes not sure what to do or even didn't solve the problem at all... most of their onsite workers including engineers and technicians were appointed under a contract basis; they can leave anytime...". (Contractor(P1)5)*

When this topic posed to the *PMC1*, this high-rank official of the project supervisor mentioned that the problem was related to the nature of the project, not because of the supervising team. For instance, the project started behind schedule; the supervisor have to absorb some loses as they needed to pay the workers even though there was no job yet at that point of time.

6.3.3.2. Financial resources

According to *EPU1*, initially, this programme was planned to be implemented through privatisation concept known as build-operate-transfer (BOT). After completion, the contractors remain with the project to manage and maintain it for a specified concession period. This statement was supported by the minute of various meetings and a series of letters related to the project. In return, the owner pays back the project cost, plus a profit, to the contractor until the end of concession period. Payment is normally staggered on a monthly basis, which helps the owner to reduce the short-term financial burden.

However, the government decision to change the approach of project implementation from privatisation to design-and-build, left the project with no specific financial resource allocated for, as projects in this programme were not part of a long-term plan, known as Malaysia Plan (locally known as Rancangan Malaysia). Respondents of planner, financier and owner that involved in the initial stage of the project emphasised about the changes during the interviews:

> *"In a privatisation projects, the contractors were the ones who worry about resource... After the government decided to convert the project from privatisation into design-and-build, it used the MOE allocation for 8th Malaysia Plan... it didn't affect the other project... the budget was reviewed during the mid-term... (EPU1)*
>
> *"... The change from privatisation to design-and-build is actually a good news; we faced lots of problems with privatisation projects... the only bad news was that there was allocation... fortunately, we can via allocation for other projects...". (MOE2)*
>
> *"...we told the committee that the project is not listed; there was no budget allocated for this project... we were asked not to question it anymore, the meeting was told that there will be enough money for it...". (Treasury3)*

According to *EPU1* and *EPU2*, the reason given for switching the method of awarding the project was that the government needed the project undertake quickly, as part of its package to generate economic growth. However, *Treasury1* and *Treasury2* disclosed at that particular time the private sector was facing cash flow problems due to a tight procedure imposed by commercial banks before approving the loans.

As for the contractors, all eight respondents who represent phase-1 and phase-2 contractors concerned about proper estimation and identifying the sources of fund prior to project implementation. All first phase contractors revealed that their financial resources for this project were from bank loans. Exploring the contractors' company profile which they submitted as an attachment to the original privatisation proposals reveals they had a paid-up of only between MYR 25,000 to MYR1,000,000; this amount is relatively small compared to value of the contracts that had been awarded to them, which was ranged from MYR71,941,500 to MYR141,880,000 (see Appendix 3).

Clause 37 of the contract document required contractors to submit a performance bond of five percent of the total project cost to the project director to prove that they were capable of undertaking the project. This bond would only be refunded to the respective contractor if the project director (the owner), with the advice of the project supervisor, satisfied that the contractors had completed all work obliged to them. The project director is allowed to spend this fund to rectify any incomplete work or defect if necessary.

However, the small-scale contractors who carried out the phase-2's job had a better deal as the government agreed to amend the contract condition. The contractors were entitled for an advance payment up to 30% of the contract sum within 14 days after the issuance of letter of acceptance. All *Contractors(P2)* respondents admitted that their problems in this project were not so much on the financial resources but more on the competition for labourers (human) and material resources.

6.3.3.3. Material resources

As in the case of human resource, the issues in the material resource, as highlighted by the respondents, also related to imbalance between supply and demand due to improper estimation.

Both respondents of supervisor, *PMC1* and *PMC2,* highlighted material resources as one of the major problem faced by projects in this programme. In some remote areas, the contractors experienced material shortage, especially steel, wood and cement. This problem also mentioned by all eight contractors and according to them, the problem became worse after launching of phase-2 projects. The problem was aggravated as:

> *"...some dealers increase the price in response to the higher demand in the market; this is because hundreds of project in the same area take off almost at the same time. Sometimes we got to go to the other town searching for the steel, wood and cement..." (Contractor(P2)3)*

Material price was also fluctuating based on economic situation, which affected some contractors, especially small-scale contractors of phase-2.

> *"Price fluctuation is especially true for the imported material but not affected the local product..." (EPU2)*

> *"Beside the dealers play with the price, we also faced with real price increase... the steel price, for example, went up drastically in2003; we suffer from that..." (Contractor(P1)5)*

As revealed by *PMC2*, the situation was worsen when some contractors exploited that situation to rationalise their action of using sub-standard material in building construction, especially those from sub-urban and remote area. Such dishonest usually ended up with a low quality building.

6.3.4. Project Scope

There were more than 9,000 public funded schools in Malaysia (see Table 3-5). Malaysian government aimed to furnish all those schools throughout the country with computer laboratory. The whole programme was divided into six zones based on geographical location (see 1.2). The implementation of this programme was phased; as of April 2006, during the data collection exercise, there were three phases namely phase-1, phase-2, and phase-3 with total number of 4,148 projects. These data were based on the SCLP's quarterly progress report provided by *MOE2* during the interview.

During the initial stage, there were 2,200 projects for phase-1 (minus 200 projects for Zone 6, see Appendix 3). However, due to various problems such as unsuitable sites and inadequate space in the school compound, eventually 268 of them were taken out. . The distribution of 1,932 phase-1 projects and 1,174 phase-2 projects is shown in Table 6-6. This research has excluded phase-3, as 1,042 projects in that phase had just started and no sufficient data were available during the data collection exercise.

Table 6-6: Distribution of SCLP projects by phases and zones

Zones	Phases	
	Phase-1	Phase2
Zone 1	486 projects awarded to Contractor A	373 projects awarded to 373 small-scale contractors
Zone 2	447 projects awarded to Contractor B	149 projects awarded to 149 small-scale contractors
Zone 3	467 projects awarded to Contractor C	120 projects awarded to 120 small-scale contractors
Zone 4	332 projects awarded to Contractor D	332 projects awarded to 332 small-scale contractors
Zone 5	200 projects awarded to Contractor E	*Not available yet during the data collection*
Zone 6	Not available; contractors withdrew due to some disagreement with the offer terms	200 projects awarded to 200 small-scale contractors

Note: the above data is as of April 2006; number of projects keeps increasing.

As mentioned in 3.4, this project comprises three main components. Table 6-7 provides brief descriptions of each component. In phase-1, all the three components were packaged in the same contract and awarded to the same contractor. However, in phase-2, the two supply components were isolated from construction component, and awarded to different contractor. The project scope, as described by *Financier*, *Owner* and *User*, was largely determined by the original privatisation proposal submitted by the contractors. They were of the opinion that, the projects should fulfil the needs of the users rather than the needs of contractors.

> *"...the concept had been change from privatisation but the design remains the same..." (Treasury3)*

> *"It was good that the method had been change... but design still sticks to those proposed by contractors. You can see, the design is too bad especially for Model 3 in phase-1… the finishes also too poor…" (MOE3)*

> *"…Those who plan this project failed to foresee the usage. For example, there are only ten PCs in model 1 laboratories. How do you use it?..." (User5)*

Table 6-7: Brief description of project components

Project component	Brief description
i) construction of building	build computer laboratory building based on specification as per given drawing according to specific model;
ii) supply of furniture	furnish the laboratory with furniture based on given specification and quantity in accordance with the respective models of the laboratory;
iii) supply of ICT equipment	furnish the laboratory with computer equipment based on a specific number and configuration in accordance with the respective models of the laboratory.

Extracted from phase-1 and phase-2 Contract Documents

From the work breakdown structure (WBS) in Appendix 4, it is apparent that building construction took the biggest portion among the three project components. It ranged from 52% in Model 3 to 60% in Model 1. This WBS was adopted from phase-1 contract document. WBS for phase-2 was similar to WBS for phase-1 even though supply components of the project were isolated from construction components and carried out by different contractors. The owner was of the opinion that a bigger portion should be spent for equipment:

> *"As I told you before, the most important thing is the computer and ICT equipment. That is what you are going to use in teaching and learning…" (MOE5)*

> *"It is no point to have huge building but the content is not enough to cater the student. We have to rotate; some classes have to wait for 1 month or more… the priority is for the exam classes…" (User4)*

To have a clear picture of the components of the project, the WBS structure as in Figure 6-1 is drawn using information in the WBS table (Appendix 4). Even though the building item in WBS table was divided into six sub-works, it was simplified in the WBS figure, whereby sub-structure, super-structure, and finishes were combined to make 'construction' item.

6.3.4.1. Laboratory Building

As mentioned in 3.4.1, there are three models of the computer laboratories, depending on number of students in particular school. Project TOR shows that Model 1 is the smallest laboratory building. Model 2 building is 5 meters longer than those of Model 1; while in Model 3, the laboratory is double the size of Model 2. Detail about each model is shown in Appendix 5.

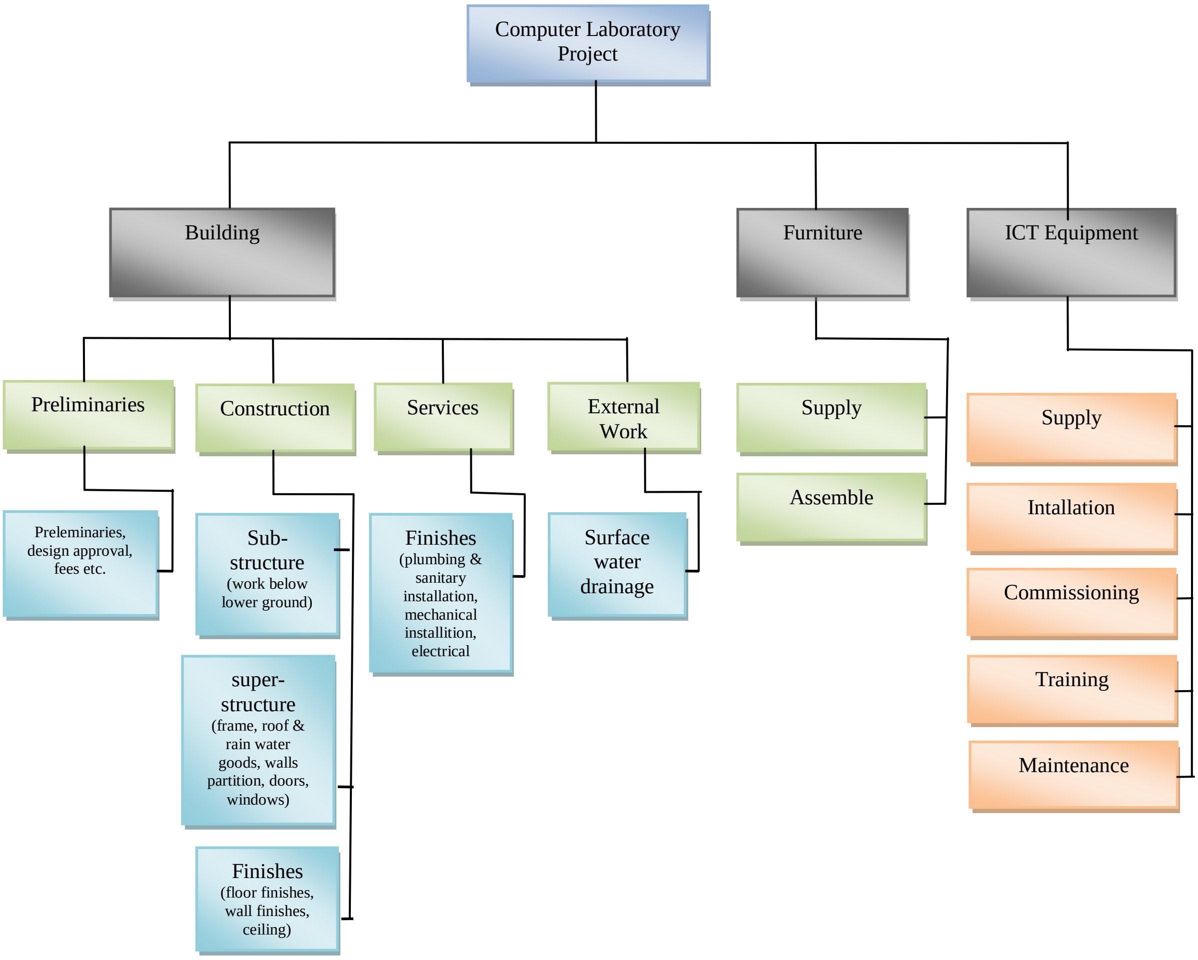

Figure 6-1: Work breakdown structure of the computer laboratory project

Project owner disclosed that there were few changes made in phase-2 after learning from phase-1. The major change made the decision-making committee was the change of Model 3 design from a long single storey building to a compact double-storey building to save space. The minor change was to upgrade the air-conditioner unit from 3.5 to 4.0 horsepower. Despite that, the owner still insists that the project should focus more on ICT equipment (see 6.3.4). According to *Owner5*, modifying the existing classroom would be adequate rather than building a separate building as computer laboratories. However, the planner has given a reasonable point of view about that:

> *"... Some schools do not have enough classrooms even to cater the current enrolment... Some other schools were too old and not suitable to be modified to place the IT component and cabling... Therefore, a separate building was the best option." (EPU1).*

> *"The reason for having a separate building is to make it possible for all laboratories to have 3-phase electricity wiring. The existing electricity supply for most of the old schools is 1-phase supply..." (EPU2)*

The idea was also supported by the financier respondent who was part of the project during the initial stage:

> *"...separate building is easier to maintain... base on initial privatisation proposal, the contractors will maintain the building along the concession period... it is easier to install 3-phase electricity wiring; most of the old schools only have 1-phase wiring..." (Treasury3)*

Contract document for both phases also stated that the electricity supply must be a 3-phase; it is necessary to cater the needs for ICT equipment for the laboratories. The supply and fixing the items is also under scope of work of construction contractor for both phase-1 and phase-2.

6.3.4.2. Furniture

Three owner's respondents, *MOE1*, *MOE2,* and *MOE4* revealed that furniture for phase-1 was totally adopted from proposal by zone-4 contractor. This furniture was selected by the project definition committee; the best among the six furniture proposals was adopted without any modification. Brief specification for furniture and numbers of every item for each laboratory can be referred in Appendix 7. All users interviewed complain about the bulky table in phase-1 laboratories.

After taken into consideration of views from the users, the decision-making committee changed the table design, from a bulky table in phase-1 to a rounded table in phase-2. According to *user3* and *user4*, one of the reasons for the change was to provide a comfortable space for the student to move around in the laboratory. As the computer laboratory is extensively use for the whole school period the durability feature of the furniture is also taken into account when designing table and selecting the chair.

6.3.4.3. Equipment

List of equipment indicated that the laboratories are equipped with the latest ICT equipment. The package included computer, colour printer, scanner, and digital camera. For the networking facility, all laboratories wee also equipped with a modem and server. The package also included training for teachers, to be provided by the ICT equipment's supplier. For security reasons, all laboratories were equipped with a security alarm. The list of ICT equipment and quantity for all three models of laboratory can be seen in Appendix 6(a) while detail specification is shown in Appendix 6(b). The internet connection was the Integrated Services Digital Network (ISDN) through a dial-up ISDN modem. Based on contract agreement, supplier is responsible to train the users upon the delivery of the equipment. The supplier also liable to do preventive maintenance at least once in every six month and corrective maintenance of all ICT equipment for the period of three years period from the date of delivery.

The only issue raised up by the owners and users (see 6.3.4) was the number of equipment. All five state-level owners, two district-level owners and all users emphasised that the number of PCs supplied was inadequate to cater the student population. In some schools, students have to wait for a month to get their turn in the rotation system. Compared with the phase-1, the phase-2 projects have some improvement in ICT equipment specifications (see Appendix 6(c)).

6.3.5. Project Risk

All the respondents admitted that this programme had a high level of risk given the number of projects involved and the fact that the projects were spread widely throughout the country. Even so, all of the respondents acknowledged that there was no risk analysis was undertaken for this programme. Again, the lack of time was given as the reason for not undertaking it. According to *Treasury2*, *MOE2* and *MOE4*, the project planner was supposed to be initiate any risk analysis, if it were thought necessary, and list it as one of the 'must do' factors in the project definition.

However, when asked whether risk analysis would have been done, if there were enough time, the planner's respondents admitted that:

> *"...might be not... that was true for almost all government projects... normally government projects are secured." (EPU2)*

The *Treasury1*, *Treasury2*, *MOE 1*, *MOE2* and *PMC2* shared the same view with the planner that risk analysis was not a normal practice in planning public sector projects. When asked for their opinion about the possible risks to the project, based on their experience from these projects, various answers have been obtained, as recorded in Table 6-8.

However, none of the interviewees, including from the EPU and the Treasury, included economic factors such as the recession as possible project risk. They were also asked to rate the 'probability' of occurrence and 'impact' to the project for each possible risk they gave. However, there was no consistency in rating for each particular risk even among the respondents from the same group. For instance, a respondent from a particular agency rate environmental effect as low probability, high impact, but the other respondent even from the same agency rate it otherwise.

Table 6-8: List of the possible project risks

Possible Risks	**Respondents**
Geographical difficulties	MOE1, MOE2, PMC2, Contractor(P2)5
Stakeholders interference	MOE1, MOE4, Contractor(P1)5, Contractor(P2)1
Environmental effects (rain, flood etc)	MOE2, PMC2, Contractor(P1)3, Contractor(P2)3
Under-strength of manpower	MOE3, PMC2, DEO1, Contractor(P2)4
Underground obstacle	MOE2, MOE4, SED3, PMC2, Contractor(P2)1
Competition (labourer, raw material)	PMC2, Contractor(P1)2, Contractor(P2)3
Commodity price increase	PMC2, Contractor(P2)3
Design fault	MOE2, MOE5, PMC2
Incompetence contractors	MOE2, MOE5, PMC2
Lack of cooperation from other authorities	PMC2, Contractor(P2)2, Contractor(P1)4

6.4. PROJECT PLANNING

The interviews focused on the six project success factors, which were predetermined earlier, as the main themes: 1) the distribution of authorities and responsibilities, 2) contractor selection, 3) project design, 4) project scheduling, 5) project costing, and 6) project documentation. Before going to the specific questions of those themes, the interviewees were asked preamble questions to establish project planning as the other stage of project process, distinguished it from the project definition. The preamble questions also aimed to verify whether the respondents were part of the project planning committee. The question was *"After setting a clear concept through the definition process, there was another stage, that is, project planning. How was this stage carried out prior to implementation?"*

As phase-2 has different set of committees from phase-1, there were differences in respondents' answers depending on the particular phase he or she was involved in.

Table 6-9 summarises the responses from each interviewee about those topics. Respondents from the supplier and user group were not listed in the table as all of them stated that they were not part of the project planning committee. In addition to those from three groups who involved in project definition, there were two more groups participated in the project planning.

Table 6-9: Involvement of stakeholders in project planning committee

Stakeholders	Agency's involvement		Personal involvement	
	Phase-1	Phase-2	Phase-1	Phase-2
1. EPU1	x	x	x	o
2. EPU2	x	x	o	o
3. EPU3	x	x	o	x
4. Treasury1	x	x	o	o
5. Treasury2	x	x	x	x
6. Treasury3	x	x	o	o
7. MOE1	x	x	o	o
8. MOE2	x	x	x	x
9. MOE3	x	x	o	o
10. MOE4	x	x	o	o
11. MOE5	x	x	x	x
12. SED1	x	x	o	x
13. SED2	o	x	o	x
14. SED3	o	x	o	x
15. SED4	o	x	o	x
16. SED5	o	x	o	x
17. DEO1	o	x	o	x
18. DEO2	o	o	o	o
19. DEO3	o	o	o	o
20. PMC1	x	x	x	x
21. PMC2	x	x	o	x
22. Contractor(P1)1	x	-	x	-
23. Contractor(P1)2	x	-	x	-
24. Contractor(P1)3	x	-	x	-
25. Contractor(P1)4	-	x	-	o
26. Contractor(P1)5	-	x	-	o

x – yes; o – no; - – not applicable

The new two groups were the project supervising team and phase-1 contractor. All three respondents from planner and three respondents from financier acknowledge the involvement of their agencies in the project planning, though only three respondents attended both phase-1 and phase-2 project planning committees. Phase-2 contractors disclosed that they were not part of the project definition committee.

6.4.1. Distribution of Authority and Responsibility

Although only five out of 10 groups of stakeholders acknowledged their involvement in the project planning committee, minutes of meeting dated 18/02/2000 disclosed that all those 10 groups were represented. Apart from that, there were three more groups: local authorities, statutory authorities, AGC and DGLM.

6.4.1.1. <u>Project stakeholders and their role</u>

All the interviewees were asked a preamble question: "*What is your agency's role in this project?*". Depending on their experience, the answers varied, from out of context to a very precise answer. Those who gave unclear answers in the first attempt were further asked with supplementary questions such as: *"in which area was your agency/company involved in this project?".* Despite variations in the answers, it can be concluded that all of them managed to recognise the group of stakeholders they belonged to and role.

In addition to data obtained through interviews, information about stakeholders' role in the project was also obtained from six types of documents: project TOR, agreements between government and contractors, agreement between government and PMC, agreements between government and suppliers, minutes of meetings, and official letters obtained from relevant agencies. Reference to those documents was also important to counter-check the answers given by the respondents. For instance, *PMC1* mentioned that the supervisor's role was only to monitor the project. Even after some probing questions, this high-rank official of the project supervising team denied that supervision role. However, contract document between the government and the PMC was clearly stated that supervision is one of the PMC's tasks. After studying through the data obtained through interviews and data from assorted secondary documents, the core business of each stakeholder in relation with this project were summarised in Table 6-10.

These people are key factors that influence the project success; each of them has their own role. Multiple stakeholders, each with different perceptive and priorities for the project, makes the project complex (de Wit 1986, Cleland 1986, Aaltonen et al. 2008). Different people might also give the different impact to the project as they have different assessment of the project success (Shenhar et al. 2002).

6.4.1.1.1 Project commissioner

As a public sector project, the government is the sole owner of SCLP. The government is also the financier. However, in the implementation, there were different government agencies playing those roles, particularly in making decisions about the project. The three-party government agencies that performed the key decision-making roles were the EPU, the Treasury, and the MOE, which in this research, are referred to as the project commissioner.

Table 6-10: Project stakeholders and their role

Stakeholders	**Agency**	**Role in the project**
1. Planner	EPU	• Processing and approving application from government agencies for a long-term plan (5 year) of government project. • Allocating government overall budget (five-year plan) after considering the application from ministries/agencies (subject to mid-term review).
2. Financier	Treasury	• Monitoring and controlling government funds by distributing the allocation within the overall budget allocated to certain ministries/ agencies. • Approving the allocations for respective project within the overall budget for the ministries.
3. Ministry-level Owner (also Administrator)	MOE (ministry level)	• Applying for the long term project and budget from the EPU • Applying the budget for the approved project prior to the starting of the project from Treasury. • Administrating the ongoing project throughout the country. • Managing and maintaining the product of the project throughout the country.
4. State-level Owner	SED (state level)	• Administrating the ongoing project within the particular state. • Managing and maintaining the product of the project within the particular state.
5. District-level Owner	DEO (district level)	• Administrating the project within the particular district. • Managing and maintaining the product of the project within the particular district.
6. Supervising team (Project Manager)	PMC	• Monitoring the project and advising the MOE about the implementation of the project • Supervising the contractors and enforcing the rules that have to be followed by the contractor.
7. Phase-1 contractor	Phase-1 contractor	• Carrying out construction and related works for the phase-1 project. • Supplying, and fixing furniture for phase-1 project. • Supplying, fixing, and commissioning the ICT equipment for phase-1 projects.
8. Phase-2 contractor	Phase-2 contractor	• Carrying out construction and related works for the phase-2 projects.
9. Supplier		• Supplying, and fixing furniture for phase-2 projects. • Supplying, fixing, and commissioning the ICT equipment for phase-2 projects. • *(Note: the role of supplier in phase-1 was fulfilled by respective contractor as both construction and supply components were package together)*
10. User	Schools	• Utilise the product of the projects.

The EPU is responsible for formulating the national economic policies (EPU 2007), while the Treasury formulates the national policies relating to finance (Treasury 2007). These two agencies also monitor and supervise the implementation of those policies under their jurisdiction. The EPU's functions are shown in Table 6-11, while Treasury's functions are summarised in Table 6-12.

Table 6-11: The EPU's functions

- Formulate policies and strategies for socio-economic development
- Prepare medium and long-term plans
- Prepare development programmes and project budget
- Monitor and evaluate the achievement of development programmes and projects
- Advise Government on economic issues
- Initiate and undertake necessary economic research
- Plan and coordinate the privatization programme and evaluate its achievement
- Coordinate Malaysia's involvement in the development of the Growth Triangle Initiatives
- Initiate and coordinate bilateral and multilateral assistance
- Manage the Malaysian Technical Cooperation Programme
- Monitor and evaluate investment activities to ensure they are in line with the corporate equity restructuring objective

Source: EPU (2007)

In consolidating projects, the EPU is the project planner. Through long-term or medium-term planning, the EPU will prepare the development programmes and formulate the project budget (EPU 2007). The agencies that will own the project, in this case the MOE are required to list down the projects under their agency. Even though the project owners prepare the project detail, the EPU hold the final say whether to proceed with it depending on the available finance.

Upon approval, the list of approved projects is forwarded to the owner, which will be acted as the implementing agency, while the Treasury is granted the amount of money budgeted for particular projects. The Treasury's role is to ensure effective and efficient distribution and management of financial resources (Treasury 2007). The purpose of the multiple agencies in distribution of power is to have a check-and-balance mechanism among those government agencies.

Table 6-12: The Treasury's functions

- To formulate and implement fiscal and monetary policies in order to ensure effective and efficient distribution and management of financial resources.
- To formulate financial management and accounting processes procedures and standards to be implemented by all Government.
- To manage the acquisition and disbursement of federal Government loans from domestic and external sources.
- To monitor that Minister of Finance Incorporated companies are managed effectively.
- To monitor the financial management of Ministries, Government Departments and statutory Bodies.
- To formulate and administer policies related to be the management of Government procurement.
- To formulate policies and administer Government housing loans for public sector employees.

Source: Treasury (2007)

6.4.1.1.2 Project Supervision Team

Normally, the supervising role for the public sector project is performed by a government agency, Public Work Department (PWD). However, due to a large volume of the SCLP, the government believed that the PWD would not have enough resources, especially on-site personnel, to oversee the whole spectrum of the programme throughout the country. To overcome the problem, the government had appointed project management consultant (PMC), a private company, to undertake the supervision job. The PMC's role is to monitor the progress of the project, supervise the contractors, provide a project progress reports and advices the project owner about the implementation of the projects, and to enforce the project terms and regulation on behalf of the government as stated in the agreement.

6.4.1.1.3 Contractors and Suppliers

As mentioned in1.2, there was a different arrangement of contractors in phase-1 and phase-2 of the programme. For phase-1 projects, there were five large-scale class-A contractors which were awarded to undertake large amount of projects. This group of contractors are entitled to be awarded unlimited value of contract (Treasury 2002) as shown in Table 6-13. The contractor selection was made through direct-negotiation with those contractors who had submitted proposal for the original privatisation project. All the three components of the project were packaged together and awarded in single contract to a particular contractor.

Table 6-13: Contract limit for civil contractor

Class	Contract limit in MYR (approximate value in GBP)
A	10,000,000 and above *(1,587,302 and above)*
B	5,000,001 to 10,000,000 *(793,651 to 1,587.302)*
C	2,000,001 to 5,000,000 *(317,460 to 793,651)*
D	500,001 to 2,000,000 *(79,365 to 317,460)*
E	200,001 to 500,000 *(31,746 to 79,365)*
F	up to 200,000 *(up to 31,746)*

Source: Treasury (2002)

In contrast, the phase-2 contractors were small-scale class-F contractors (see Table 6-13), which were awarded only a single project each. The contractor selection was made through direct award, and each of them was given three months to complete the construction. Their contract covered only the construction of laboratory building. The supply of furniture and computer equipment was awarded separately to the other parties. Even though each contractor was awarded only a single project for construction component, the phase-1 scenario of awarding large number of project to single contractors was repeated in phase-2. The whole supply of phase-2 furniture was awarded in a single contract; so was the whole supply of ICT equipment.

6.4.1.1.4 Users

In this context, the users were those who utilised the product of the project. They were teachers and students of primary and secondary schools. Their perception on the project success might different from other stakeholders, as their concern was more on the product of the project. To the user, the most important consideration about project is the benefit they get from the project output, regardless of how the project was implemented. Thus, the users' contribution in the project implementation could improve the chance for success (Dvir 2005).

6.4.1.2. Non-standard practice

In responding to the question *"How were authority and responsibility distributed among the parties involved in this project?",* there were mixed views among the project commissioners' respondents. None of the planner or financier respondent mentioned any unusual arrangement in the project; nor did the project supervisor and the contractor. However, in responding to the same question, the owner disclosed that there were some divergences from best practice during the implementation of the projects. *MOE2* argued about the issuance of LOA to the contractors during the pilot project. According to this interviewee, based on normal practice, the letter should be produced by the MOE as an implementing agency, not by the EPU. Checking through the project file, the said letters dated 23/02/2000 was found. The letters were sent to seven phase-1 contractors to inform that the government had agreed to appoint their company to implement the projects.

The second issue as highlighted by *MOE1* and *MOE4* was the Treasury's direction about the payment procedure. Based on proper normal procedure, as implemented during the initial stage, the PMC verifies the claim they received from the contractor; if the claim is proper, the PMC send it to the MOE for approval; finally, the MOE send the approved claim to the Accountant General's Department (AGD) for payment. However, in 2002, the Treasury issued a direction to expedite the process. In the new arrangement, the PMC would send the contractors' claim direct to AGD after verification, and omit the MOE. According to these respondents:

> *"... although this action was intended to accelerate the payment to the contractors, the MOE's Secretary General who is also the project director lost his control over the ministry's budget." (MOE1)*

The other respondent even more cynical:

> *"... like they are working for the contractors, not for the government..." (MOE4)*

The other issue, as highlighted by *MOE3* was the PMC's failure to play their role effectively in monitoring the projects and supervising the contractors. All the *contractors* during the interviews also complained about the supervisor in supervising the projects. According to them, the supervisor's on-site personnel were always late in responding to their call for project inspection and approval. One of the owner's respondents provided a sensible observation about the supervisor:

> *"We understand that there are thousands of site to oversee. They are good in some places but very bad in the other places...they should know what to do, not just waiting for instruction... especially for phase-2 contractors, guidance is crucial... it is not worth paying them lots of money but then they are not providing what we need..." (MOE2)*

The PMC denied that they were not effective; the *PMC1* during the interview mentioned that their role in this project was only to monitor the progress of the projects and report it to the government for further action. According to this respondent, the supervising role should be done by the contractors' consultants. As mentioned in 6.4.1.1, two relevant documents were referred to counter check. The first document, i.e. the contract between government and PMC showed they were not telling the truth. Para 1.3(v) in Second Schedule of the contract document stated that supervising the contractors is one of the PMC's obligations in the project management, besides monitoring the projects and advice the project owner about project progress. The second document, i.e. the TOR attached to the letter of offer to PMC dated 05/01/2001, also stated that one of their tasks is to conduct a periodical supervision.

6.4.2. Contractors Selection

It has been mentioned in 1.2 that there were two types of contractors, based on two kinds of contract award. In phase-1, the contractors consist of large-scale class-A contractors that were allowed to build project of unlimited contract value. In contrast, the phase-2 contractors were small-scale class-E and class-F contractors who were allowed to build only up to MYR500,000 and MYR200,000 projects respectively (refer to Table 6-13).

6.4.2.1. Phase-1 contractors

The *EPU1* stated that between March 1996 and May 1999, the planner received seven proposals from seven contractors, each of which proposed to build a computer laboratory for public school throughout the country through build-operate-transfer privatisation method. All of them proposed almost similar concept except for the specifications of the laboratories.

> *"Through this privatisation method, the contractor would build the laboratory building, supplying the ICT equipment together with furniture, and maintaining the laboratory for the specified concession years. In return, government pays the concession to the contractors along the concession period for an amount agreed by both parties." (EPU1)*

> *"...However, all the seven contractors proposed seven different proposals, which was difficult to be implemented without prior coordination. The purpose of coordination was to get a standard design, size, cost, and so on..." (EPU2)*

Through a letter dated 18 November 1999, the planner invited all the seven contractors to resubmit a technical proposal and financial proposal based on standard and a uniform format. All the seven contractors submitted their proposals to EPU by 31 December 1999 as stated in the letter. All of the contractors who submitted the revised proposals were invited by EPU to a meeting on 18 February 2000. As highlighted by *MOE1*, *MOE5* and *Treasury3,* most of the committee members thought that the meeting was for the contractors to defend their proposal. Instead, the meeting was the turning point, where the committee members were told by the chairperson that the programme is to be implemented using design-and-build approach, not privatisation. The reason for this change could not be found in the minutes of the meeting but based on interview with *EPU1*, *MOE1*, *MOE5* and *Treasury5* there were two main reasons: to get the programme started soon, and to generate economic growth after badly hit by 1997 economic crisis through public sector investment.

> *"... It was not possible to get the project started soon via privatisation. After a bad recession, the contractors who proposed the project could not manage to get financial resources..." (EPU1)*

All the seven contractors were offered to undertake the projects through direct-negotiation. None of the respondents seemed to agree that the project should be implemented through that approach. Based on the existing procedure as stated in Treasury's circular on direct-negotiation, title '*Garis Panduan Permohonan Perolehan*

Secara Rundingan Terus' (translation: *Guidelines for Direct Negotiation Application*) dated 17 April 2002 that has been circulated to all government agencies, direct-negotiation could be allowed only in five critical circumstances. One of those critical circumstances was 'the project is urgently needed'; and that was the only reason used to allow direct-negotiation with the phase-1 contractors. However, none of the respondents seems to be agreed that the urgency of this programme had met the extent to which it should be implemented through direct-negotiation.

The committee members were told that, as part of the selection process, each contractor should build three pilot projects of computer laboratories, which consists of Model 1, Model 2 and Model 3 (see Appendix 5). The MOE was required to prepare the list of 21 schools for the contractors to build the project. The letter of offer dated 23 February 2000 was sent to the contractors by the EPU stating that the pilot project must be completed within three months time, which is not later than 1 June 2000, while the project cost to build those three model was fixed at MYR750,000 (approximately GBP107,000). However, only six contractors were involved in the pilot project. The secretariat did not provide any reason to the committee members of why the seventh contractor was excluded from the project.

According to *EPU1*, *MOE1*, *MOE2* and *Treasury2,* upon completion of the pilot project, evaluation was made by the committee, whereby the supervisor played an important role to advice the rest of the committee members. At this point, the secretariat of the committee had moved from the EPU to the Treasury. In a letter dated 21 June 2000, the Treasury informed the MOE that Government had agreed to start the projects in three zones, i.e. Zone 1, Zone 2 and Zone 4 with 500 sites allocated for each zone. The best three companies, based on their performance in the pilot project –

Contractor A, Contractor B, Contractor D - were selected to be award the projects for Zone 1, Zone 2 and Zone 4 respectively. While in the letter dated 3 October 2000, the Treasury informed the MOE that the Government had agreed to award projects to the remaining three contractors. Contractor C was awarded 500 projects in Zone 3, while Contractor E and Contractor F were offered 200 projects each in Zone 5 and Zone 6 respectively. Contractor E and Contractor F have less number of projects due to less number of schools Zone 5 and Zone 6.

A search made at Companies Commission of Malaysia found that only Contractor B had both building construction and ICT equipment supply experience. Exploring through the contractors' company profile which they submit as an attachment to the privatisation proposal showed that their paid-up capital ranged from MYR25,000 to MYR1,000,000, which was relatively small compared to total value of the contract awarded to them, which ranged from MYR71,941,500 to MYR141,880,000.

6.4.2.2. Phase-2 contractors

As mentioned by *EPU1*, *Treasury2*, *MOE1* and *MOE2*, the government decided to change the approach by awarding the project on a small-scale basis in phase-2 after taken into consideration the fact that phase-1 projects experienced some difficulties. All the planner's respondents, *EPU1*, *EPU2* and *EPU3* mentioned that the EPU was not directly involved in this phase-2 projects. However, minute of the meeting dated 24 September 2001, indicated that the EPU was the member the committee.

The financier's respondents, *Treasury1*, *Treasury2*, and *Treasury3* also described their involvement as minor, i.e. only to approve the project cost and budget. However, further investigation suggested that the Treasury played a major role; proven by two documents, as follows:

- letter to MOE dated 21 September 2001stated that government has agreed to extent the computer laboratory project with phase-2;

- minute of the meeting dated 24 September 2001, showed that the Treasury was the secretariat of the meeting.

The 24 September 2001 meeting is a major turning point to the programme. The rest of the projects would not be awarded using phase-1 method anymore. Starting from phase-2, a new approach would be applied. This meeting outlined the characteristics of the phase-2 projects as follows:

- Contractors must be selected among the small-scale class-E and class-F contractors (see Table 6-13) through direct-negotiation;

- Only one project to be awarded to any single contractor;

- 2,000 site (projects) had been approved to be implemented;

- Project cost was fixed at MYR110,000 for Model 1, MYR120,000 for Model 2, and MYR210,000 for Model 3;

- The building size and scope remained the same as phase-1 (However, planning committee at MOE decided to change the Model 3 design from single-storey to double-storey building with the same floor area);

- Contract for IT and furniture components were separated from the construction contract and given to the other supplier;

- Contractors were allowed to claim an upfront payment of up to 30% of the project cost;

- The same PMC that monitored and supervised the phase-1 projects was appointed as the PMC for phase-2.

All project commissioner respondents acknowledged that contractors were selected through direct-negotiation approach. When asked a supplementary question about the rationale behind the utilisation of direct-negotiation instead of open tender, the most popular answer was "*to get the project started soon*". Only *MOE4* offered different version of answer: "*we have to follow the instruction*".

The owner's respondents, *MOE1*, *MOE2*, and *MOE4* acknowledged that the MOE took the lead in the contractor selection process, based on instruction from the Treasury through letter dated 21 September 2001. *MOE1* and *MOE4* who directly involved in the selection process mentioned that they were working using the lists of contractors from two sources, i.e. list of contractors provided by SEDs and list of contractors from 'political sources'. They admitted that apart from SEDs' advice, the evaluation was made solely based on information stated in CSC certificate and CIDB certificate. There was no other way of evaluating the contactors. As long as the contractors provide valid CSC certificate and CIDB certificate, they were entitled to be selected. The only restriction was that the projects in particular region must be awarded to the contractors from the same region.

All the five *SED* respondents admitted that in order to provide the list immediately, as requested by the ministry, they had no choice but to include the contractors that they knew rather than those with good performance. They also claimed that many contractors turned down the offer, as they were already committed as a sub-contractor for the phase-1 projects. The feedback from 'political office' about the same issue could not be found as those who involved had left the office and their whereabouts could not be traced.

6.4.2.3. Supplier

The supply component consisted of two categories of items, that is, furniture (Appendix 7) and ICT equipment (Appendix 6). Phase-1 contract documents between the government and the contractors showed that the supply components of that phase were packaged together with the construction component. That means the main contractors were responsible to supply the furniture and ICT equipment after the completion of the building construction.

There was a different scenario in phase-2 projects; the supply of furniture and ICT equipment were split out from the construction contract and awarded to the other contractor. The purpose of that separation was to reduce the burden to the small-scale contractors. There were two separate contracts for supply components: one contract for furniture and another contract for ICT equipment.

Treasury2 and *MOE2* revealed that the government had imposed the condition that the main item of ICT equipment, i.e. the PC must be a 'made in Malaysia' product. There was only one supplier that fulfilled the criteria, forced the contract to be offered to them through direct-negotiation. The problem arose when the company was unable to produce enough PC to meet the demand; caused delay to numbers of the phase-2 projects.

> *" ...lack of PCs supply resulted in some project could not be handed over to the user even though the construction component had been completed." (PMC2)*

The *MOE1*, *MOE2*, *MOE3*, *MOE4* and *PMC2* blamed the supplier for the delay. *User3* and *user7* confirm that in the case of their school, the supply of ICT equipment was made long after the building completion. However, supplier denied that production of ICT equipment was the source of the delay problem.

> *"Our company produced 150 PCs per day, which includes the production of laptops and servers. With that rate, we were capable to produce 12,500 units per month." (Supplier1)*

> The matter seemed more complicated, as the supplier blamed the other party:

> *"Based on our experiences, the main problem of the delay supply was lack of coordination by the PMC. The PMC also provided us with inaccurate information. There were cases where the PMC reserved a large number of PCs to be supplied on certain date but when time came the schools had not completed yet... In the other cases, the PMC gave us a very short notice; make us seen incapable to fulfil the requirement on time. It is not fair to judge us just like that; we have some other commitment to supply the same item to the other parties..." (Supplier2)*

Even though there were separate contracts for the ICT equipment and furniture, both were actually awarded to the same company. The reason was to make sure that supply of both components synchronised. However, feedback from the *MOE2*, *MOE3*, *MOE4* and *PMC2* revealed that the main supplier had sub-contracted the furniture supply to another party as they did not have any expertise in that job. According to these respondents, the problem arose when that furniture supplier found to be a non-performer.

6.4.3. Project Design

The computer laboratory programme adopted the design-and-build concept, whereby the projects were built by the same party who designed it. Designs for the first phase of the programme were submitted by the six contractors (see 6.4.2.1) prior to pilot project. However, as revealed by *EPU1*and *MOE5*, after the completion of pilot projects, only one design was selected so that all laboratories in phase-1 would have the same design.

According to *PMC2*, the purpose of having the standard design is to make it easier to maintain. The best designs for all three models in the pilot project, from the committee's point of view, are those submitted by Contractor A.

> *"The selection was made by the committee after evaluating the pilot projects... after holding a ballot by the committee members, the one proposed by [Contractor A] was selected as the best design to be used..." (EPU1)*

> *"Only one design was selected... all laboratories in phase-1 have the same design... the design was fixed... however the contractors were allowed to add some minor features to the building, for example they were allowed to decorate the building... each zone has their own colour scheme for the lab.." (MOE5)*

> *"The reason for having only one design is to make it easier to maintain... however, the contractors are free to make some minor decoration to the building enterior; that's why in phase-1 you see different lab colour for different zones." (PMC2)*

The project brief for all three models of computer laboratories is shown in Appendix 5. As discussed in 6.3.4, there are three models of computer laboratories. With a size of 50 x 30 square feet, Model 1 is the smallest among the three models of laboratory building. There were three compartments: computer laboratory, a supervisor room, and a server room. Model 2 is five feet longer than Model 1. Like Model 1, this model also had three compartments. The biggest building is Model 3; with the floor area of 110 x 30 square feet, this model is doubled Model 2 size. It consists of two laboratories, a server room, and a supervisor room. Feature for all three models are shown in Plate 6-1.

Model 1

Model 2

Model 3 (phase-1)

Model 3 (phase-2)

Plate 6-1: Comparison between the models of computer laboratory building

Selection for the best furniture design was made the same way as building design, i.e. through ballot. *UPE1* and *PMC2* disclosed that the one proposed by Contractor D had been chosen as the most suitable design to be used for the phase-1 projects. Brief specification for furniture is recorded in Appendix 7, while the feature of student table and chair are shown in Plate 6-2.

phase-1 table

phase-2 table

Plate 6-2: Comparison between phase-1 and phase-2 table designs

In the phase-2, some modification had been made to the building design after taking into consideration the supervisor's advice. The major changes for the phase-2 compared to phase-1 as mentioned by *MOE1*, *MOE2* and *PMC2* were in the Model 3 building design and the student table design. Even though the floor area remains the same as phase-1, the design of the Model 3 was changed from a long single-storey building to a compact double-storey building (see Plate 6-1). The rationale behind this major change is:

> *"We faced with the problem of limited school compound, especially in the town area. This new design could save half of the land area in the school compound." (MOE2)*

The second change was in the material of roof trusses. Timber-frame panel was used in phase-1 but according to *PMC1* and *PMC2*, it was changed to steel-frame in phase-2 due to two reasons. The first reason was to save cost, as the price of grade-A timber was higher than steel price. The second reason was for the purpose monitoring; they claimed that in phase-1, some contractors tried to cut corners by using grade-B timber even though contract agreement clearly stated that roof trusses material must be of grade-A timber.

The other change made to the building was the windows size and position. After getting some feedback from the phase-1 users, that window's size and position found to be not suitable because.

> *"All windows in phase-1 building are too small and too high; it prevents enough light to enter the laboratory room. The window's height is not practical; even tallest teachers could view the surrounding from the windows." (MOE2)*

> *" In phase-2 the windows size were enlarged and the position were lowered down. It is not only looked more practical but also allowing more light so that saving the electricity." (PMC2)*

Contractor(P1)1 whose company proposed the design mentioned that security was the main reason behind that. To overcome the security problem, each phase-2 laboratory is equipped with security alarm system.

Some modifications also applied to phase-2 furniture. Major changes made to the long and bulky student table of phase-1. *PMC2* disclosed that the design was not adopted in phase-2 because it consumes lots of space. According to *PMC2,* all the phase-2 laboratories were supplied with round student tables (see Plate 6-2).

6.4.4. Project Scheduling

The LOA sent to phase-1 contractors prior to the starting of the project clearly stated that the projects must be completed within six months. In phase-2, as construction component is separated out from supply component, each contractor was given only three months to complete the construction job. Despite acknowledging the need for the facilities was critical, none of the respondents seemed to agree with the project time-frame:

> *"I have no idea of how they scheduled the project. It is so impractical…" (SED4)*

> *"Phase-1 contractors have 500 projects to be completed; in [Zone 5] where logistically is so difficult, they have 200 sites. How come they managed to do it within six month? I don't know why the contractors accepted it, in the first place…" (SED5)*

> *"Three month is so rigid. At the same time they asked for quality building. Can you just imagine how to build double-storey building within three month including ground work without scarify the quality?" (Contractor(P2)2)*

Even those respondents who involved in the project since initial stage admitted the peculiarity in scheduling the project completion time. When asked about the method used to calculate the schedule and the inconsistency of the scheduling between the two phases of the programme, all of them agreed that it was a wrong decision but none of them could give a firm answer.

> *"No formula at all… it based on PMC's advice… none of the contractors objected, so it considered practical… only after implementation, we realised that a wrong decision has been made…" (EPU1)*

> *"I must admit that I was part of the committee but I couldn't recall how the decision was made.. it was really a bad decision…" (Treasury3)*

> *"I don't know how to respond… put it like this: not all the decisions purely made by the committee members; some of the decisions were made somewhere else by somebody else…we have a PMC to advice but they didn't do their job…" (MOE1)*

Most of them suggested that the more reasonable time of 18 to 24 months. For phase-2 projects, they were of the opinion that the reasonable time for such a project is six to nine months, with the consideration of the capability of the small-scale contractors. Despite claim from the planner and the owner that the supervisor was not advising the committee properly in determining the project time, *PMC1* defended their stance and put the responsibility to contractors:

> *"We were told that the government wanted the project to be ready soonest possible. We suggest the reasonable time… The contractors should take the blame for accepting the offer without any objection… The contractors should have argued with the committee if they found that the time given was insufficient to complete the whole project." (PMC1)*

When the same question asked to the contractors, even though all the phase-1 contractors acknowledged that they were invited to the meeting during which the decision was made, they have some reservations. They admitted that their representative were in the meeting and realised that the time given was too short for them to complete the whole projects but:

> *"Nobody dare to object the committee's decision because they afraid of losing the project. We accept it and take it as challenge…" (Contractor(P1)1)*

> *"If we refuse to agree, the project would be offered to somebody else…" (Contractor(P1)3)*

> *"We have no choice. We have only two options: take it or leave it.." (Contractor(P1)5)*

Besides the above reasons, which according to them had affected their reputation badly, the contractors also put the competition among them for construction materials and labourers (has been discussed earlier in 6.3.3) as the main cause of project delay.

6.4.5. Project Costing

The government has decided to implement these projects at fixed cost bases on the model of the computer laboratory. Studying the project documents, including contract, revealed that there was no element of project variation order allowed. As mentioned by *EPU2*, the PMC was the party who advised the committee about the project cost. After considering the difficult situation in Zone 5 and Zone 6, the committee had increased the project cost by 35% for those zones. All respondents from *planner, financier, owner* and *supervisor* were of the opinion that the project was reasonable and profitable. However, contractors have different opinion about the project costing:

> *"... I don't say that we didn't make profit but the cost is very tight. Fortunately we have few easy sites to cross-subsidise those difficult ones." (Contractor(P1)3)*

> *"...frankly, with the material price increased and so forth, we hardly make profit." (Contractor(P2)1)*

One of the reasons of contractors not making enough profit was sub-contracting. There were cases where this unhealthy exercise repeated to five or six tiers; in this case, the last tiers will suffer the possible non-profitable project with the profit being taken by the contractors which were higher in the chain. The worst cases as revealed by supervisor were that some contractors 'sold' the projects on to third parties. The lowest tier who really constructed the project tried to make better margin by 'cutting corners' and this end up with the low quality product. This practice had also happened in phase-2 projects.

> *"Since phase-2 contractors were awarded only one project each, it would be difficult for them to make profit if they sub-contract the project." (PMC2)*

The contractors were paid based on cost per unit for each project, ranging from MYR165,000 (GBP26,191) for Model 1 to MYR400,000 (GBP63,492) for model 3, which has been discussed earlier in 6.4.4. Cost breakdown of each project component for all three models of computer laboratory is recorded in Appendix 5, which also shows the 35% increment for Zone 5 and Zone 6. In the case of phase-2, the construction contractor only applied to the building construction component; any element of sub-contracting would affect the profit.

6.4.6. Project Documentation

As mentioned in 5.2.1, during the data collection, I was allowed to access official document at the MOE, where most of the project documentations were placed. Good cooperation also received from the other agencies: the EPU, the Treasury, and the PMC. From the observation, all the project official documents including TOR, LoI, LoA, bank guarantees, performance bonds, and insurance policies were well maintained with organized filing system. The only exception was the contract documents.

In the phase-1 projects, there was a complete set of contract documents for all five contractors. Since all the three components of project were packaged together, there was no separate contract document for furniture and ICT equipment. As in other government projects, contract document followed the standard format, inclusive of all required appendices. However, these important documents were signed long after the project start-up. Record showed that Contractor B, contractor D and contractor E signed the agreement three months after the project start date, while Contractor A and Contractor C signed the agreement more than a year after the project start.

> *"...[Contractor A] is the last to sign the phase-1 contract because of some disagreements in some of the contract terms. One of the issues that took so long to be resolved was the issue of supply of chairs." (Owner3)*

> *"[Contractor A] disagreed with the decision made by the committee about chair design... The issue was only resolved 12 months later after the matter was referred back to the committee and their appeal to use chair, with a slightly different design, was agreed by the committee." (Owner4)*

> *"It was not that we don't want to sign the contract; not that we disagreed with the decision made by the committee. What we asked for was to use our own product. We are producing chair with the same function. Even the feature looks similar. Only brand name is different... but they kept delaying, they don't want to entertain our appeal..." (Contractor A)*

Delay in finalising the item's specification and design resulted in contract could not be finalised, as it is part of the contract. Even though in the LoA it is stated, "*Until the formal contract is signed, this Letter of Acceptance would be the legal contract to bind your company and the government*", it is not an excuse to delay the preparation of the contract document.

In phase-1 projects, contract documents were prepared by the contractors and verified by the supervisor but in phase-1, contracts were prepared and managed by the project supervisor for the reason of lacking of experience among the small-scale contractors. As mentioned in 6.3.4, there were 1,174 contractors in the phase-2 of the programme. Since each contractor was awarded one project, there were 1,174 contracts. For each contract, there are three contract documents; hence there are 3,522 contract documents for phase-2 of the programme. Table 6-14 showed comparison between phase-1 and phase-2 for numbers of contracts.

Table 6-14: Number of projects and contracts in phase-1 and phase-2

	Phase-1	**Phase-2**
No. of projects	1,932	1,174
No. of zones	$5^{\#}$	$5^{@}$
No. of contractors	5	1,174
• Construction	5 (all component were incorporated in a single contract)	1,174
• Furniture		1
• ICT equipment		1
• PMC	1	1
No. of contract agreement	5	1,174
• Construction	5 (all component were incorporated in a single contract)	1,174
• Furniture		1
• ICT equipment		1
• PMC	1	1

$^{\#}$Excluded Zone 6, $^{@}$Excluded Zone 5

Number of contract documents is tripled number of contract, as there three documents for each contract

As of the data collection time, there were 118 contracts still not signed, as their whereabouts could not be traced. Based on the schedule, projects carried out by those contractors were supposed to be completed. The contractors would face the problem of claiming their final payment as it needed the agreement. Since the number of document is so big, the supervisor faced with some difficulties in arranging the contractors to sign the contracts:

> *"We call them to our regional office to sign. Only few of them showed up... it is difficult to transport such a big volume of document to find each of them individually to sign it." (PMC2)*

The signing of contracts between government and ICT equipment supplier and furniture supplier were also delayed. Some disagreement between parties involved during the direct-negotiation to fix the contract terms and conditions was the reason for delay in signing ICT equipment contract.

> *"...the disagreement was in the interpretation of some items in computer specification… it was quite odd; while PMC tried to protect government interest by asking the supplier to give a good specification, [one the owner representative] siding the supplier…" (PMC2).*

While the delay in signing furniture contract was due to disagreement in determining the furniture cost.

> *"We were not delaying; we were protecting government interest. The supplier asked for an unreasonable price for the furniture, especially table… unfortunately, we alone in this... " (PMC1)*

> *"They asked for a very high cost... Based on PMC evaluation, the price should be much lower than what the supplier asked for." (MOE4)*

There was also a delay in signing of the contract between the PMC and the Government. The PMC agreements were prepared by Technical Unit, Development and Procurement division, MOE, who took long time to prepare the terms of agreement for two reasons:

> *"... Firstly, the officer who prepared the terms of the contract was too busy, secondly, there was lack of communication between the PMC and those officers..." (MOE2)*

> *"... The PMC did not provide information requested by the officer who prepared the contract…" (MOE4).*

As a consequence, both phase-1 and phase-2 contracts for project supervisor's were signed in December 2004, four years after the starting of phase-1 projects and 2 years after the starting of phase-2 projects.

6.5. PROJECT EXECUTION

For project execution, the longest stage in the project life-span, six project success factors were identified as main themes to be examined. The studied factors are: 1) administrators effectiveness, 2) supervising team efficiency, 3) contractors' competence, 4) communication and feedback, 5) integrity among the parties involved, and 6) project documentation.

6.5.1. Project Administrators Effectiveness

The main problem faced by project administrator[11] during the implementation of this project was the staff shortage. There was limited number of personnel to manage a large number of projects throughout the country. As stipulated in the contract agreement, the MOE's Secretary-General is the project director. However, in the actual business, the Privatisation Unit[12] administered this SCLP. The main activity of this unit is to manage the MOE's privatisation projects.

> *"By its nature, the computer laboratory project was not part of Privatisation Unit's business. However since this project was initially a privatisation project, the responsibility was allocated to that unit; and it remained there even after the project implementation has been changed to government-funded method." (MOE1)*

[11] The term project administrator was used interchangeably with project owner as both roles performed by the same group of people in MOE. Role of project administrator, especially applied during the project execution stage.

[12] This unit is one of the seven units under Division of Development, Privatisation and Supply, MOE. However, after the restructuring which has been approved by the Public Service Department in 2004, the name of the division has been changed to Development and Procurement Division, while Privatisation Unit has no more exist, and function has been distributed to the respective unit based on category of the project.

Studying the organisation structure of the MOE showed that the Privatisation Unit was headed by a principal assistant secretary (Grade-48 officer) and assisted by two assistant secretaries (Grade-41 officer), one assistant administrative officer (Grade-32), one clerk (Grade-17), and one typist (Grade-11). This number of staffs is comparatively small to cater the workload managed by the unit countrywide.

> *"Apart from computer laboratory projects, we were managing the other privatisation projects… there are more than 3,000 computer laboratory projects spread throughout the country." (MOE5)*

Moreover, studying through their list of duties suggested that the officers were also doing some administrative tasks as part of their works. Such a heavy workload created an under-strength situation.

> *"Recruitment of new officers is another complicated issue; involving another agency... appointment of new officer is under jurisdiction of PSC. The newly-appointed officers were then distributed to all ministries by the other agency, PSD, based on requirement…" (MOE1)*

> *"The MOE attempted to resolve the problem by recruiting four temporary officers with hourly-based salary… but there was not much not improvement… those officers left the job once they received a better offer and training the new officers who replaced them would have taken a long time." (MOE5)*

This situation forced the MOE to rely very much on the project supervisor especially for the on-site task. However, the supervisor had a very limited number of personnel and most of them were inexperienced personnel. As a consequence much of the job that they supposed to do were left unattended.

> *"We have to do most of the job that supposed to be done by the PMC… delegation of job to SED officers also not possible because they also faced with the under-strength problem…" (MOE2)*

Besides administering the progress of the projects, the project administrator has some powers in the project, as stipulated in the contract agreement. For instance, in the case of a non-performing contractor, the termination power was held by the project director. Normally, the action will be taken with the advice from project administrator; the termination is carried after the endorsement from the project steering committee chaired by project director. Minutes of project steering committee meetings indicated that the project administrator was the secretariat of steering committee. The other role of project administrator, as apparently stated in the contract, is to endorse the progress payment to the contractors after the supervisor verification.

6.5.2. Project Supervising Team Efficiency

As has been mentioned earlier in 6.4.1.1.2, the role of supervising for the public sector project is normally performed by a government agency, PWD. However, in the case of this project, the government believed that the PWD would not have sufficient resources to oversee the whole spectrum of such a large volume of the programme. As in the case of project administrator (see 6.5.1), the PWD also faced the same constraints in recruiting additional staff. In the government agencies, recruiting staff to look after a specific project through one-off approach is not a norm. To overcome this complex situation, the government had employed the PMC to supervise this programme. The LOA to the PMC was issued by the MOE after receiving a direction from the Treasury through a letter dated 21/04/2000. The PMC as the project supervisor were expected to perform the job at least at par with PWD, if not better, but:

> *"...quite unfortunate, the PMC was not doing their job as expected..." (EPU1)*
>
> *"I must recognise the hard work by those personnel in their head office... but they make a very bad mistake when they don't have capable site staffs..." (MOE3)*
>
> *"The PMC performance is very poor; they don't have enough staff; they don't have enough facilities... you give us the amount of money that have been given to PMC, we can do it much better than them." (SED3)*

> *"They are not only non-performer but also make unnecessary mistake… sometimes they not sure what they are doing…" (Contractors(P1)3*

> *"Their bottom line is money… You won't believe me if I tell you that they supposed to advice us on the project matters but sometimes we advised them…" Contractor(P2)2*

> *"Among the worst decision made by the decision-makers was to reappoint the same PMC to monitor the phase-2 projects despite their bad performance in phase-1… they are not only lacked in experience but also don't have sufficient resources to manage the project… yet they were awarded with such a big volume of phase-1 and phase-2 to handle." (MOE2)*

As claimed by various parties (discussed in 6.3.3.1), the supervising team had employed a very limited number of staff in order to maximise their profit. The personnel that were initially appointed to manage phase-1 projects were also utilised to manage phase-2 projects. All site staffs were appointed on a contract basis; some of them left the company halfway through the project and left the project unattended.

All of the contractors complained about the difficulties in contacting the PMC especially when they were needed to endorse the progress of the construction before going to the next stage. All respondents from state-level owner highlighted that the supervisor assigned the same staff to look after both phase-1 and phase-2 projects. The matter was even worse:

> *"…most of the personnel who were assigned to monitor and approve the progress of the project have lack of experience and basic knowledge about the construction." (Contractor(P1)4)*

Even though *PMC1* superciliously pronounced during the interview that he did not see anything wrong in their service, the *PMC2* is more rational, as he admitted that their service was not up to the standard as expected by the client.

> *"I must admit that we don't have enough facilities as compared to PWD… The company should have more regional office throughout the country… The recruitment of those on-site staff was a project-base assignment; they are not permanent staff. Because the project started late, most of our human staff were not being used…" (PMC2)*

Despite a very high salary paid by the government to the top ranked personnel, as stated in the agreement between government and the PMC document, their performance was not up to a satisfactory standard. PWD as a comparison has a much better facilities and proper setting, up to district level. The advantage of having PWD as the project supervisor is that there was no worry about making company profit because they are government officers who have permanent monthly salary.

They are not even strong financially, as the CCM record, based on financial year ended on 31/10/2004, showed that this company only have MYR100,103 (GBP15,889) paid-up capital. Record also showed that they have MYR4,290,853 (GBP681,088) current asset and MYR4,478,573 (GBP710,885) current liability. This figure suggested that, as a company, the supervisor is not sufficiently capable to be offered a project management contract of MYR9,828,469[13] (GBP1,560,074).

The CCM record also showed that this company is a private limited company, and their nature of business is 'project management'. The first company registration was in May 1998. After June 1999, the company name was changed, but the nature of business remained the same. That means, they have only two and a half years from the date of the first registration to the date of the starting of the programme. For such a big amount of projects, spread all over the country, relatively this company have lack of experience. To make the matter worse, this company were also offered the monitoring job for phase-2 of the programme.

[13] Base on cash flow projection for this project, obtained from the MOE.

6.5.3. Contractors' Competence

As mentioned in 6.4.2, there were two types of contractors: large-scale contractors who performed the phase-1 projects and small-scale contractor who carried out phase-2 projects. There were lots of differences between both groups; not only in their company set-up but also in the way the projects were awarded to them. Figure 6-2 illustrates the differences between the two contract settings. To make the matter worse, in phase-2 the supply components were separated from construction component and the whole lots were awarded to a single company.

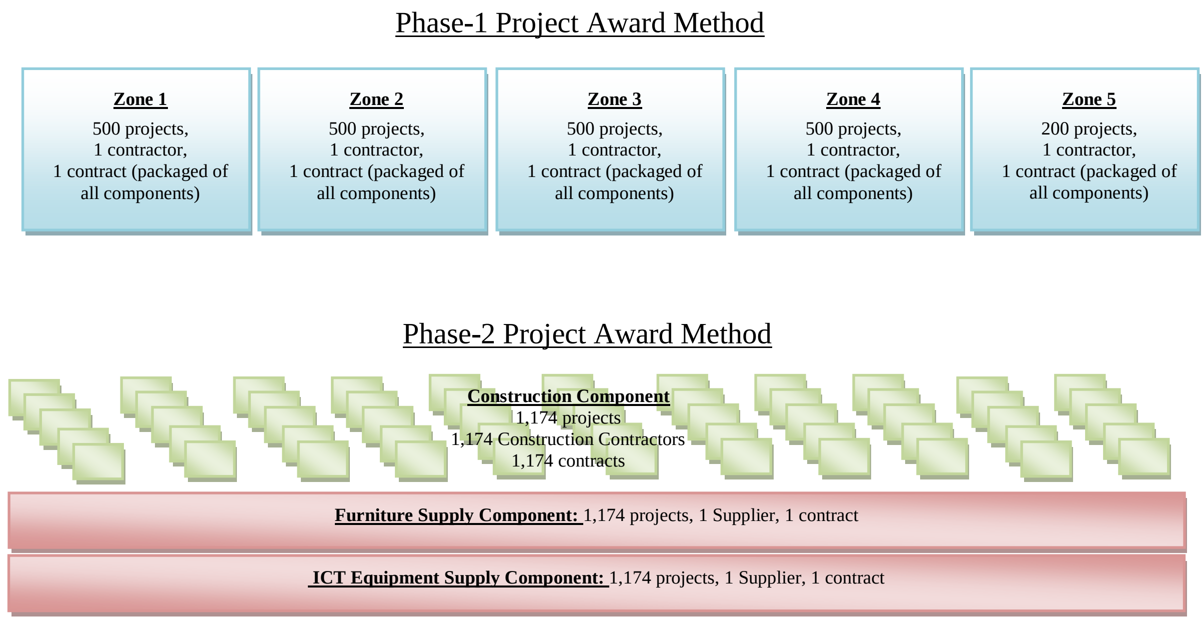

Figure 6-2: Comparison between Phase-1 and Phase-2 Contract Setting

6.5.3.1. Phase I Contractor

Nature of business for two of the companies, Contractor A and Contractor B, were found in the CCM's documents, while nature of business for the other three companies, was not stated in the documents (Table 6-15). However, after checking their profile submitted to the government for privatisation proposal, it is apparent that all those five companies are the IT consultants or ICT suppliers. Only Contractor B found to be both civil contractor and ICT supplier. Since major part of the project involves construction work, the other four contractors had to appoint a construction partner in order to undertake the job. When asked about their companies, they responded:

Table 6-15: Phase-1 contractors' background

Contractor	Year of first Registration	Authorised capital (MYR)	Paid-up capital (MYR)	Nature of business
Contractor A	12/01/2000	1,000,000	900,003	Provision of consultant and advisory services in high technology areas which include provision of competency area in technology management, partnership management, marketing and information services
Contractor B	25/02/1998	1,500,000	1,500,000	Civil contractors, suppliers of computer and computer related equipment.
Contractor C	04/12/1991	1,000,000	750,000	Not stated
Contractor D	04/04/2000	5,000,000	No information	Not stated
Contractor E	07/07/1984	10,000,000	2,159,725	Not stated

Source: Companies Commission of Malaysia

> *"We are registered as an ICT company but we don't face any problem of doing this job. We have strategic alliance with our construction partner... not only for this project. We have numbers of projects before, which we are working together as partner..." (Contractor(P1)2*

> *"Yes, our company is an ICT company but that is not a problem. We appoint sub-cons. That also should be no problem if we can select the best sub-con without any influence..." (Contractor(P1)3*

Sub-contracting is the major problems in the first phase of this programme (see also 6.4.5). *PMC2* revealed that in Zone 3 and Zone 5 there were cases where the projects were sub-contracted up to six tiers. The lowest tier contractor suffered a very small margin when the profit being taken by the contractors higher in line. Some of them abandoned the project or try to minimise their loss by constructing the building at a poor standard.

> *"The consequences if constructing substandard buildings were very bad. There were cases where buildings collapsed..." (MOE3)*

> *"The worst among all was [Contractor D]… they were ICT company; until the project starting date, they still didn't have any partner yet. Finally, they appointed three construction companies as their sub-con to run the project in three states… but the ties between this main- con and sun-cons were so weak…" PMC2*

Those five companies were lacking in both financial and experience strength (Table 6-15). Exploring the contractors' company profile which they submit as an attachment to the privatisation proposal as well as company search at CCM (Table 6-15), showed that they had a paid-up capital only from MYR 25,000 to MYR1,000,000. The figures suggested that those companies were relatively too small compared to total value of the contract awarded to them which was ranged from MYR71,941,500 to MYR141,880,000.

6.5.3.2. <u>Phase II Contractors</u>

There were some good contractors in phase-2. MOE's project progress report showed that those contractors performed well and managed to complete the project in front of schedule. Quality of the buildings they constructed was also acceptable.

> *"They are small-scale contractors but they have lots of experience. Some of them have completed the building within less than three months..." (PMC2)*

However, they represent only a small group, as the rest of phase-2 contractors' performance were below expectation.

> *"They are not strong financially. They are also lacking in experience..." (DEO1)*

> *"Most of them are inexperienced... Some even first-timer.. the worse thing is that they take it for granted... for instance, especially in the remote area they used conventional method to mix concrete materials (SED2).*

> *"Some of them are totally incompetent... and some faced with cash flow problem and these forced these class-F contractors to surrender their project to third party contractors." (MOE2)*

> *"There were cases where the contractors sold the project as soon as the project awarded to them." (PMC2)*

In the other scenario, as revealed by the *MOE3* and the *PMC2,* there were small-scale contractors who had surrendered (rented) their contractor certificate to be used by the third party to apply for the project. *MOE3* and *PMC2* had disclosed that there were third party contractors who constructed more than 10 projects in phase-2 through such a practice.

6.5.3.3. Phase-II Suppliers

As mentioned in 6.4.2.3, supply contract between the government and suppliers existed only in phase-2; in phase-1, supply components were packaged with the construction component, thus do not require separate contract. The purpose of separating those supply components from the construction in the second phase of the programme is to reduce the burden of the small-scale construction contractors:

> *"The reason for awarding both contracts to the same company was to make sure that supply of both components synchronised because both components are complement each other's." (MOE1)*

It was good that the decision maker concerned about the capability of the small-scale contractors and could foresee the possible risk with the construction part of the projects. However, there were some strange arrangements in the supply components contract. No doubt that, the phase-2 ICT supplier was an experience company in producing and supplying various types of ICT equipment:

"Our company produces various spec of computer and numbers of equipment..." (Supplier2)

"We have vast experience in providing and supplying computer for most of the government agencies either for office usage or for education... we still have contract with most of them" (Supplier1)

"[the main supplier] produces quite a good product...the most critical problem in that company was management... " (Treasury2)

However, the decision to awarded furniture contract together with ICT component was much questionable as there lots more furniture suppliers in the country:

"Officially, there were two contracts for supply components, one for ICT equipment and the other for furniture but both contracts were awarded to the same company... quite strange to give furniture contract to ICT company, isn't it..." (MOE3)

"... It seems like they didn't learn from the previous mistake. It is a repetition of phase-1 mistakes; even worse actually.... this one is really monopoly..." (SED3)

Despite the existence of two contracts, it was disclosed that:

"... In the actual exercise [the main supplier] had sub-contracted out the furniture supply job to [the furniture supplier] as they had neither experience nor expertise in that field. The problem getting worst when [the furniture supplier] as the sub-contractor also had lack of experience..." (MOE2)

There are clauses in the contract, which allows the enforcement to the non-performer. However, the enforcement of those clauses only applied to the main supplier, not to their sub-contractors. That means, contractually, action could only be taken to the computer supplier as the signatory for both contracts. In that situation, the computer supplier should make sure that the furniture supplier to perform but:

"[The main supplier] has ineffective control over [the furniture supplier]..." (PMC2)

"[The main supplier] totally lost their control... after sub-contracting the project to [the furniture supplier], [the main supplier] has just cleaned their hands..." (MOE5)

As has also been mention in 6.4.2.3, the problem became worse when there was lacking in coordination among parties involved:

> *"There was lack of coordination between the three parties – the PMC, [the main supplier] and [the furniture supplier]. " (MOE4)*

Project delay was an inevitable corollary of such arrangement, even though those parties involved denied it during the interviews (see 6.4.2.3). There was a big gap between the completion of building construction, the supply of furniture and the supply of the computer.

6.5.4. Communication and Feedback

Study shows that there were some good relationships between certain parties in the project. Good rapport results in good communication among them and could lead the projects to run smoothly. Miscommunication could affect the project; the impact can be seen during the project process as well as in the product:

> *"... There were lots cases of miscommunication. For instance, they hacked the wall to install the cable. That is clearly because of poor communication between civil work team and electrical work team even though both teams are from the same company. This kind of extra work is unnecessary; why the conduit was not installed during the construction of the wall. It does affect the quality as well..." (SED3)*

Such a miscommunication could be avoided with proper coordination; it needs a good leader among them. If miscommunication could happen within the same party, the situation would be worse if two or more parties in the project were not in good terms among them:

> *"I heard that [one of the owner's officer] and [one of supervisor's officer]. Since they are holding important position, more or less it would us too..." (Contractor(P1)5)*

The other issue related to communication is feedback. Ideally, the progress of the project should be tabled to the meeting by the project supervisor. That is stated in the contract between the government and the supervisor. Most of the problem in the project could be resolve if the matters were brought to the committee. However, in this programme most of the problems were not brought to the relevant committee by the supervisor or the contractors. The problems only reached the committee during a critical stage.

> *"The contractors hide the problems because they don't want to jeopardise their reputation... in the situation like this, the PMC should have realised the problem because their people are there; I mean they supposed to be at the sites... they should report such a problem to the committee but they didn't; meaning that they were not monitoring the project closely." (MOE2)*

> *"[Contractor D] never report their problem with sub-con to the committee until it was already burst…" SED5*

> *"I believe that the PMC know about the wrongdoing in [Zone 3] but the hide it… finally they had to admit, but only after the roof has collapsed.." SED3*

Apart from committee at the EPU chaired by the Director General of EPU and committee at the Treasury chaired by Secretary General of Treasury, there were three committees set up at the MOE. The highest committee, known as the steering committee, chaired by the MOE Secretary General, who is also the project director. The second committee, called the working committee, chaired by the Deputy Secretary General (Finance and Development), MOE. The third committee, known as the Task Force Committee, chaired by the Under-Secretary of Development, Privatisation and Supply Division, MOE.

6.5.5. Integrity

Integrity was the most sensitive issue in this interview exercise and the most difficult studied factor in gaining the data. Even after some probing questions, the respondents were unwilling to discuss this matter especially when asked anything related to exceptional practices in the project. They remained suspicious and unwilling to discuss the matter even though the interviewer stressed that the information was purely for academic purposes, and the informant would remain anonymous. During the interviews, the interviewer stressed that integrity did not necessarily mean bribery but most of them were only willing to say, "*I heard about that*" or "*somebody told me about that*" when discussing integrity and business practice. However, they refused to name specific individual involved or specific occasion when it happened.

Most of the information about this factor was unintentionally revealed by the respondents through discussion on other topics. The discussion here, however, does not mention the identity of respondents to ensure that the informants remain anonymous. The most common occasion mentioned were some exercises in the project which were not according to standard practice. Four occasions which were most frequently mentioned by the interviewees were:

- the appointments of the PMC;
- the appointment of both phase-1 and phase-2 contractors,
- the appointment of phase-2 suppliers.

From their response, it can be presumed that 'those who were in power tend to give the job to someone they know rather than someone capable'. As for the PMC appointment, the respondents were of the opinion that it was strange to have only a single company to manage both phase-1 and phase-2 of the programme. Despite the company did not have any experience in managing the project, the appointment was made by direct-negotiation without going through any tendering process. The same approach was used in the appointment of phase-1 contractors and phase-2 contractors. For the appointment of supplier, they were of the opinion that the appointment of an

ICT-based company to handle the supply furniture for computer laboratory was a strange decision.

The other point made by respondents, which could be related with integrity, was in the failure of those who have authority to take proper action accordingly. The respondents mentioned that most of these non-standard practices happened during the project implementation. Some respondents mentioned that *"the on-site supervisor's personnel asked for something*" before giving approval to the progress of the projects. There were also cases where *"the contractor would offer something"* to the other authorities including on-site PMC staffs in order to stop them from taking action or not approving their substandard jobs. It was reported that these type of practices were also involved the other authorities before giving approval (however, local authorities and statutory authorities were not covered in this study). The other practice in this category which was mentioned during the interviews was the direct participation of family members or someone who are closely related to the officers in the project.

6.5.6. External Influences

Different groups of interviewees have different types of external influences concerned. From various external influences mentioned by them, it can be divided into three categories: human influences, environmental influences and economic influences. Contractors were the most effected stakeholder from the external influences:

> *"... Some of the sites given to us are not ready for construction. We need to bear our own cost to remove objects such as tree and old structures from the sites..." (Contractor(P1)5)*

The interviews records showed that *Contractor(P1)1* and *Contractor(P1)2* shared almost the same problem. According to them, the site should be ready or made ready by the owner prior to project commencement. Other problem related to site was underground difficulties which needed some extra cost to solve it.

> *"...problem related to underground should be taken into consideration... you should not standardise the cost for each project... we have numbers of projects which needs extra piling ..." (Contractor(P1)1)*

The same points was also mentioned by *Contractor(P1)5, Contractor(P2)3,* and *Contractor(P2)5.* Apart from that, they highlighted that such a problem had also caused some delay to the projects as its construction needs longer time. However, the project owner has different view about the problem related to sites:

> *"Majority of the sites, I would say 99 percent, are free from any problem and ready for construction... There were some sites with very small trees on it; you can easily cut it... some sites come with simple old structure such as shade for bicycle; which even I can remove it myself..." (MOE5)*

> *"Committee would consider compensation for extra works, based on case by case... but their claim must be reasonable; committee normally approve it if such works cost the contractors more than one thousand ringgit. We would not entertain claim for removing small bushes or very simple structure..." (MOE4)*

> *"With PMC's advice, government would bare all extra cost for piling. We also compensated cost for pillar to raise the laboratory buildings in some flood prone areas..." (MOE1)*

Weather elements, especially related to heavy raining, are the other problem which sometimes caused difficulty to construction activities. There were cases where flood due to heavy rain caused some losses to the contractors:

> *"There were few cases... the weather is unpredictable, you don't know when the rain would come... in the worst scenario, the flood remained there for few days... two kind of loses; firstly, work could not be proceed and secondly, there were some damages to the construction material because of flood...". (PMC2)*

The other external influences were related to economic factor. One of the problems was the price fluctuation, as has been mentioned earlier in 6.3.3.3.

> *"There is no compensation for this kind of problem. The rationale is that the contractors would benefit if the price goes down; so they should absorb the price increase... but I believe that government would step in if the price increment is so extreme...". (Treasury1)*

Contractors also mentioned about interference by irrelevant parties in the project implementation, especially in phase-1. This kind of influence was typically related to the appointment of sub-contractors. According to them, they could not simply ignore such request or instruction as it came from influential figures such as local politicians.

> *"...people they proposed as sub-cons are incapable but if we refuse their request, they might make our life difficult... I couldn't elaborate this..." (Contractor(P1)3)*

> *"They are local politician; so influential... initially it seemed good; to give job to local contractors but it ends up badly as people they proposed are rubbish... those people are their followers... they abandoned the projects without telling us... we got to take back the project to complete them... they threatened us... we were forced to compensate them for taking back the project; funny, isn't it?" Contractor(P1)5*

According to project supervisor, based on their observation, there were numbers of projects built through such an arrangement eventually ended up with serious difficulties as the sub-contractors proposed by those influential parties were incapable of completing the jobs given to them. Nonetheless, there were some genuine and capable contractors; they managed to complete the projects given to them within reasonable schedule and quality.

The other interference involving politics mentioned was about the distribution of laboratories. Two of the states, which were under opposition at that particular time, were the last to get the phase-1 projects and number of projects given to them was only 100 each compared to 300 for their neighbouring state. For phase-2, there was not even a project allocated to those two states.

> *"... to me it was a wrong decision; the computers are for the children, not for their parents... why we should punish the children while they know nothing about politics..." (MOE3)*

> *"That kind of thing is actually can back-fire the government... in the first place, it was their parent who involved, not the children..." (SED3)*

The other party which could significantly influence the project success was the statutory authorities. There were two statutory bodies who involved in this programme, i.e. the authority for electricity supply and the authority for telephone provider. Zone 1, 2, 3 and 4 are sharing the same electricity authority, while Zone 5 and Zone 6 have their own body for this facility. Feedback received from various parties indicated that there were some difficulties in dealing with electricity authorities.

> *"We faced some problem dealing with them to get approval". (Contractor(P1)3)*

> *"Depend on the personnel at those local offices; the approval varies from one district to the others". (PMC2)*

> *"...as time taken for the approval could affect the projects in term of completion time. We sometimes stepped in to assist the contractors" (DOE2)*

> *"there was only one way to speed up the application... the applications need to be accompanied with 'something'... some of them even asked us to appoint them or their men to be our wiring contractors...sounds crazy but it was true". (Contractor(P1)5)*

The same problem arose when dealing with telephone service provider. There is only a single telephone provider for the whole county, including Zone 5 and Zone 6 but the approval varies from one place to the others depending on the local offices of this agency. The same bureaucratic issues reported by the contractors while dealing with local authorities.

> *"We got to deal with numbers of local authorities, especially for drawing approval. Each local authority has its own by law... quite difficult for us to study each of them..." (Contractor(P1)1).*

While discussing this topic, it is essential to highlight that not all external influences were bad to the project. There were some influences that ended up with good impacts to the project. For instance, there was a circumstance in Zone 5 where a local politician helped to speed up the project.

> *" The [local authority] had imposed a very rigid regulation. They refused to approve five of our drawings because the distance from the site to the main road is less than 40 feet setback... they mentioned it as not fulfilled the by-law requirement. Thanks God... we were lucky to get [a local politician] came into rescue... With the assistance of his good office, the issue had been resolved." (Contractor(P1)5)*

6.6. PROJECT PRODUCT

The product stage started once the contractors hand over the projects to the owner. The handover process takes place when all parties satisfied that the projects are in good order and fit to be utilised. Handing over involved six (four in phase-1) stakeholders, consisting of contractor, furniture supplier, ICT equipment supplier, supervisor, owner, and user; all parties would sign the handover certificate to indicate that the project was satisfactorily accepted.

According to the project TOR, upon receiving the project completion notice from the contractor, the supervisor would carry out the final inspection to verify whether the project is defect-free and ready for handover to the owner. After inspection, the PMC produced a practical completion certification to signify that the contractor has satisfactorily completed the project without defect:

> *"Normally, the local authorities produced CPC upon the project completion. However, for this project the government had agreed that CPC is not required due to the fact that the project is simple and based on standard design. The responsibility to approve the project was given to the PMC." (EPU1)*

The TOR of the project also stated that the supervisor has three options in recommending the project for handing over, depending on the evaluation during inspection process. Firstly, if the project is defect-free, the handover would proceed without any conditions for the contractor. Secondly, if the project has minor defects, the handover proceeds and the contractor was required to rectify the defects within specific time; failure which causes them a deduction from contractor's performance bond (see 6.3.3.2). In the third condition, where the defect is major, the handover process will not take place until the contractor rectifies it and the PMC reinspect the project. This process applied to every single individual, including in phase-1.

6.6.1. Completion Time

The contract documents of phase-1 and phase-2 projects indicated that there were two different scenarios in project time for both phases of the programme. The phase-1 contractors were given six months to complete 500 projects (except for Contractor E with 200 projects), while phase-2 contractors were given three months time to complete one project each. As mentioned in 6.4.4, none of the respondent, including those who involved in project definition and project planning for both phases could provide the justification for the project timescale.

Two supply components in phase-2 were given to the other contractor. Contract agreements allowed these suppliers to complete the supply for the whole phase-2 projects within12 months, based on delivery schedule prepared by the PMC. The delivery schedule was not attached as an appendix to the contract document, but prepared by the PMC depending on completion of construction components. Contractually, project started seven days after the issuance of LOA by project owner. That means phase-1's Contractor A, Contractor B, and Contractor D, which their LOA dated 08/11/2000, officially started their projects on 15/11/2000 and they should complete the whole projects awarded to them within six months, i.e. by 14/05/2001. However:

> *"None of the phase-1 contractors manage to complete the whole projects awarded to them within the time given." (UPE3)*

> *"While some of the computer labs were completed within reasonable time, there were numbers of the labs completed very late, far behind schedule..." (MOE2)*

The MOE's progress report dated 04/07/2003 also indicates that Contractor A, Contractor B and Contractor D had not completed the projects awarded to them. According to that report, the project director, with the advice from the steering committee, had agreed to give an extension of time (EOT) for three months, which ended on 14/08/2001. However, after the expiry date of the EOT, all the three contractors still have numbers of projects to be completed. That circumstance required the steering committee to make a decision:

> *"After considering problems faced by the contractors, the committee steering agreed to let Contractor A and Contractor B continue the project. The project director had agreed to give them the second EOT of four months..." (MOE3)*

After the expiry of second EOT on 14/12/2001, both Contractor A and Contractor B still could not manage to complete their projects, which led the steering committee to charge them with liquidated ascertain damages (LAD). Both contractors, however, had submitted letters of appeal to the government to exempt them from the LAD. The Treasury, through a letter dated 11/02/2002 had agreed to allow both contractors to complete the whole projects without any fine. According to the progress report dated 28/08/2003 prepared by MOE, Contractor B appeared to be the best contractor of all when they took 24 months to complete the whole projects. Contractor A took three months longer. There was a different scenario for Contractor D who carried out projects in Zone 4.

> *"[Contractor D] was not given a second EOT; they are not entitled for EOT; their performance is very bad." (MOE4)*

The MOE's progress report dated 28/08/2003 stated that at the end of first EOT, Contractor D managed to complete only nine laboratory buildings. They were given default notice dated 26/02/2002 but their performance was not better off. Their contract was eventually terminated on 28/06/2002. A total of 326 incomplete projects abandoned by them had been 'rescued' by small scale contractors.

For Zone 3 of the phase-1 projects, the LoA was issued to Contractor C on 17/05/2001; thus, the projects were contractually started on 25/05/2001. The MOE's progress report dated 28/08/2003 indicated that this contractor also faced the same problem; they could not manage to complete their projects within the stipulated time. They were granted with the first EOT for them to complete the projects within three months, from 24/11/2001 to 23/02/2002.

> *"The performance of [Contractor C] was so bad... project delay was one thing, the other problem with them was the quality of the building" (SED4)*

> *"... For [Contractor C], they were quite good during the early stage... I was understood that they faced some financial problem, which made them as bad as they couldn't manage to pay their sub-cons..." (MOE1)*

> *"The contract for Contractor C was eventually terminated after inspection showed they had not built the project in accordance with specification." (MOE4)*

There was a different situation for Contractor E, which started the projects on 02/11/2001.

> *"I would say that [Contractor E]'s performance is not bad... but they faced with some difficulties including logistic problem of [Zone 5] and problem with their sub-cons." (MOE3)*

While they supposed to deliver the whole package of the projects to the project owner by 01/05/2002, they still have numbers of projects to be completed. The steering committee had agreed to approve their application for EOT through a letter dated 25

July 2002. However, during the expiry date of this EOT on 01/08/2002, they still could not manage to complete their projects.

For phase-2 projects, there were three categories of contractors, which led to three range of completion time. One of the project owner respondents who closely monitored the project has provided the best explanation for the situation:

> *"The first category consists of good contractors; they were experienced, financially good and skillful; they managed to complete the project within reasonable time. The second group is quite good contractors but too dependent; they took longer time to complete the project. The third group is purely a bad group; some are part-timer; they couldn't manage the projects and take too long to build such a simple building; some of them even abandon the project." (MOE5)*

The worst part of the phase-2 projects was the supply components. In most cases, even though some of the buildings had been completed, it took long time before the suppliers delivered the furniture and the ICT equipments. This issues related to this had been discussed in detail in 6.5.3.3.

6.6.2. User Satisfaction

From the interviews it is apparent that the users appreciated the government's effort to furnish schools with ICT facilities. Some even mentioned that it is about time that all school should be equipped with such facilities to cater the needs in teaching and learning process. Despite highlighting some deficiency the users satisfied with the computer laboratory building as well as facilities provided.

> *"Overall, this lab is okay except for our computers; a bit outdated compared with our friends..." (User3)*

The computer teacher above compared the computer in her laboratory, which is in the phase-1 projects, with the other laboratories in phase-2. The different between the two phases has been explained in 6.3.4.3 above and the details are recorded in Appendix 6. The other lacking of the buildings which were highlighted by few of the users were:

> *"I appreciate that we have this facilities. Everything is acceptable... I wish this computer lab is built with a toilet attached... the other thing is windows, which is too high..." (User5)*

> *"Honestly, I satisfy with this computer lab. We should have more computers but I appreciate the constraint government has... the only thing is the design; for instance, the windows are too small, no toilet attached, wasting students' time should they need to go to toilet." (User1)*

The windows specification mentioned by the two users above was in the phase-1 projects. Changes had been made to the design in phase-2 projects (see 6.4.3). Besides few small lacking mentioned above and some issues related to project scope which has been discussed in 6.3.4, all of the users satisfied with the computer laboratory buildings and facilities provided:

> *"The government effort to furnish schools with these facilities showed that they are serious in preparing children to face the digital challenge." (User3)*

> *"There were some other ICT programmes. I used to involve with one of the programmes in the other school when I was there before... of all, this is the most comprehensive school computer programme." (User8)*

The other ICT programmes as described by *User8 above are* as has been mentioned in 3.3. The SCLP is better than any other computer programme introduced by various divisions in term of coverage and comprehensiveness of facilities provided. Despite number of computers need to increase to cater growing number of students in some schools, the programme has fulfilled the needs of using ICT as teaching and learning aid..

6.6.3. Product Benefit

All of the user respondents acknowledged the importance of the facilities in improving the student knowledge and skill in computer. From their feedback during the interviews, the computer laboratory facilities were used for three purposes so far. Firstly, the students were exposed to the computers in order to make them computer literate. This step is important before going to the next step in the teaching and learning process.

> *"Computer literacy is important. We cannot proceed with teaching-learning if the students don't know how to use the computer..." (User4)*

> *"Normally, we make sure that all the students know how to use computer; not much problem actually because children catch it very fast, some of them even have computer at home... we also teach them how to surf the internet and find something useful for their lessons." (User6)*

Secondly, the equipment was used as a tool in the teaching-learning process. Besides improving teaching and learning in ICT related and non-ICT subjects, the facilities had also created an interesting environment that attracted the students in the class. Using this new approach, the students were more interested in the lessons taught compared with the conventional method.

> *"My students appreciated the computer usage in teaching and learning. Even those who were usually not concentrate while I was teaching in the classroom, seems interested to the subject when they were in the computer lab..." (User2)*

> *"The way the students respond to the subject taught, I mean other than ICT subject, is different. No more boring and sleepy in the classroom... unfortunately, the facility is not enough to have all subjects taught using computer. " (User8)*

Finally yet importantly, the computers were also used by the teachers as tool for academic management such as a managing database, preparing the teaching materials, and searching for teaching materials through the internet.

> *"Nowaday, teachers have got lots of workload. Fortunately, some of the works can be done faster using computer. " (User7)*

> *"...it helped a lot... save lot my time... no more worry about keeping record... " (User2)*

Despite those benefits of the computer laboratories to the students as well as to the teachers, there are few issues of lacking in computer facilities have been highlighted by the respondents. The major issue was the content of ICT subject. As mentioned in

3.4.2.2, this task is under the jurisdiction of Curriculum Development Centre, Ministry of Education.

> *"... It is ashamed; there is no proper syllabus or software for IT subject from the ministry. I heard that they are still preparing..." (User6)*

> *"We need to find the teaching software ourselves from open market. Some teachers even use their pocket money... for the sake of the children. Those who are good in programming, created the software themselves to fulfil their needs." (User4)*

> *"The CDC is still developing the proper software; they informed the steering committee last week that they just complete ccourse content... this matter is beyond our duty..." (MOE3)*

> *"... We were told that the CDC is still developing them... I am not sure why they take so long... they are part of the project since theearly stage... but to be fair to them, the job is not quite easy..." (MOE1)*

There were issues of priority in the usage of ICT facilities, highlighted by the users. One of the issues is that whether it is fair to give priority to the examination-year student. The other issue is whether it is fair to prevent teachers from using the computer for their non-teaching works during school hours for the reason of not to the teaching learning process.

6.7. SUMMARY

This chapter presented the results of the qualitative study examining the data collected through interviews and data from secondary resources. Evidence derived from various stakeholders based on their genuine experiences and observations as well as official documentation helped to answer the research questions. Even though I did not use my personal experience in the project as a main data source to avoid research bias, some of the knowledge gained during his involvement in the project was used to verify the reliability of the data collected.

Results of the qualitative data analyses show that the projects did not follow a proper process of definition. Some of the important success factors were either not sufficiently taken into consideration or were ignored at all. The other important factors during project planning were also not treated accordingly. The reason given by main stakeholders was that they were given a very limited time prior to the implementation of the project. Even though the intention was to start the projects quickly seems reasonable in terms of social obligation, such a decision is not a good basis for such a big programme.

Deficiencies in the first two stages of project lifespan had affected the remaining stages. From the project management point of view, the decision-maker was too ambitious in deciding the project timeframe. The decision to implement an extensive volume of project simultaneously was the other error made by the decision-maker. From a human resource management perspective, awarding a big volume of phase-1 projects to incompetent contractors affected the smoothness of the project implementation. The results of analyses also show that the project had an incapable project supervisor (project manager). The decision to assign only a single project supervisor to look after thousands of projects throughout the country resulted in the team being ineffective and unable to oversee the projects properly.

Despite those problems in the project process, the results of the analyses show that the users were highly appreciative of the project product. The facilities provided through this programme were recognised by the schoolteachers as a very useful approach in the teaching-learning process.

CHAPTER 7:

FINDINGS AND DISCUSSION

7.1. OVERVIEW

The results of quantitative analyses from Chapter 5 and qualitative analyses from Chapter 6 are triangulated and further refined in this chapter. It has been suggested (Mingers 2001) that results of the research are richer and more reliable if different research methods are combined. In the case of this study, the triangulation helps develop further insights from the research to provide a more significant interpretation of the project performance.

Figure 7-1 illustrates the four project success criteria[14] that were used to structure the 20 project success factors along the four stages of project life span. The first three success criteria relate to the project process, while the fourth success criterion relates to the project product. This figure is in-line with the theoretical framework (4.3.2); which defines the project success as a combination of project management success and product success. In addition, the discussion about project success encompasses various stakeholders reflecting their diversity of priorities and interests in the project. Finally, the discussion highlights the influence of various project characteristics on those project success factors.

[14] the term ‘success criteria’ were also referred to as ‘dimension’ during the discussion in Chapter 4 and Chapter 5.

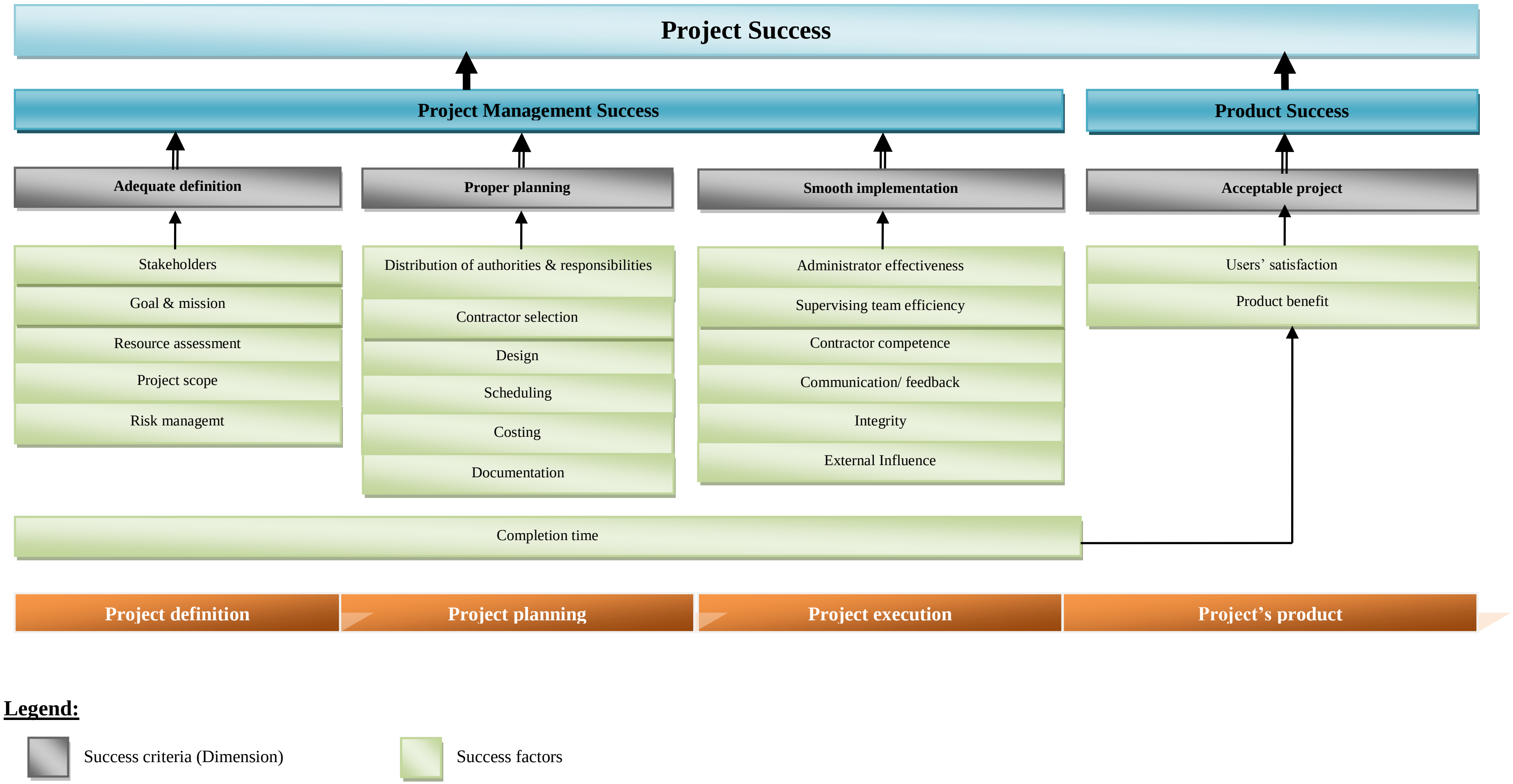

Figure 7-1: The Occurence of Success Factors Throughout the Project Life Cycle

7.2. PROJECT MANAGEMENT SUCCESS

This section discusses the findings about the project success factors during the project process. It covers 17 success factors within the first three stages of the project life cycle (see Figure 7-1). The discussion considers two aspects, i.e. the project performance and the various stakeholders' perspective of the project.

7.2.1. Adequate Definition

The project definition stage, the initial stage of the project life cycle, is very important in generating a clear direction for the further steps of the project (Cho & Gibson 2001, Webster 1999). This stage requires a reasonable time since it is important that policy makers examine carefully every aspect of the project as it will be the foundation for the next step of action. All decisions made at this stage will contribute to the success of the next stages of the project life cycle.

7.2.1.1. The Project Stakeholders

Although most of the stakeholders in this program are organisation, such as government agencies or companies, in practice those organisations are represented by people. Those people speak on behalf of the organisation but sometimes there are differences in opinions among different people representing the same organisation. For instance, when a new officer replaced another officer who moved out, he or she might have different views about certain matters. This kind of difference could sometimes influenced decisions as their individual views were important inputs in determining the project scope and direction.

Stakeholders could affect the project in various ways, either negatively and positively. These people might have different power and interest in the project depending on their status or organisation they represent (Morris & Hough 1988). With the power they have, these people could either undermine or support the project (Gil & Beckman 2007). Besides power they have, the stakeholders' could influence the project depending on their interest in the project.

7.2.1.1.1 Powers and interests

This programme dealt with various stakeholders, each of which has different level of power and different priority. It is essential to identify the needs of various stakeholders so that any differences in their interest could be properly incorporated (Olander & Landin 2005). However, the decisions that might fulfil their needs are influenced by different levels of stakeholders' power. Good communication with those interested parties should lead to most of them, if not all, satisfied with the project or the product. In the project management practice, categorising the stakeholders is important so that they are easier to be managed; either in fulfilling their needs or in gaining their support (see 2.7.1.1). It is essential to manage their differing demands through good communication and consultation to make sure that everybody has a genuine opportunity to contribute to the project decision making helping ensure that all stakeholders' needs are fulfilled.

In the programme being researched, such a categorisation was not undertaken during the early stage of the project life cycle. However, for the purpose of illustrating the role of such a categorisation and helping develop further insights, the classification is done here. Based on their power and interest, the groups of stakeholders of this programme were divided into four categories (Johnson & Scholes 1999), as shown in Table 7-1. Stakeholders who were not active respondents in this research but were involved in the programme are also included in this table.

Table 7-1: Level of power and interest of stakeholders

Power			
	High	• PMC (the supervisor)* • Statutory authorities • Local authorities	• EPU (the planner)* • Treasury (the financier)* • MOE (the ministry-level owner)*
	Low	• The community • The public	• Phase-1 contractors* • Phase-2 contractors* • Suppliers* • SED (the state-level owner)* • DEO (the district-level owner)* • The users * • Local politicians
		Low	High
		Interest	

***** included as respondents in this study

Adapted from Johnson and Scholes (1999)

The first category comprises those who have an executive power and a very high interest in the project. This category consists of the government agencies that acted on behalf of the government, based on power given to them by the law, the constitution or the existing government regulation. In the context of this programme, they are known as the planner, the financier, and the owner. The combination of these 'big three players' referred to as the project commissioner.

The second category consists of groups of stakeholders who have power but less interest in the project. Since the project or product of the project had less priority for these stakeholders, they exerted less effort to make sure the project complete on time or fulfil the specified quality. Stakeholders who fall under this category were the project supervisor, local authorities, and public utility authorities. Based on their roles, AGC and AGD can also be categorized into this group.

The third category consists of stakeholders who have a significant interest in the project or the product of the project but they have only limited power. They were subject to the decisions made by those in the first and second categories. Stakeholders in this category included the contractors and the supplier whose main concern was profit, and the users who were the beneficiaries of the product of the project. Based on their limited roles, the state-level owner and the district-level owner can also be categorized into this group. The other group of stakeholders in this category was the local politicians who might indirectly benefited by telling their voters about the programme even though they actually did not have hand in any of the project. In certain circumstances, however, stakeholders in this category were capable of substantially influencing the project; particularly, by influential figures such as local politicians who interfered in the implementation of the projects in their locality, such as in case where the local politician interfering the appointment of sub-contractors (see 6.5.6). In most of the cases, this kind of interference resulted in negative effects on the projects.

The last category of the stakeholders was those who neither had sufficient power legally allocated to them nor directly benefited from the projects or their products. However, in certain limited circumstances, they were part of project and could help in determining the project direction. Among the groups of stakeholders that falls under this category are the local community and the public. A detailed classification of project stakeholders based on their power and interest is provided in Appendix 14.

Separation of powers is essential to ensure that the mechanism of checks and balances exist within the project organization. This is especially among the stakeholders who have a higher power. With the separation of powers, the authorities should not be beyond the powers available to them; they should not exercise the powers of the other. In other words, all stakeholders have a particular strength, but there are restrictions, including those in the first and second categories. To overcome this kind of conflict, the most powerful stakeholder, e.g. the government, should act wisely to recognise the interest of all stakeholders and provide mechanisms for them to contribute to the decision making.

7.2.1.1.2 The stakeholders participation

The stakeholders' involvement was found to be a fundamental factor in determining the success of this programme. As mentioned earlier in 2.7.1, managing the project stakeholders is crucially important in shaping the project success. If a project is to be perceived as successful, then the stakeholders' needs must be fulfilled. The best approach in reducing this gap is by gaining their view prior to project implementation.

Each stakeholder's perceptions during the project definition or project planning are valuable and should be taken into consideration (Orlander & Landin 2005). The most difficult task was to combine these perceptions into a single agreed specification as it may be impractical to satisfy all interested parties. It might be more helpful to assess the evaluation of a project's outcome by groups of individuals or organisations with perceptions, which could be expected to be reasonably common (Liu & Walker 1998). After taken into consideration views of all stakeholders, it was the duty of the decision maker to finalise the project goal and project purpose as long as it complied with the available resources.

In the case of this program, everybody agreed that the stakeholders' participations during the project conceptualisation stage were crucially important for the project success (see 2.6.1.1) but it was not given due attention by policy makers. Out of 10 groups of stakeholders involved in this study, only representatives of three groups acknowledged their significant participation in the decision making committee lead by the planner (Table 6-3). Those parties were members of the project commissioner, which consist of the planner, the financier and the ministry-level owner. The other seven parties – the supervisor, the phase-1 contractors, the phase-2 contractors, the state-level owner, the district-level owner, the suppliers, and the users – denied that they had any effective means of involvement in this critical committee. Furthermore, for those who participated, only planner insisted that they were fully participated in project definition; the financier and the ministry-level owner mentioned their participation as partial due to the fact that some decisions had been made prior to the meeting. The worse scenario was that some of the important decisions had been made earlier by 'someone else' and the committee was called only to endorse the decision with a little opportunity to explore alternatives.

Some important suggestions proposed by the members were not considered fully by the committee. For example, one of the MOE's suggestions was to prioritise the expenditure on ICT equipment rather than the building component. From the MOE's point of view, the project cost could be reduced by converting the existing classroom into computer laboratory with small renovation. This suggestion was not seriously considered by the committee as it was contrary to the views of others. This illustrates the different priorities among the stakeholders and the failure to debate these fundamental differences. The only input proposed by committee members which was accepted by the committee was about the size of the laboratory.

The other main stakeholder, the financier, questioned the financial procedure of the programme; a large budget needed by this programme but it was not allocated in the normal five-year Malaysian Plan. However, the planner had a different focus, emphasizing that the purpose of the project was not only to furnish schools with the computer laboratory but also to generate the economic growth, thus high expenditure was a strategic element of the programme. This is a prime example of different stakeholders having different objectives with no effective debate or communication, leading to diverse expectations and ultimately very different views of project success.

On top of that, the planner who was the secretariat of the project definition committee failed to identify every important party to be invited to the meetings. For example, in MOE, There are two departments that perform tasks related to the programme; the Educational Policy Planning and Research Division (EPRD) played a role in planning the project while the Development, Privatisation and Supply Division (DPSD) is the executor of the project. Actually, both sides should be involved, but only the DPSD were invited to join the committee. Importantly, both divisions must participate in the project initialisation. The planner attempted to defend their action by stating that the ministry's representative should speak for all parties in the same ministry but this is not practical.

Three more groups of stakeholders excluded from the committee were the state-level owner, the district-level owner and the user. Although all three are under the same ministry, the MOE, each has different roles in the programme and should have been represented individually. All three groups should have had the opportunity to contribute to determining the project specification and its implementation. In addition, the time given to DPSD to gather information before the committee meeting was too short and critical information was not always available.

In addition, the planner who is also the secretariat to that particular committee did not clearly distinguish between the project definition stage and the project planning stage in explaining the stakeholders' participation. For instance, the supervisor and the phase-1 contractors were represented in the committee during the project planning stage but not in the project definition stage, as mentioned by the planner. The fact that the project implementation approach had changed from privatisation to direct-negotiation made it difficult to distinguish between the two stages. The other main point identified was that the time given for the committee members to prepare their input for the project formulation was insufficient.

7.2.1.2. Project Goals and Mission

The goals and mission should be clearly set by the policy makers in the early stages of the programme. The goal of this programme was to provide the ICT facilities to all public funded schools in Malaysia so that the schoolchildren could develop their ICT knowledge, while the mission was to ensure that the Malaysian young generation are well equipped with the ICT knowledge to fulfil the demand of the future (MOE 2000). From the economic perspective, the intention of this programme was to stimulate the economic growth due to slow recovery after the country was badly hit by the Asian economic crisis in late 1990s.

In any huge programme like this, it is important that the goal and mission set are attainable given the resources available: some compromise may be necessary. For this programme, the target set was appropriate for both social and economic sector. For a developing country like Malaysia, any effort to prepare young generation with essential knowledge and skill is essential. This programme was one of the government's efforts to achieve the target of 'Malaysia as a develop country' by year 2020 (Mohamad 1991). While the second goal – to induce a speed economic growth – is one of the government's strategies to recover from the recession that effected Malaysia and other Asian countries in late 1997.

The set goals and missions found to be reasonable and achievable. The ability of all members of project commissioner to describe the project goal and mission correctly (see 6.3.2) showed that it had been set clearly by the policy-makers during the project conceptualisation. However, the other parties were unable to answer accurately and clearly when asked about this matter showed that the project goals and missions were not properly conveyed to all stakeholders. As mentioned in 2.6.3.1.1, a high performance driven project demands the whole project team to understand the project's goal and purpose. Unfortunately, in this programme this critical information was not disseminated; some of the important stakeholders such users were even not invited to the committee.

7.2.1.3. Resources Assessment

It is apparent that the project resources were not given due attention by any party or committee during the project definition stage. In other words, there was no resource projections made during the early stage of the programme. The fact that none of the respondents, even those from project commissioner, could confirm that this project factor had been discussed in detail in any meeting (refer to 6.3.3), suggests that it was not treated as an important parameter. Realising that the programme would be extensive, involving large number of projects and scheduled to be completed within short period, the committee should have anticipated that this programme would require an extensive amount of labourers, raw material and equipment. However, none of those requirements was properly estimated. A proper estimation of human, monetary, equipment and material resources is essential to ensure that the project work correctly (Webster 1999).

7.2.1.3.1 Human resource

Like other normal projects, execution was the stage where the availability of human resource was critically important (Belout 1998, Belout & Gouvreau 2004). Although the burden of providing sufficient labour was the responsibility of the contractor, the inability of policy-makers to anticipate the problems of recruiting the necessary labour force was highly unfortunate. In this programme, it was apparent that the shortage of labour badly affected the progress of this project.

Apart from the contractors (also suppliers) and their workers, another crucial group of stakeholders in the implementation stage was the project supervisor. Fortunately, the policy-makers foresaw the problem of supervising the project by appointing the PMC and did not depend on the PWD. The incapability of the PMC is a separate issue which will be discussed later in this section.

In order to obtain sufficient human resources during that critical period of project implementation, a proper projection of human resources was crucial. The result of the study reveals that as far as this programme is concerned, there was no such projection taken prior to the implementation. The projection could be in the form of survey to identify the availability of the specific group of people required by the programme, considering both the quantity and the skills required. It should consider the possible competition among the contractors. If the result of the survey reveals that the workforce is likely to be inadequate, the project commissioner should consider two alternatives. The first alternative is to resolve the workforce problem before continue with the project. Alternatively, the implementation plan for the programme should be revised. Trade-off between resources and completion time may be necessary. This can be done by dividing the program into more phases, spreading the work over a longer timescale and reducing number of projects in each contract.

The project administrator was the other group of stakeholders with a prominent role. The study reveals that there were insufficient officers administering the projects. However, the option of recruiting additional officers was beyond the jurisdiction of project committee; creating new posts would have been a long process requiring approval from the Public Service Department (PSD) and the Treasury. This exercise, known as restructuring can only be done once in every five years. To overcome this problem, the government had taken a proactive step by appointing the PMC to assist the administrator with the intention of injecting additional skilful project management capability.

7.2.1.3.2 Material and equipment resource

Apart from the building material, which some contractors had to compete for it due to insufficient supply and price fluctuation, the supply of computers was also problematic. This was an obvious example of improper planning of material and equipment resources. Furthermore, the traders took advantage of the high demand by increasing the price. The situation was even more critical in the remote area where supply was very limited. Surprisingly, none of those who were involved in formulating this programme could foresee the possible problem before making the decision. It was not even discussed in any meeting. As a result, they had scheduled the phase-1 and phase-2 of the programme to be completed by the contractors within an unrealistically short period.

Good programme scheduling should be made in accordance with the availability of resources. A similar survey as in the case of human resource should have been undertaken to check the availability and sufficiency of the materials and equipment in the market. The survey may include the source of material, the volume of production, and the competing demand from the other projects during particular period. The results of such a survey could require further resource-time trade-offs.

7.2.1.3.3 Financial resource

Being a fully public-funded programme, the financial resource might not be so critical in SCLP. The government is financially stable even though this programme entails an immense amount of spending. Despite some concerns expressed by the financier in one of the meeting, the committee was optimistic that there would be no problem in financing the project. The meeting was informed that the government had guaranteed the availability of the financial resource.

One unusual characteristic of this programme was its omission from the five-year long-term Malaysia Plan[15]. In the normal practice, any public sector project would be registered in the implementation list only after EPU have approved it. As far as this programme is concern, it should have been listed under the 7th Malaysia Plan (1996-2000) or 8th Malaysia Plan (2001-2005). This unusual scenario happened as a result the change of contract method from privatisation to direct-negotiation. The privatisation approach, which was normally implemented by outsourcing the development cost,

[15] Malaysia Plan or in local term known as Rancangan Malaysia is the five-year long term plan in projecting the development programme of Malaysia

would not have required a listing in the Malaysia Plan. The sudden change of contract method could have affected the implementation of other projects, although the programme was initiated to generate the economic growth. This is because prior to the approval of its own budget, SCLP had utilised the existing MOE budget (as mentioned by one of the respondents in 6.3.3.2).

With regard to project progress, the financial recourses for contractor, suppliers and the supervisor also important in order to make sure that they have enough fund for their operation. These groups of stakeholders should be financially strong and not totally dependent on the progress payments from the project. However, those parties typically need a substantial initial funding for mobilisation prior to project takeoff to set up site and regional offices (for supervisor), recruit new workers, and purchase extra equipment. The evidence from the company profiles reveal that most of those companies, including the supervisor, were not financially strong.

7.2.1.4. Project Scope

Building more than 9,000 computer laboratories throughout the country within a relatively short period was a great challenge. Even though the programme was zoned and phased, such a big volume needs some experienced management team to handle it. The decision to have a standard design for the whole programme was a good judgement. The best design from the perspective of the decision-makers was chosen from the six designs proposed by the contractors during the pilot project. In phase-2, after receiving feedback from phase-1 projects, there were some slight modifications to the building design, furniture design, and ICT facilities specification.

The committee had also made a wise decision in determining how the laboratory should be built, in spite of two contradictory ideas from the two main stakeholders (as has been discussed briefly in 7.2.1.1.2). The owner was of the opinion that the programme should emphasise the ICT component rather than the building and proposed that the existing classrooms should be modified and converted it into computer laboratories; the cost should be much lower than having separate buildings. According to the owner, the savings might have been channelled for better ICT facilities.

However, the committee remained firm with the decision to have computer laboratory as a separate building for two reasons. Firstly, apart from the objective to furnish schools with the ICT facilities, this programme also aimed at boosting the economic growth as part stimulus effort to recover from recession which badly hit the country in late 1990s. Thus, the expenditure itself was an objective of the project. Secondly, some schools did not have enough classrooms even to cater for the current enrolment; other schools were too old and dangerous to be modified. With the separate building it would be easier and safer, especially in fixing 3-phase electricity wiring; most of the old schools only had 1-phase wiring.

Apart from that decision in the determining project scope, the committee made some misjudgements. One of the misjudgements was the failure to change the specification proposed by the contractors when they have every right to do so after the project implementation approach had been change from privatisation to direct-negotiation. For instance in some schools, 10 and 12 PCs for model 1 and model 2 laboratory respectively, was insufficient to cater for the projected number of students.

7.2.1.5. <u>Risk Management</u>

The SCLP was (and still is) one of the biggest public programme in the country in terms of number of projects, which spread throughout the country, thus it was exposed to a high risk. Even so, as admitted by all groups of main stakeholder, risk management had never been discussed specifically in any of the meeting to formulate the project. Even the planner (6.3.5) did not treat risk management as a serious task. Although it was not clearly elaborated, the reason was that the government projects are generally secured. Surprisingly, such an assumption was not only applied to this programme but also to all other public sector projects and programmes. The decision-makers strongly believed that the government is financially strong and organisationally established; thus, total failure is unlikely for the government funded projects.

Taking risk management so lightly was counter to good project management practice. While the individual projects might be low-risk, the whole programme spread throughout the country was highly exposed to risk. Implementing it without considering any of the possible threats and appropriate management responses is questionable. Even though the finance might be a secure in the public sector project, the other factors were not. Project management experts (see 2.6.1.5) emphasise that managing risk should be an integral part of project management but none of the members of project commissioner seriously discussed this topic.

This failure to consider risk management as an essential element in good project management appears common to Malaysian public sector projects: it should be treated as a prerequisite of all projects. While there are various methods used to manage risk (e.g. Flanagan & Norman 1993, Smith 1999, PMI 2004, Zou et al. 2006), identifying potential risks associated with a construction project is a great challenge as different stakeholders might assess the diverse risks affecting the project differently. The other challenging task is to classify those risks based their own impact and probability. Based on the list of possible risks obtained from the interview (see Table 6-8) and suggestions from the reviews of the literature (see 2.6.1.5), the risks of this kind of project can be grouped as in Table 7-2. This matrix is in accordance with the probability of risk events and the impact of those particular risks to the project. This is in line with PMI (2001), whereby risks are grouped based on their probability and impact.

Table 7-2: Project Risk Category based on Probability and Impact

Probability	High	• Stakeholders influence • Lack of integrity	• Competition (for labour, raw material etc) • Increase of commodity price
	Low	• geographical difficulties • bad practice of bureaucracy • underground obstacle	• Economic recession • environment effect • design fault • Incompetence contractor • lack of cooperation from other authorities • under-strength manpower
		Low	High
		Impact	

Some high risks may require a redesign of the scope or approach of the project so that they can be eliminated. Other risks, which cannot be avoided, may need contingency plans. For instance, if a weak contractor is identified as the risk to the projects, avoiding this kind of contractor during the contractor selection could reduce the possibility of the project failure. For the risks which are beyond the decision-makers' control such as commodity price, lack of labour, unforeseen underground difficulties, and interference from the other parties, a contingency plan to mitigate the risk might be the best approach. Transferring the risk to the third party, for instance in the form of insurance, is not suitable for this programme as it would not solve the problem per se and could ultimately result in higher costs.

7.2.1.6. Was this Project Well Defined?

From the discussion about the project definition above, it is apparent that the project went through a reasonable definition process to initiate the correct path for the next stages of the project. There was a proper decision-making committee to verify the needs of the project stakeholders. Some sensible decisions were made but the committee did not always function properly. Among the problems were a lack of time and interference from the higher authorities. The findings of the analysis of the project definition stage can be summarised as follows:

- The stakeholders' participation was very limited and most of the project decisions were not based on their recommendations. Some of the decisions were made 'somewhere else' by 'somebody else';
- There was a clear set of project goal and mission; but the information was not properly conveyed to the stakeholders;
- There was no specific resource assessment completed before the project started, except for the deployment of project supervising team. The labourers and construction materials were two important resources that critically required attention;
- The project scope was acceptable;
- Project risk was not considered explicitly by the decision-making committee.

A project that starts without sufficient definition and hoping that the matters will be clarified as the project progresses, normally results in a significant amount of rework, causing the projects to exceed time and budget limits (Webster 1999). Unfortunately, due to economic and political pressure, the government had to make a firm decision to start this programme quickly before completing all the usual tasks associated with the project definition phase. One of the reasons was to stimulate economic growth due to uncertain economic situation after the country was badly affected by the Asian economic crisis in late 1997. From the greater government perspective, that decision could be viewed as a sensible decision even though it had unfortunate implications for the programme.

7.2.2. Proper Planning

The change of project award approach from privatisation to direct-negotiation had created some confusion in the programme management since not all of the activities of the privatisation approach are organised similarly to those of the direct-negotiation project. For instance, the appointment of contractors for the privatization project occurred in the conceptualisation stage, but for direct-negotiation project this activity took place in planning stage. This scenario had bewildered many parties in the programme, including the project commissioner Some of the decisions made during project conceptualisation were understandable for a programme implemented through privatization but not appropriate for the implementation through direct-negotiation. These problems arose because the government's decision to change the project award was made at the end of conceptualisation stage, when the project scope had already been finalised. Since the decisions made in the conceptualisation stage were of the high-level, the decisions in planning stage should follow suit.

7.2.2.1. Distribution of Authority and Responsibility

The authority and responsibility in this programme were granted to the organisations, rather than individuals. This is common for all public sector projects in Malaysia. The problem arose when an individual in an organisation was replaced by another. Such a replacement sometimes caused changes to some decisions, probably because of different individual interpretations. Although such changes involved only minor decision but it could have had a major impact to the project.

7.2.2.1.1 Organizational Breakdown Structure

There was a clear hierarchical organisational breakdown structure (OBS) in this programme. The OBS helped those parties involved to identify the areas their organisation's responsibility and to play a significant role in the programme. The existence of this functionally oriented structure in indicating organizational relationships and constructing the assignment of work responsibilities (Wideman 2002) indicated that this programme, to some extent, had followed good project management practice. Based on their roles in the project, as stated in Table 6-10, the hierarchy of 10 parties is illustrated in Figure 7-2.

This OBS shows that the distribution of authority and responsibility among the government agencies was well established and clearly defined. However, in the actual practice there were some divergences, where certain agencies or certain officers had taken certain action beyond the power allocated to them. The deviation, either directly or indirectly practiced by certain parties, created four major discrepancies in this programme.

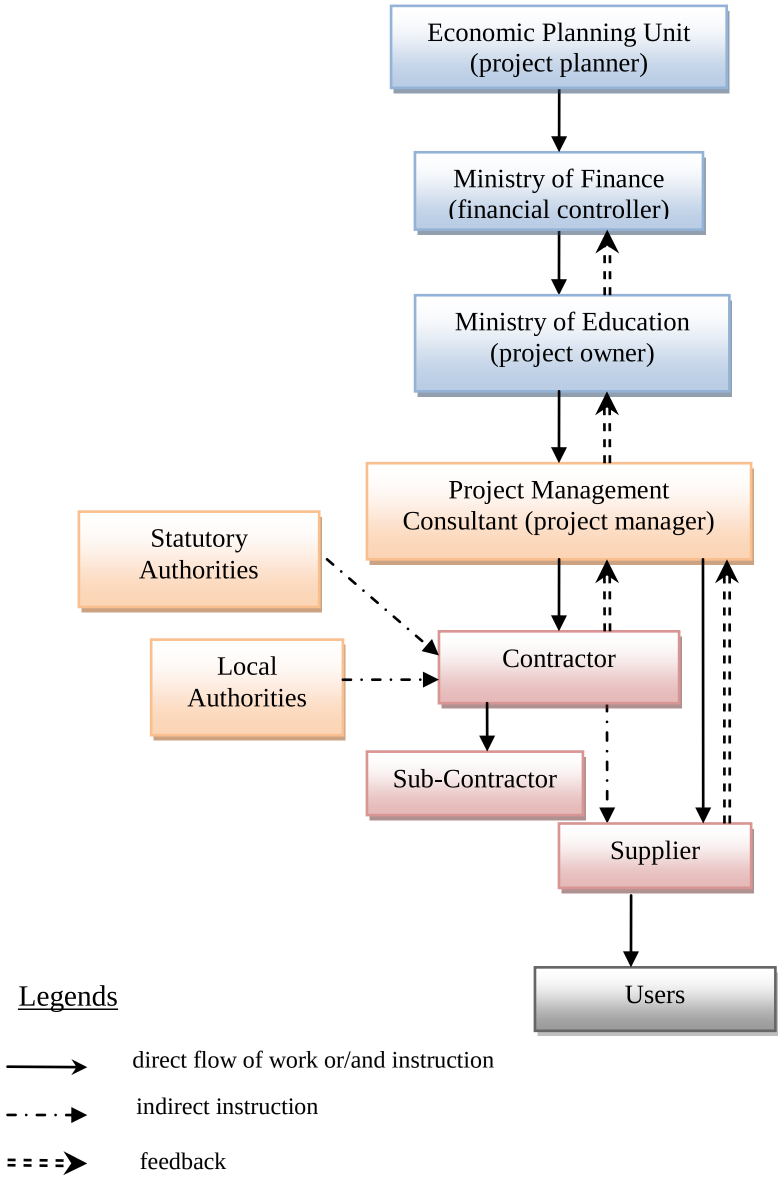

Figure 7-2: Organisational Breakdown Structure (OBS)

7.2.2.1.2 Divergence in the project

An appropriate distribution of authority and responsibility is essential in the project organisation as a check and balance mechanism in order to avoid the misuse of power. Ideally, all parties who were involved in the project had their own role, as stated in Table 6-10. However, there was evidence (see 6.4.1.2) that some exceptional arrangements took place in this project. Although the division of power was clearly stipulated in relevant law and regulation (7.2.1.1.1) especially among those with executive power, there were cases where one particular party influenced another party's job. This kind of disturbance caused a power mismatch and conflict of interest in the system. The implementation of the project faced particular difficulties when one party could not perform accordingly because of unnecessary interruption. This kind of disorder usually produced a negative impact to the project implementation and product, though there were few isolated cases of positive impact (such as Sheikh & Khan, 2005).

There were four such non-standard practices traced in the implementation of SCLP. The first one is in the issuance of LOA to the contractors of the pilot project. Based on normal procedures, such a letter should be produced by the owner of the projects. However, the letters dated 23/02/2000 to the contractors of phase-1 projects were produced by the project planner. Even though the progress of project was not affected by this non-standard practice, it was an early indication of some of the attitudes towards good standard practice. The second non-standard practice with a greater impact to the projects was traced in the project execution stage. In this case, the project financier had directed the project supervisor to send the contractors' claims for project progress payments to the AGD straightaway without being verified by the project owner. Even though there was a good reason for this practice, i.e. to accelerate the payment process seems acceptable, it was against the normal procedure. The worse effect of that unusual practice was that the project owner lost control over their own budget: the Secretary General of MOE indirectly lost his power as ministry's budget controller. He also could not play significant role as the project director since he no longer had the opportunity to stop or control the payment if he did not agree with the progress of the project. The only available option to the project owner was to stop the warrant of fund transfer to the AGD but such action could have aggravated problems and created an unhealthy relationship between members of the organisation structure.

The other exceptional practice traced in this programme was in the contractor selection exercise. Based on the existing procedure, the direct-negotiation approach is only allowed in five critical circumstances[16]. Based on the situation in this programme, none of those criteria was truly fulfilled, including 'the project is urgently needed' criterion; even though the programme was urgently needed, it was not to the extent that normal procedure of fair contractor selection should be avoided.

The last exceptional practice found in this programme was the failure of the project supervisor to fully play their role. Contractually, the supervisor represented the government in monitoring the projects and supervising the contractors. However, the supervisor had misinterpreted their duty in this programme by limiting it to project monitoring and reporting only, with no supervisory action. To rationalise their action, they claimed that the supervising role should be done by the contractors' consultants. However, the contract document between the government and the PMC showed this claim was unjustified. Para 1.3(v) in Second Schedule of the contract clearly ruled that of the role supervising the contractors is one of the PMC's obligations in the project management. In addition, they were also responsible to monitor the project and advise the owner regarding the project progress. The other responsibility that they failed to fulfil efficiently was to approve the contractors' works, especially in phase-2. As most

[16] The five conditions for direct-negotiation are: i) urgent needed, ii) for the purpose of standardizing; iii) a supply source (sole agent) , iv) involving security or strategic element; and v) bound by contractual.

of the phase-2 contractors did not have any technical staff to advice them, the supervisor's role was crucial.

7.2.2.2. Contractor Selection Procedure

This programme was a privately initiated, whereby seven companies submitted their proposal to build the laboratory building, supply the ICT equipment together with furniture, and maintain the laboratory for certain concession years; the approach is known as build-operate-transfer. However, the government had changed the implementation approach from privatisation to a public-funded method, and the selection of the contractors to be made through a direct-negotiation.

7.2.2.2.1 Phase-1 contractors

The idea of changing the project implementation approach from privatisation to public funded through design-and-build was seen as reasonable given the needs of the country at that particular time. The decision was made due to some political and social pressure to implement the projects as quickly as possible. In addition, there was an economic pressure for the government to generate a fast economic recovery after a bad recession that hit the country in the late 1990s.

However, the decision to award the project through direct-negotiation was questionable. On top of that, the decision to offer the four contractors with 500 projects each and the other two contractors with 200 projects each was doubtful. The volume was too large for any single company to complete them within the six months timescale as stipulated in the agreement. Apart from an assessment through a pilot project, there was no proper study to evaluate the capability of the potential contractors. Evaluating the contractors solely based on their performance in building the pilot projects was inadequate as it only tested their ability to build single buildings, not their competency in managing large-scale programmes.

Managing a multi-site large-scale programme requires not only knowledge, skills and experience in construction works but also in the other aspect of project management including the financial management, schedule management, human resource management, tools and machinery management, sub-contractors and suppliers management, and communication management. The failure of the contractors in any those crucial aspects, which will be further discussed in 7.2.3.3, resulted in many problems in the projects' progress.

7.2.2.2.2 Phase-2 contractors

Learning from the phase-1 mistakes, whereby too many projects granted to a small number of contractors, the government decided that only one project should be awarded to each contractor in phase-2. The decision to offer contracts to small-scale contractors was reasonable as the individual projects were relatively small. The building cost of the project ranged from only MYR105,600 to MYR200,000, without ICT and furniture components.

However, some of the phase-1 mistakes were repeated in phase-2, particularly in the failure of the decision-maker to assess the contractors' capabilities. The contractors were selected through a very simple direct-negotiation process without any proper study made to check their background or experience. The selection process was totally dependent on the list supplied by the SEDs. Most of the contractors recommended by the SEDs officers were 'those who close to them' rather than 'those with good performance'.

7.2.2.2.3 Supplier

There were two categories of suppliers in both phases of the programme, the furniture supplier and the ICT equipment supplier. The supply of components for the project took place after the completion of construction components. In phase-1, the supply components were packaged together with the construction component and awarded to the same contractor. In contrast, the supply of furniture and ICT equipment in phase-2 were separated from the construction contract, and awarded to another contractor.

The advantage of phase-1 approach was in the synchronisation between all the three components of the project. The project implementation would run smoothly if the main contractors could manage their own suppliers properly and the ICT equipment and furniture reaching the laboratories on time after construction was completed. However, with this arrangement the project owner had a lack of control over the supplier, as the contract agreement only bound the owner and the main contractor. Any arrangement between main contractor and their suppliers and subcontractors was beyond the project owner's knowledge.

Conversely, in the phase-2 arrangement, all the three components were independent each other. The decision to separate the supply of ICT equipment and furniture from building component was sensible as most of the small-scale contractors might not familiar with the ICT components. Ideally, upon completion of building construction, the supervisor would arrange with the furniture supplier as well as ICT equipment supplier to synchronise the supply so that there would be no gap between the completion building construction and the supply of furniture and ICT equipment. However, in practice, that rarely happened. There was often a long delay between the completion of building construction and the supply of furniture and ICT equipment. The supervisor and the suppliers blamed each other for the delay, illustrating a lack of communication between these two main stakeholders. The interviews indicated that both parties contributed to the project delay.

The biggest mistake made by the decision-makers in phase-2, according to many parties, was in the awarding of the supply of ICT equipment and furniture to a sole company; it was a repetition of a phase-1 error. As in the selection of phase-1 contractors, the selection of phase-2 suppliers was also made through direct-negotiation, rather than a normal tender procedure. The situation was even worse in this case as the volume was much bigger: the whole of the phase-2 projects equipment and furniture supply was monopolised by a single company.

The two reasons were given to rationalise that action were debatable. In particular the failure of the decision-makers to anticipate the inability of the supplier to fulfil the high demand was not excusable. The first reason, i.e. to protect the local ICT producer's interest might have been quite acceptable if the supplier had been competent enough to perform the job. However the selected company was weak and lacked the capacity to produce enough units to meet the high volume demanded by the phase-2 projects. The second reason, i.e. to synchronise the supply of both components was also questionable. While the isolation of supply components from the construction component was made to reduce the burden on the small scale construction contractors, the same committee had decided to award both supply components of such a big volume to a single company, creating a similar problem for this company

Eventually the whole of phase-2 furniture supply had to be sub-contracted to the other company by the main supplier. The sub-contractor had full control of the furniture supply and further problems arose when the sub-contractor did not perform accordingly.

None of the clauses in the contract could be enforced by the owner or the supervisor directly to furniture supplier as the contract was only bound the main supplier (which was also the ICT equipment supplier). The situation was even worse since the main supplier had lost control over their sub-contractor. As a consequence the supply of the ICT equipment and the furniture was disorganised: the lack of coordination between the various suppliers was among the main contributing causes to the project delay.

7.2.2.3. Project Design

As mentioned in 7.2.1.4, the decision-makers had sensibly chosen a uniform design for the whole programme so that the laboratories would be easier to maintain. The entire design submitted by the contractor was fully accepted without any modifications. Although the committee had every right to add or modify the features proposed by the contractors nothing was changed. They even overlooked some odd features in the design which might have been corrected, most probably due to the time constraint.

Although a number of design faults were detected in the first phase building, those faults did not affect the function of the building. The majority of the faults were in the model 3 building design, where the single-storey building consumed a large land area of 110-feet-long and 30 feet-wide. In phase-2, modification was made by introducing a double-storey building (see Plate 7-1); this new design reduced the land area required by half but the interior floor area was maintained. This was very important for some schools facing a problem of a limited school compound, especially those in urban areas. This new design (see Plate 7-1) had save half of the land area.

during construction

after handover

Plate 7-1: Model 3 building of phase-2

There were a few more design faults in phase-1 but these were minor and readily rectified in phase-2 projects without affecting the project cost. The change of roof trusses, from timber in phase-1 to steel in phase-2, was made for the purpose of saving cost and easier to monitor the quality, not because of design fault.

The committee was also responsive to the unsuitable design of furniture and in particular the student table selected for phase-1. Apart from consuming lots of space, the table was too bulky and did not fit the student. This table was replaced by a round table in phase-2, which was more space-friendly and comfortable to the students. This is an example of few problems that might have been avoided if the users had been more involved at an earlier stage. As for ICT equipment, changes to the specifications were required as ICT technology had progressed significantly since phase-1.

7.2.2.4. Project Scheduling

Setting the project completion time should be made appropriately after taken into consideration various factors. Being too ambitious in determining the project timeframe would make it difficult to achieve. In this programme, the project scheduling was unrealistic. The fact that phase-1 contractors were each scheduled to complete 500 projects within six months was too ambitious. Although the phase-1 contractors realised that it was almost impossible to complete the projects within six months, none of them dare to challenge or argue the decision as they afraid of losing the contract. Such an environment is unhealthy the decision-makers should encourage constructive criticism, especially in dealing with such a big programme.

Repeating the same mistake in phase-2 after the bad experience of phase-1 was unacceptable. Knowing the capability of the small-scale contractors, the project planning committee for phase-2 at the MOE should have considered a longer period for the contractors to complete the project. The same consideration should be given to the suppliers. Various parties were of the opinion that the phase-1 projects should have been given 18-24 months to be completed, while phase-2 projects should have been allowed 9 months. In most cases the delivery of the projects were not really late compared to a realistic timescale, but delivery was behind the unrealistic schedule set by the project owners (Kerzner 2006).

In the case of this project, the determination of the project timeframe was made by the committee without the use of any formal method of estimation (see 6.4.4). The committee also had not considered the availability of resources (7.2.1.3) or other possible constraints in making its decision about the timescale. The other mistake identified was the failure of the committee to organise the input from the main stakeholders adequately (see 7.2). Views from various stakeholders are essential in order to get a clear picture based on their experiences or observations. For instance, officers from the particular DEO would be in the best position to advice the committee about situation in their area. The consequences of determining project timescale without a proper evaluation will be discussed later in this chapter (7.3.1.1).

7.2.2.5. Project Cost

The concept of fixing the project cost is good in the event that all the unforeseen factors are minimal. This approach avoids variation orders and makes the management of the project easier. However, in the case of this programme, the projects were scattered throughout the country with diverse geographical conditions and cost implications.

For instance, some cost variation should have been allowed in the extreme case where there were problems due to underground difficulties. The sites in flood prone areas should also have been given the same consideration. Other site difficulties identified in this programme deserving special variation orders were rigid slope, heavy structure, old building, big tree, and unavailable access road. The worst scenario was in the case where some extra costs were needed to fulfil conditions required by local authorities or statutory authorities. A rigid approach to applying a fixed cost regime inevitably leads to problems where there are genuine local difficulties: some, carefully controlled, flexibility is needed.

7.2.2.6. Project Documentation

The project documentation was generally sufficient in both phase-1 and phase-2. The documents included TOR, government-contractor agreement, government-PMC agreement, letters of intent, letters of award, bank guarantees, performance bonds, insurance policies, and handing over certificate. Most of the parties who involved in the projects had fulfilled the project requirement by producing the specified documents properly and within the specified time.

The only exceptional were in the management of contract documents; these important documents appeared to have been completed just to fulfil the official or legal needs rather than to serve as a guideline for project management. The research found that the contract documents were prepared but all of them were completed retrospectively. Although a clause in LoA emphasised that "*this letter is a valid document to bind the two parties until the formal contract signed*", the parties involved just ignored it.

There were two reasons for the delay in preparation and signing of the contract for this direct-negotiation programme. Firstly, negotiation to fix the terms and conditions of the contract took an unreasonably long time as the parties involved faced with difficulties to reach consensus. The negotiation, which was started after the issuance of the LOI was supposed to be under the spirit of a win-win situation. However, the contractor took the advantage of being the sole contractor awarded for the particular projects to exert pressure on the government. Such cases can often happen when the projects were awarded based on mutual agreement before the contract's terms and conditions are concluded. Ideally the contract should be ready before any real commitment taking place. However, in the situation where it is impossible to avoid it, a better alternative should be introduced. One of the alternatives is to get the contractors to agree upon the principle needs before any issuance of LOA.

Secondly, the delay was due to inefficiency of the respective parties in preparing and managing the contract document. Preparing the contract document was under the jurisdiction of project supervisor. The study found that they did not have any legal personnel to advice them; in the case of phase-1, the supervisor depended on the contractors to draft the initial contract. The supervisor was supposed to verify the document drafted by the contractors but did not perform this task adequately. In the case of phase-2 projects, it was apparent that the inability of the supervisor to prepare the contract document had caused the delay. Even after the documents were ready they did not exert a reasonable effort to distribute them to the signatories. Furthermore, the agreements were not treated as important legal document binding the signatories. The failure of the supervisor to get the contracts signed by 118 contractors was a clear indication that they did not treat them as critical documents.

7.2.2.7. Was this Project Well Planned?

There was evidence that the planning of this programme was undertaken through a proper committee. In particular the planning process was better than project definition committee in terms of stakeholders' participation. As in project definition committee, there was a mixture of good and bad decisions made by the committee. Despite encouraging better participation, some of the decisions made by the committee were still inappropriate due to various reasons, including a pressure to complete the projects quickly. The summary of the findings for project planning are as follows:

- There was a clear distribution of authorities and responsibilities among the parties involved in the project but during the implementation there were some divergence.

- The selection of contractors, suppliers, and supervisor was made through direct-negotiation approach, not through normal tender procedures. While none of those parties clearly meet the conditions, they were selected to carry out the projects. In addition, the large volume of projects awarded to the phase-1 contractors, the phase-2 furniture supplier, the phase-2 ICT equipment supplier, and the project supervisor was unacceptable;

- The simple project design, adopted from one of the phase-1 contractors was satisfactorily accepted;

- Project completion time was specified without any proper justification or consideration of practicalities;

- The fixed project cost was a sound concept as it is easier to manage, but in some difficult local circumstances, variation orders should have been allowed;

- Despite systematic project documentation, there were some discrepancies in managing the contract agreement, whereby most of the contracts were signed well after the expected date.

7.2.3. Smooth Implementation

As the longest stage in the project life cycle, project execution consumes the most resources and needs the most effort. The study indicated that the success of all factors that emerged in this stage is largely determined by related factors from the earlier stages of the project life cycle: the progress of this stage was strongly influenced by decisions made in project definition and project planning stages.

7.2.3.1. <u>Project Administration</u>

The administration task of the whole SCLP was performed by the Privatisation Unit, Development Privatisation and Supply Division, MOE. They undertook this task on behalf of the MOE's Secretary-General, who was also the project director. The heavy workload, which was beyond the workforce strength, was the main problem faced by the project owner in this stage: the project owner also acted as project administrator. The administration was undertaken by just six permanent officials, including two clerical staffs. The demands on the staff were even greater as the same officers also had administrative responsibilities for the other projects, particularly privatisation projects. Besides administering the project and the contractors, the officers were also responsible in the other administrative jobs.

The role of this group of stakeholders was critically important in the organisation of the SCLP. While performing its role on behalf of the MOE's Secretary-General, who was also the project director, the project administrator had powers as stipulated in the contract agreement. One of the administrator's major roles was in advising the project steering committee chaired by project director to terminate the non-performing contracts. The project administrator was the secretariat for the project steering committee; the other role of project administrator, as apparently stated in the contract, was to endorse the progress payments to the contractors after the supervisors' verification.

Even though the administrators were working under-strength, new recruitment was difficult as the process involved other government agencies and needed to follow specified procedures. The only option available was to appoint contract workers. However, another problem arose as this type of officers have restricted powers. For instance they did not have sufficient power to enforce or to sign high-level official documents. Their loyalty to the organisation was also weak and would readily resign if there was an opportunity of a better job elsewhere. Surprisingly, despite the heavy tasks assigned to them, the officers in charge managed to carry out their duty effectively; this statement was supported by both quantitative and qualitative result of the study.

7.2.3.2. Project Supervision

The term ‘project manager’ could not be found in any document for this project. After studying the Government-contractor contract, Government-PMC contract, TOR and other relevant documents, the nearest related term that could be identified was the ‘project director’. As has been mentioned in 7.2.3.1, the project director is also the Secretary-General of the MOE. However, by comparing this project organisation with the literature (e.g. Turner 1993, Blair 2005, Kerzner 2006), the role of the project manager is more similar to that of the project supervisor.

In the normal public project, this role is normally played by the PWD. However, after taking into account the volume of the project, the government had decided to outsource this role to another party by appointing a private company, referred to as the PMC. The role of the PMC in this programme was to monitor the projects, supervise the contractors, and report the project progress to the project director. They also approved the status of the project before the contractor could proceed to the next task, and verified the contractors’ claims before forwarding them to the project administrator for approval. Based on the long list of their responsibilities in the project, the company selected to play the supervising role should be financially strong and have adequate experience in this business. In addition, the personnel engaged to run the task should be dedicated and highly motivated people. In the situation where the human resource in the government agencies, particularly the MOE and PWD is limited, it was vital that the PMC performed well so that the project could run smoothly.

However, the study showed that this PMC were not performing as expected. Despite their denial to take responsibility, the result of both qualitative and quantitative analyses indicated that their role as the project supervisor appeared to be one of the factors that had a significant negative impact on the project success. In addition, their refusal in accepting the supervisory role (see 6.5.2), despite the contract document stating otherwise, was a great problem. The decision to appoint this company as a sole supervisor for both phases of this programme was seen as a great mistake by the decision-makers.

7.2.3.2.1 Strength

It has been highlighted earlier (7.2.1.3) that human resource management could seriously affect the project. In the situation where the numbers of the government officers (project administrator) are limited, the project commissioner had a high expectation for the project supervisor's assistance so that the project could run smoothly. In terms of recruiting enough personnel to oversee the projects, the supervisor had greater freedom and did not have to follow the usual government procedures for recruiting the workers. However, in order to maximise the profit, they recruited a limited number of staff. The situation was even worse as the majority of the staff were lacking in experience. As a consequence, the supervisor's performance was disappointing. They were not capable in carrying their duty efficiently and did not have enough staff to fulfil the requirement of the contractors when their presence is needed.

The performance of the on-site personnel was monitored by the higher ranking personnel from their head office. While those high-rank officers could easily perform spot-checks their on-site staff in the first three zones, the spot check in the other two zones was difficult as they were far from the head office. This appears to explain the different performance in the various zones. The study also indicated that the supervisor's performance had a great influence to the users' satisfaction of the project (5.6.1), the benefit of the product to the users (5.6.2), and the project completion time (5.6.3).

The CCM record showed that the PMC was not financially strong; to appoint them without proper evaluation the decision was a big mistake. With only MYR100,103 (GBP14,721) paid-up capital, they were not really qualified to supervise such a big programme. Without a sufficient financial resource it was difficult for the PMC to prepare facilities and to recruit sufficient human resource.

7.2.3.2.2 Experience

The PMC was actually a newly-form company. The CCM record showed that it was registered as a private limited company in May 1998. There was no record showing that they had any experience in managing public sector projects. In addition, appointing them to supervise the phase-2 after their bad performance in the phase-1 was very questionable. Moreover, their willingness to accept the offer to supervise the phase-2 despite their poor performance in phase-1 demonstrated that they were more interested in the profits than performing responsibly.

7.2.3.2.3 Commitment

While discussing the power and interest of the project stakeholders in 7.2, the supervisor was grouped in the second category. The stakeholders in this category have some power in the project but at the same time they have less interest in the project. As far as the PMC is concerned, there was some inconsistency in their performance. At some levels, especially those from their head office, the PMC staff worked hard together with the other members of the project commissioner. However, at other levels, especially the on-site staff, they produced a sub-standard quality of service. For instance, they took a long time to respond and visit sites when their services were needed by the contractors for advice or approval.

Their bad performance in Zone 3 and Zone 6 compared with Zone 1, Zone 2, and Zone 4 suggested that the geographical area had influenced their preference in conducting the task (see Table 5-4). Geographically, Zone 1, Zone 2, and Zone 4 can be easily accessed by high standard highway from federal capital, where the PMC head office is located. The other two zones located in the less developed area; thus, fewer visits were made by their top management from headquarters to check the performance of site workers. Feedback from the contractors, SED, and DEO all revealed that the site staffs were not committed to their duties. With that kind of commitment, the government's investment in appointing this company as a project supervisor was not worthwhile.

7.2.3.3. Contractors' Competence

There were three types of contractors involved in the three components of the projects, i.e. the construction contractors, the furniture suppliers, and the ICT equipment suppliers. The integration of those three components was crucial to a successful project. The time taken to complete each component and the transition period between them was also critical. There were cases where time gap between the components had led to the delay of a project even though each component was completed within reasonable time.

Contractually, there were two major differences between the phase-1 and the phase-2 contractor arrangements. Firstly, the difference was in the volume of projects awarded to them; in the first phase, each contractor had to execute 500 projects, except for Contractor E with 200 projects. In contrast, each second phase contractor was responsible to build only one project each. Secondly, there was a difference in the contract arrangement (Table 6-14). In phase-1 there were only five contracts, one for each zone and the contract covers all the three components of the project. However, in phase-2, the three project components were awarded separately. For construction component, each project had its own contract while the ICT supply was a single contract for the whole of phase-2 project, as was the furniture supply.

Even though project WBS has clearly divided the project into three components (Table 6-1), the contract arrangement for both phases did not follow suit. In phase-1, the project owner had an agreement only with the five main contractors, and this agreement did not require the main contractors to reveal their sub-contractors and suppliers. Those main contractors held full responsibility over the whole spectrum of their allotted projects; meaning that the performance of each project's components was not clearly disclosed.

In phase-2, there was no relationship between the construction contractors, the furniture supplier, and the ICT equipment supplier resulting in poorer coordination between the components . In addition The project supervisor who was supposed to synchronise those three components, was incapable of undertaking the job efficiently, especially as this involved coordinating 1,174 construction contractors, each with own contract. The matter was even worse in the supply components as the suppliers for both furniture and ICT equipment were unable to fulfil their contracts: the furniture components had to be sub-contracted to another party. However, the sub-contractor was also incompetent and unable to fulfil the order.

7.2.3.3.1 Experience

Based on the number of years from their first registration to the project starting date, Contractor E was the most experienced company in phase-1. They had 16 years in the business as an IT equipment supplier and system consultant. Contractor C and Contractor B had experience as IT related contractors for nine years and two years respectively. The other two contractors had less than a year experience before the start of the programme.

Data obtained from the CCM, interviews with the particular companies and their profiles submitted to the government together with privatisation proposal, showed that all the five companies were IT consultants or IT suppliers; none of them was a construction contractor. In order to carry out the project, the main contractors had to appoint construction partners since 47%-60% of the work was construction (Appendix 4). In this regard, Contractor B was the best among all phase-1 contractors. They had formed a strategic alliance between an IT based company and a construction based company prior to applying for the contract. The registration date shown in the CCM's document is actually the registration date of the joint-venture company. Both parties had a long experience in their own field. As a result, they became the first company to complete the whole set of allocated projects . The last project in their package was handed-over to the project owner on 31/04/2004, about 26 month from the start date.

In contrast, Company D which appeared to be the worst among the phase-1 contractors was a purely an IT based company. Until the project start date, they had not yet formed any partnership with any party to handle the construction task. Finally, they appointed three construction companies to run the project in three states under Zone 4.

However, it was a weak alliance as those three construction contractors, each of which was responsible for one state, running the construction work as sub-contractors, not as partners. Consequently, they managed to complete only 9 out of 500 projects allocated to them. Eventually the government had to step in and terminate the contract. A total of 332 abandoned projects in this Zone D were rescued by small-scale contractors under PWD supervision, while the other 159 projects which had yet to be started were removed out from phase-1 and incorporated into phase-2.

Contractor C had a similar arrangement as Contractor D but they performed better. They managed to start 467 of the 500 projects allocated to them. However due to weak ties with their sub-contractors who claimed that they were not paid for work done, most of the projects remained in the incomplete stage for a long time until their contract was eventually terminated by the government. The other reason for the bad performance of projects in this zone was that there were too many layers in the project sub-contracting arrangement, resulting in a very low quality product. The supervisor reported that there were cases in Zone 3 of up to six tiers of sub-contracting. Like Zone D projects, all the abandoned projects in Zone C were completed by rescue contractors under PWD supervision.

Contractor A, which had the same arrangement as Contractor B, also performed well. However, they completed their projects later than Contractor B due to two reasons. Firstly, they had an argument with the government decision over the student chairs; they wanted to supply chairs their choice with the same specification. Secondly, three of their completed projects could not be handed-over earlier to the project owner due to the lack of a power supply.

In Zone 5, there was also a strong partnership between Contractor E and the construction company. Detailed exploration showed that throughout the project execution process, that construction contractor played a major role, more than the Contractor E, in completing the project. Despite some difficulties due to a lack of basic infrastructure, they managed to complete all 200 projects assigned to them. The other major problem in this zone was the interference from the other parties, which will be discussed in 7.2.3.5.

The above finding reveals three important lessons. Firstly, it is important to appoint contractors with the relevant field of expertise to perform the particular task. In this case, three of the contractors were fortunate in having strong construction partners from the correct field of expertise. Secondly, if partnership is necessary, a strong strategic alignment with the right partner is crucial. Weak partnership, such as through sub-contracting arrangements, is fragile and risky to the project. Lastly, an experienced and strong contractor is essential to improving the probability of project success, especially for a large-scale programme .

As for phase-2 contractors, even though each of them delivered just a single project and fulfilled only the construction component, experience is still important. Despite the fact that the project was a simple building, an inexperienced contractor would take a longer time to complete the construction work compare with their experienced colleagues. They needed guidance before undertaking the project; this was clearly demonstrated by the strong relationship between completion time and project management factors (5.6.3). This guidance should be provided by the PMC (7.2.3.2); while the experienced contractors would undertake the project without waiting for the project supervisor (in the case of late response from the supervisor, although such practice were not advisable), the inexperienced contractors had to wait for the PMC's advice or approval before proceeding. This was especially true when they were dealing with technical matters such the type and size of wood. Experienced contractors also had advantages in dealing with the project requirements, such as sources of material, source of labour, applying for approval and submitting a progress claim.

The contracts for supply components in the phase-2 were also complicated. The decision to package the whole of phase-2 ICT supply in a single contract and award it to a single company was a mistake. The same mistake was also observed in the supply of phase-2 furniture. To make the matter worse, both contracts were awarded to the same company. The rationale behind such an unusual decision was to synchronise the supply. According to the decision maker, by awarding both contracts to the same party, the supply of the ICT equipment could be done soon after the supply of furniture. Although the reason may appear sound; the consequences were not happened as planned, as the other problem arose.

7.2.3.3.2 Capital strength

For the project to proceed smoothly, contractors' capital strength is essential. Payment to the contractors was made based on progress of work; meaning that they were paid only after completing each portion of the project as stipulated in the agreement. Even though they were allowed to claim project's upfront payment up to 35% of the total project cost before the starting of project, that amount was not sufficient to cover initial cost; the contractors needed to spend their own money in advance. Especially in phase-1 a large amount was need for mobilization, workers, equipment and material before the project could begin.

Comparatively, the phase-2 contractors had fewer burdens as they needed to undertake only a single site compared with phase-1 contractors who need to look after 200 to 500 projects. However, they still need to spend their own money in advance in order to get the project take off smoothly. The 35% upfront payment was sufficient for them to initiate the project but some special arrangements were needed in some cases. For instance, some contractors were small companies and did not own the particular equipment required for construction. In order to make sure that the construction equipment, such as concrete-mixer machine, was available before the project started, they needed to purchase or rent it in advance.

7.2.3.3.3 Workers strength

Phase-1 contractors needed to complete 500 projects (200 in Zone 5) within six months. To fulfil the contract requirement, the contractors needed a large number of workers especially labourers. Practically, contractors would not recruit such a large number of workforces quickly. Dividing the projects into smaller numbers by sub-contracting it to the other contractors might be one of the alternatives in term of delegation of work. However, this alternative would not solve the problem if the workers were ultimately from the same pool. Moreover, too many tiers in the sub-contraction created other problems (7.2.3.3.1). That was the case of this project as they competed for workers.

The competition for labourers was worse after the implementation of phase-2 projects, which also sourced the workers from the same pool. Normally, the labourers were not permanent employees of the company. Their appointment was project-based with hourly or daily salary. They would move to any other employer that was willing to pay more. To make the matter worse, some of the phase-2 contractors were the sub-contractors of the phase-1 projects, and they had conflict of interest in prioritising the project. The majority of the contractors relied on the foreign workers, particularly Indonesians, who were willing to accept the job on low pay. Local people, who demanded a higher salary, were reluctant to take the job. Most of the Indonesian workers were illegal workers who entered the country without any working permit; some of them did not even have a passport. The worst scenario was in 2001 when some projects were abandoned for few months after the authorities exercised a major enforcement resulting in many illegal immigrants returning home.

7.2.3.3.4 Knowledge and Skill

All phase-1 contractors were large-scale Class-A contractors. They had a complete set of staff as required by the project including engineers, architects, quantity surveyors, and system analysts. In order to reach that level they need to demonstrate some ability and performance in related field. All of them were experienced contractors, but they were ICT contractors with no knowledge of construction. Fundamentally there was nothing wrong in having ICT contractors in this role as long as they had a strong partnership with construction contractor providing the necessary additional knowledge and skills. As the ICT component just represented a small portion of the project, the construction partner needed to play major role in the project. Contractor A and Contractor B were good examples of strong coalition between ICT and construction companies.

Comparatively, phase-1 contractors were more established compared to the small-scale class-F contractors of phase-2. Those small-scale contractors carried out their project with nominal resources. In implementing the projects, they relied on the supervisor to guide and provide them with advice, delivering any missing knowledge. The fact that their performances across the different zones were similar (5.3.3), reveals that they shared the same capability regardless of their whereabouts. Likewise, their performance was below the expected value (5.5.1), meaning that, without a proper control they were unable to undertake the project. The failure of the supervisor to play a significant role affected the performance of these contractors even though they often had a good record in previous projects.

7.2.3.3.5 Technology deployment

The SCLP projects were small and simple structures; thus, did not require a highly sophisticated technology. This construction work needed only simple construction equipment (Plate 7-2). Para 7.2.3.3.1 and 7.2.3.3.2 mentioned that the first phase contractors were more established companies compared with second phase contractors. However, the problem arose in the case of too many tiers in the phase-1 project. Works done by the fifth or sixth tier sub-contractors were often even worse than those done by small-scale phase-2 contractors.

Plate 7-2: Simple building equipment is enough for this project

The other problem arose was in the case of contractors tried to cut corners. In order to reduce costs, they used a poor construction method. For instance, they mixed the concrete material on the bare ground (see Plate 7-3) which eventually affected the building quality. This method was specifically not allowed by the contract but was observed in both the lowest tier sub-contractors of first phase and the class-F contractors of second phase. This practice breached the contract as both phase-1 and phase-2 contracts required the contractor to use the specified mixer. This kind of poor practice was also evidence of the PMC's failure to monitor the project and to supervise the contractors.

Plate 7-3: Some contractors ignore the rule by using conventional method

For the furniture and ICT equipment (see Appendices 5, 6 and 7), the deployment of technology was not crucial. The supplier needed only few workers to transport, install and commission the equipment. There was no case of any major breach of contract for these components for both phases of the projects.

7.2.3.3.6 Which contract method is better?

Phase-1 with many projects awarded to a fewer contractors and phase-2 with a single project to a single contractor were totally different each other in terms of setup and approach. Comparisons between those two approaches of the contract mechanisms, to find out the advantages and disadvantages of both approaches is summarised in Table 7-3.

Table 7-3: The advantage and disadvantage of phase-1 and phase-2 setup

Setup	Advantage	Disadvantage
Phase-1 • MANY projects to ONE contractor • All project components are packaged in single contract	• Easy to control as fewer people are answerable; • Fewer contract and other documents to manage; • Contractors have appropriate technical staff; • Proper office arrangements; • Manage to perform their work independently (or through partner); • Own proper equipment (at least through partner or sub-contractors).	• High responsibility; • Has to distribute the projects to meet the completion time; • Need longer time to complete; • Need more labours • Unfair award of projects.
Phase-2 • ONE project to ONE contractor • Separate contract for each project component	• Low responsibility; • Does not have to sub-contract the projects (except for some component); • Shorter time to complete; • Need fewer labourers • Fair award of projects.	• Difficult to control a large number of contractors; • Too many documents to handle; • Lack of technical staffs amongst the contractors; • Improper office setup (some of the operating from home); • Dependent on guidance (need PMC to supervise especially on technical matters); • Lack of equipment.

Phase-1 arrangement is better in term of managing the contract, as only few parties holding responsibility to the project owner or project director. Administratively, this contracting method would be easier to control, as all the project components were packaged in a single contract. However, this kind of arrangement needs competent contractors; they must be financially strong and have sufficient project experiences in the relevant field.

In order to have competent contractors, selection should be made through a proper and transparent process: integrity is very important. It is essential for the policy-makers to comply with regulations and procedure of the project procurement and tender process. It is also important for the project administrator to control the sub-contracting arrangement by putting necessary clauses in the contract agreement to impose the condition that the main contractors must declare their sub-contractors and suppliers. This mechanism would help the project administrator to control the tiers of sub-contractors and maintain the quality of the project. Usually, too many tiers result in low project quality, partly due to the reduced margins as each level of sub-contractors extracts their profit. In order to avoid discrimination against the small-scale contractors, the contract might impose conditions on the main contractors requiring a percentage of their sub-contractors to the small-class contractors – class D, class-E and class-F.

Phase-2 method is good in terms of a fair project distribution. It is more flexible and requires less mobilisation, resulting in faster project take-off. However, this method requires more support administratively, as the small-scale contractors often need more guidance. In addition, this kind of arrangement is very time-consuming, especially in managing the documents. There were 1,174 projects in phase-2, each of which has its own contract. That implies that the project administrator and project supervisor have to deal with at least 1,174 people, 1,174 x 3 copies of letters of intent, 1,174 x 3 copies of letters of award, 1,174 x 3 contracts documents and 1,174 x 14 progress payments.

Furthermore, there was a peculiar arrangement in the phase-2 supply contract, where the supply of furniture and ICT equipment for whole phase-2 were packaged in a single contract each. Synchronisation between the three components faced with some difficulties as it involved various parties; failure in synchronisation would cause a long gap between each component leading to a delay in the projects' completion.

If the government decides to use this kind of award method in the future, some adjustment is essential. Each contract should have all three components packaged together for the purpose of easier synchronisation. To make it more manageable, the phase-1 style could be adopted; a reasonable number of small-scale contractors are grouped in a contract, where they will perform as sub-contractors to a higher scale contractor. This model will reduce the administrative burden and it could be manage by lower level administrators, such as SED and DEO.

7.2.3.4. Communication and Feedback

Good communication amongst the project team is one of the important factors that could affect the project success, especially during the execution stage. A good rapport between parties involved in the project is crucial to make sure the project runs smoothly. Coordination between parties can benefit the projects in two ways. First, it helps the projects running smoothly, and second, it would resolve most of the project issues faster. A clear direction and firm decision is essential in order to make sure the smooth implementation, while proper feedback is a key to the resolution of any issue.

In this programme, a good platform for communication and feedback has been established. Three levels of committees were established at the MOE (6.5.4) to handle all project matters during the project execution: this would have been sufficient if all parties use those platforms efficiently. One of the functions of each committee is to troubleshoot the problem related to the project.

However, the committees did function well. Problems between contractors and their sub-contractors or suppliers for instance, were treated by the main contractors as an internal matter and were not made known to the committees. The fact that the chairperson of the steering committee, who was also the project director, had never been informed about the problem between Contractor D and their sub-contractors during the earlier stage of the project execution clearly shows that the facility was not utilised properly. The problem was eventually revealed to the highest committee after the project has been delayed for 18 months. The contract for that zone was eventually terminated as the problem was identified too late to be resolved by the committee. In Zone 3, the problem of too many tiers in subcontracting affected the project quality, where most of the building needed rectification especially the roof trusses. The supervisor had never reported this problem to the committee: several buildings collapsed due to substandard quality.

Good communication also proved to be very important to avoid unnecessary and overlapping work but who should take the rule as mediator when there are disputes? The group of people in the project best qualified for this role were the supervising team. Their people were everywhere; thus it should be no problem for them to communicate with everybody either to convey any information and direction or to report any poor practice.

7.2.3.5. Integrity

This issue was relevant in each of the first three stages of the project life-cycle, that is, throughout the project process. Due to its sensitive nature, integrity was recognised as one of the most difficult factors to interpret in this study. It remained undisclosed as none of the respondents were willing to reveal it in detail despite acknowledging that exceptional arrangements existed in this project. From the analysis of the interviews (see 6.5.5) and the questionnaires (see 5.3.5), the integrity issue can be divide into two categories.

The first category describes the failure to exercise power to the best advantage of the project, whereby many of the standard procedures were not followed. The misuse of position and power to favour someone or some parties, i.e. favouritism, was part of the bad practices. In some circumstances, favouritism may be acceptable as long as the favoured parties were qualified and the award was not breaking the law; it was the question of irrationality rather than integrity. The issue of integrity arose in the case where the favoured parties were not qualified or less qualified, ignoring the existence of other more qualified parties. The second category of integrity concerns was a practice of permitting practices that should be disallowed, and vice versa. This type of integrity concern could also take the form of failing to take action to correct the wrongdoing of others.

As far as the SCLP is concerned, the first category of non-standard practice was more important in terms of the cost involved. A classic case would be the award of the projects or part of projects to someone or parties who have close relationship such as friends or close family. The parties who obtain the contracts might be qualified in term of their capability, but the award process was improper. A further problem arose when action was not taken to address the wrongdoing of parties who carried out the work because of their close relationship to those in power. Wrongdoing such as ‘cutting corners', using a sub-standard material, and not fulfilling the specification by those who carried out the project could result in a great loss to the project.

7.2.3.6. External Influences

Comparing the results of the quantitative analysis (5.5.1) and those of the qualitative analysis (6.5.6) reveals that there are some apparent contradictions between the two in terms of the effects of external influences. However, the differences may be explained by the different foci of the analyses. There were various external influences in this programme but those influences affected only a few projects, not the whole programme. For instance, the interference by local politicians in selecting sub-contractors happened only in few areas. Thus, in the quantitative analysis, this effect did not appear to be significant as a large number of projects were analysed. However, in the qualitative analysis, which highlighted the issues deeply into a specific project the issues became visible: individuals may tend to readily recall such instances even though they may be comparatively rare.

An external influence in this context means someone or something beyond the control of any members of the project commissioner. Most of the external influences were apparent during the execution stage, when the project director holds an executive power in controlling the project. External influences can be divided into three categories. The first category was human interferences, which included some influential figures such as local politicians. The second category was environmental influences or geographical difficulties, while the third one was the economic influences.

7.2.3.6.1 Human interferences

Interference by people or group of people has been briefly discussed in 7.2.1.1.1 above. External influences could affect the project, either negatively or positively. Negative influences were related to risk (7.2.1.5), while positive influence could be classified as opportunity. The study demonstrated that most of the influences negatively affected the project. However, there were also positive influences recorded. For instance, one of the local authorities in Zone 5 had imposed a very rigid regulation which involved all projects of phase-1 in that district. They refused to approve the drawings of five sites because the distance from the site to the main road was less than 40 feet, as required in by-laws. However, with the assistance of a local politician, the issue was resolved.

Apart from that, most of the influences were negatively affected the projects. Political interference was a major form of interference. One of the biggest interference, which was highlighted by most of the respondents, was the distribution of projects across the country. Two states, which were under opposition party rule at that particular time, were excluded from the implementation of phase-2 projects. In the opinion of the respondents this practice back-fired on the government damaging their image; it was thought that children should not be penalised because of their parents' political stand.

As this programme spread throughout the country, the contractors had to deal with different local authorities. Different local authorities had different sets of by-laws and the projects needed different sets of specifications. Without revealing specific details, the contractors related these issues with the exercise of improper bureaucracy and some failure of the integrity of the officers in charge: some contractors suggested that the problems could only be resolved when applications were accompanied with something[17] to speed up the approval process.

7.2.3.6.2 Environmental influences or geographical difficulties

Despite being highlighted by all contractors during interviews, the statistical test showed that environmental and geographical influences were not a major issue (5.5.1). Rain, for instance is a normal phenomenon in a tropical countries like Malaysia. The contractors should take a proper precaution to avoid any project delay due to rain. The other complaint by the contractors was that the site was not ready for building to take off because of existing structures and trees. The owner revealed that it was not a major issue as there was only a small tree or a very simple old structure on site and the problems were readily resolved. If the problem were large requiring significant extra expenditure, the government would normally bear the cost.

7.2.3.6.3 Economic-related influences

The external influences related to economic factor might be rare but they could badly affect the project success when they did occur. In this programme, the financial problems were traced to the fluctuation of material prices (also see 7.2.1.3.2). There were two opposing ideas about this issue. The contractors were of the opinion that the contract should include this in order to protect their interest. However, the project financier has a different idea; compensation was not necessary as price fluctuation is difficult to control. Sometimes the material price even went down, where the contractors would benefit from that.

[17] This expression referred to something that need to be given by the contractors, either money, gift etc., which is related to 7.2.3.5.

7.2.3.7. How was the performance of the project implementation?

The shortfalls in the implementation of this project were largely due to deficiencies in the earlier stages of the project. The important findings of the project implementation can be summarised as follows:

- The project administrator (MOE and its agencies, SED and DEO) administered the projects with the under-strength workforce. However, they managed to maintain their performance;

- The project supervising team (PMC) was ineffective in carrying out their job, in spite of large amount spent by the government to pay for their service. They lacked experience and facilities, and had insufficient staff to supervise such a big programme; some of their roles were left undone.

- The phase-1 contract mechanism is a better approach, in term of management, provided that they were properly selected among the best contractors in related field and number of projects awarded to each contractor was reasonable.

- The phase-2 contract mechanism was good in term of the smaller burden on each contractor but there was a big burden on the administrator and supervisor as there were too many contractors to deal with and large numbers of contracts to manage.

- The phase-2 ICT equipment supplier and the phase-2 furniture supplier were unable to fulfil the large contracts awarded to them.

- A good mechanism for communication and feedback existed in this project. However in some circumstances, contractors and supervisor tended to hide their problems from the committee in order to maintain their reputation;

- A lack of integrity existed in the project but due to its sensitive nature, no clear information was gathered from the respondents.

- The external influences were not significant in their effects on this programme as they only affected certain projects; however, in general, such issues should not be ignored as the impact to the project, where it happened, was large.

The best approach of awarding such a big volume programme is by selecting several competent contractors through a proper tendering process and thorough evaluation, while packaging all project components in a single contract. Each contractor should be awarded only reasonable, manageable number of projects. The advantage is that the administrator has fewer companies to look after so that easier to monitor. At the same time, this approach would avoid the element of monopoly that aggravated many problems, such as the ICT and furniture supply.

7.3. PRODUCT SUCCESS

Especially for the users, the project product has a greater impact than the project process. As far as SCLP is concerned, there were two reasons the users were more concerned about the product rather than project process. Firstly they were not involved in the planning, undertaking or monitoring of the project. Hence the users had no detailed expectations or knowledge about the project progress. Therefore, the users focused more on the product rather than the process. Secondly, as the parties who utilised the project output, they are the best party to evaluate it.

7.3.1. Acceptable Project

It was the aim of every member of the project management team and the contractors to complete the projects successfully and deliver the product to the project owner on time. Nonetheless, completing the project within schedule is difficult to achieve as it is influenced by many factors. Depending on their interest in particular project, different stakeholders judged the project outcomes differently. The acceptability of projects is normally judged by their output and outcome. Output is the product delivered at the end of the project, while outcome is effect and benefit users obtain from the outputs. As far as a particular project in SCLP is concerned, the output was the school laboratory with all its facilities, while the outcome was the improvement of the teaching and learning provided to students.

7.3.1.1. <u>Completion Time</u>

Even though completion time is not a product per-se, it is discussed as part of the product stage as it is measurable only after the project reaches this stage of the cycle. As well as being a success factor itself, the completion time also reflected other success factors, particularly in the product stage. Conversely, the performance of this factor was affected by the other factors that occurred in the all stages of the project life cycle. Indeed, certain parties used it as the prime indicator in judging the overall performance of the project. .

The study reveals that the completion time was affected by two interrelated factors from the previous stages, namely the resource assessment (7.2.1.3) and the scheduling (7.2.2.4). The main point, which the decision-makers had overlooked during the conceptualisation and planning of the project, was the time-resources trade-off. If time is a fixed constraint, resources must be sufficient, and vice versa. In the case where both are constraint, then the time is usually relaxed, as in the case of the SCLP. Resources were a major constraint due to the high volume of the project, but time was also a constraint as the projects were due to be completed within a publically announced timescale; thus, the decision-makers should have adapted the programme and produced a schedule based on the available resources.. The decision to split the programme into several phases was a sensible attempt to reduce the peak resource demand but dividing it into only three phases was just not enough to for ten thousands of projects. Such a big programme as the SCLP needed more phases with a smaller number of projects in each phase so that it would be more manageable.

To make the matters worse, the completion time was also affected by the other factors in the same stage, notably the competency of contractors, including suppliers (7.2.3.3) and the efficiency of supervisor (7.2.3.2). The contractors, especially the phase-1 contractors and phase-2 suppliers, were incapable of undertaking such a large number of projects. The major problem with the phase-1 main contractors affecting the project performance was related to their poor project management capability, notably their weak ties with their sub-contractors and suppliers: too many tiers in sub-contracting made them difficult to control. In phase-2, the incompetence of the furniture and ICT equipment suppliers were a major cause of the project delay. Their inabilities to produce, supply, and install the furniture and ICT equipment within a reasonable time after the completion of the construction component affected the overall project completion time substantially. Poor coordination by the project supervising team aggravated the situation. The PMC lacked essential skills and experience to handle a programme involving so many projects scattered throughout the country.

The completion time of SCLP was even more complex as it was influenced by various project characteristics, notably the contracting method and geographical location. The phase-1 contracting method, whereby all the three project components were package in a single contract for particular contractors, was a better approach compared to phase-2 method in which each component was contracted separately. The advantage of this approach was in the project control. The only issue in the SCLP phase-1 contract was too many projects were awarded to particular contractors, which required them to take a longer time for mobilisation before starting the projects ultimately producing a substantial delay in the completion of the whole programme. The large volume of projects required the contractors to carefully plan and arranges the logistic matters, including workers employment, sub-contractors selection and machineries relocation, each of which required substantial expenditure. Eventually the overall programme completion time was affected even though the individual projects progressed quickly once they had actually begun. If the number of projects could be reduced to a manageable volume, the phase-1 contracting method would be a better approach in managing programmes with such a large volume of projects.

Conversely, the phase-2 approach allowed the construction contractors to start their work immediately as each of them responsible to only one project. Those who were competent managed to complete their project early. However, the problem arose after the completion of construction component as there was no continuity. In most of the projects, the supply of ICT equipment and furniture did not take place on time due to inability of the suppliers. Apart from inefficient suppliers, a long time gap between the construction and the supply arose due to a lack of coordination between parties involved, including the incompetent project supervisor.

The study disclosed that in phase-1, projects for Zones 3, Zone 4 and Zone 6 took a longer time to complete compared to Zone 1 and Zone 2. The longer delay in Zones 3 and Zone 4 was due to the bad performance of the contactors. Even after numbers of EOT, Contractor C and Contractor D could not complete the projects and eventually both contracts were terminated. As for Zone 3, the longer time taken was related to external interference.

Apart from the genuine delay particularly in the case of contractors' bad performance in phase-1 and the long gap between construction and the supply of components in phase-2, the completion time of this SCLP was acceptable. Although most of the projects were delivered behind schedule, the time taken was actually within the acceptable time-frame. The 'delay' was a result of an over-ambitious schedule set by the decision-makers. The committee had set the project schedule without referring to any guideline or analysis. The study disclosed that most of the phase-2 projects took 9-12 months (Figure 5-2) to complete; this figure was in line with the suggestion by the stakeholders that the reasonable completion time for a project based on the phase-2 model is 9-11 months. As for phase-1 approach, where groups of projects were awarded in single contracts, most of the projects were completed within 21-24 (Figure 5-1) months, which was in line with the 24-26 months as suggested by the stakeholders.

There were different views among the project stakeholders about the project delay. Whilst some stakeholders could not tolerate the delay and saw it as a symptom of project failure, others could accept a reasonable delay so long as the product was beneficial. For instance, the project commissioner viewed the late delivery as demonstrating that the project had not fulfilled its original objective (7.2.1.2) but to the users, the delay was tolerable, as the project had helped improve teaching and learning (5.6.4).

7.3.1.2. The User Satisfaction

The users were the best party to verify the product of SCLP, as they were the ones who utilised it. Interestingly, despite the late delivery, all components of the project in SCLP were accepted by the users with a high degree of satisfaction. The differences in level of acceptance among users in different zones and between phases (5.4.1) were explicable. As far as building is concerned, the quality, appearance, and features of the computer laboratories had led to the variation in user's satisfaction between zones. Especially in phase-1, the building's design is unique to specific zone: even though the whole of phase-1 projects were built using the standard design, each contractor was allowed to make some minor modifications in the interior decoration and colour scheme of the building. Those minor changes led to the differences in the level of user acceptance between the zones.

The differences in user expectations between zones for the ICT and furniture were more difficult to explain. Possibly it was related to standard of living in those zones; the users in the less developed zones appreciated the projects more than their colleagues in the well-developed zones. Even though all zones used the same specification for furniture and ICT equipment, those who resided in the remote areas appreciated the facilities more than those from urban and semi-urban areas. For instance, most of the parents in the developed zones can afford to purchase computers for their children to use at home. However, that reason could only explain the low acceptance in Zone 4 and the high acceptance in Zone 5 and 6, as Zone 4 was highly developed while Zone 5 and

Zone 6 were less developed. The low acceptance in Zone 3 and high acceptance in Zone 1 and 2 contradict this hypothesis, as Zone 1 and 2 were highly developed and Zone 3 was less developed.

An alternative explanation for the variation in users' satisfaction was related to the performance of the projects in particular zones. A positive association between users' satisfaction and the performance of project management (5.6.1) suggested that the problematic zones, notably Zone 3 and Zone 4, had produced a lower quality products compared with those with higher performance, especially Zone 1 and Zone 2. This could explain the low satisfaction in Zone 3 and Zone 4 as well as the high acceptance in Zone 1 and 2 for all three components of the project.

The differences between phases could be easily understood as both phases have different building design, different set of furniture and different specification of ICT equipment. There were two reasons of why the phase-2 facilities were better and gained a higher recognition from the users than phase-1. Firstly, the second phase of the programme was furnished with revised facilities after learning from shortfalls during the first phase. Secondly, phase-2 was launch almost two years later than phase-1; thus, the facilities especially ICT equipment were based on the latest specification in the market (Appendix 6).

Apart from those variations, undoubtedly, the SCLP was the most comprehensive school computerisation programme ever, as it covered all public schools throughout the country. Despite some minor shortfalls mentioned by the users and the other stakeholders (6.6.2), the computer laboratories provided under the SCLP were good enough to meet the needs of schoolchildren and teachers. To furnish those schools with more sophisticated facilities would be beyond the government's capability as there were almost ten thousand public schools in Malaysia. The high acceptability among the users was proven quantitatively (5.5.2) and qualitatively (6.6.2). The high appreciation is due to the contribution of computer laboratory building together with the up-to-date ICT product in each school, generating a new dimension in the Malaysian education system. This result contributed to the government's endeavour to ensure that the young generation are well equipped with ICT knowledge to face the challenging world of the future.

7.3.1.3. Product Benefit

The study showed that the users recognised the usefulness of the facilities in improving the student knowledge and skill in ICT as well as to facilitate the teachers in teaching and learning process (5.5.2.3 and 6.6.3). In this regard, all teachers appreciated the government's efforts in providing the facilities to each school. To them, this development is clear evidence that the government was serious and giving special attention to preparing the younger generation to face the global challenge.

The products were beneficial to the users in three ways. Firstly, it was judged to help the students to be more computer literate. While basic computer literacy may be easily developed by those in the urban and sub-urban area, with more opportunities to access computers, this benefit was important for those in the remote areas. All students benefit from having a trained and skilled teacher to take charge of their ICT education while web browsing, was very important for the students in getting more informative material for a wide range of lessons in the classroom, and also for their daily usage.

Secondly, the facilities were used as a medium for the teaching and learning, not only for ICT related subjects but also for the non-ICT subjects. It was interesting to discover that students of all zones appreciated the computer usage across a wide range of teaching and learning. The facilities generated a stimulating environment to attract students to concentrate on the subjects taught in the class. It was reported that the students paid more attention to the lessons compared to more conventional teaching methods. Lastly, teachers utilised the facilities, especially PCs, printers and the internet connection for academic management purposes, which included updating their student database, preparing their teaching materials, and searching for teaching materials worldwide.

Especially in the ICT related projects, the users were concerned to have easy-to-use software besides the physical features (Mahmood et al. 2000) in their acceptance of the product. In order to facilitate the users knowledge and skills in using the product efficiently, the SCLP had included the training as part of the ICT package. Although the training covered only a basic knowledge, it appeared to be sufficient for most the users.

Despite many benefits, the study identified some failings. The main issue was related to the curriculum of the ICT subject. This task, which was under the jurisdiction of Curriculum Development Centre, MOE has still not been resolved even though some of the computer laboratories were in used since 2004. The study revealed that the specific software for the ICT subject was still under development and none was in use thus far. The delay was questionable as the relevant party had been aware about the SCLP since the beginning of the programme. In response, some teachers purchased software from the open market or developed software themselves for their children, even though this was beyond their personal responsibility.

The other issue was the inadequate number of PCs given the large number of students, especially at the highly populated schools. This issue is complicated as the government was constrained financially. Some schools have adopted a rotating system with priority given to the examination-year classes as the best alternative available. The other alternative of obtaining additional computers financed from the other sources such as donations might be workable but who should take that responsibility? The teachers should not be burdened with such a task: the parent-teacher association might be the best party to pursue this job.

7.3.1.4. Was the product of the project acceptable?

Based on the above findings, a number of specific issues related to the success factors during the product stage can be summarised as follows:

- The fact that none of the projects were completed within timeframe is a largely consequence of an unrealistic scheduling made during the project planning. However, some projects did experience real delays, due to a variety of project management factors.

- Despite most of the project being delivered behind schedule, the users were satisfied the deliverables of the SCLP. They recognised the benefits of the projects; besides facilitating the students in improving their knowledge, the outputs of this programme were also useful for teachers in improving their teaching efficiency and administration.

7.4. PROJECT CHARACTERISTICS

The effects of the success factors were discussed through 7.2 and 7.3 in the context of direct impacts on the projects. Nonetheless, the impacts of those factors were themselves indirectly influenced by underlying project characteristics. In this research, two prominent project characteristics were identified: geographical location and contracting method.

7.4.1. Geographical Location

The geographical locations, determined by various zones throughout the country influenced several project success factors throughout the project life span. There were several features associated with different zones. First, differences in infrastructure and facilities had different impacts on project success. For instance, those zones with a better road system had advantages during the project implementation compared with those with lesser facilities. Second, different zones had different socio-politic characteristics which influenced the work culture, the supply of construction material, availability of labourer, political influence in appointing sub-contractors, and the level of acceptance to the project deliverables. In this study, all three factors were influenced by the project location.

The project supervising team was found to be largely influenced by geography: their performance in the zones nearer to their head-office was better than those in the more distant zones. Their inability to respond to the differences of various zones reflected their incompetence in this programme. All zones should have received the same level of supervision and guidance: officers should have visited the sites regularly regardless of the location of the projects. However, in this SCLP, they only focussed on the zones which were easier to reach and devoted less effort on the remote zones. The differences in level of supervision were also due to their weakness in terms of manpower, financial, and experience; this was demonstrated in the outsourcing of the supervisory role in one of the remote zones, which was far away from their head-office. The difference was also due to the regular spot-checks undertaken by higher rank officers in the sites in the zones nearer to their headquarters.

In addition, the project location also influenced the level of customer satisfaction of the project products. The difference in preference was influenced by socio-economic characteristics of the users in each zone. Users in the remote areas appreciated the product provided by the government and were more satisfied with it, while users in the urban or sub-urban showed a lower level of satisfaction. This is because those who lived in the city are more familiar with such facilities while users in rural areas have less access to ICT and hence have different expectations. However, this did not affect the level of appreciation of the facilities provided. Users in all zones had appreciated the product of the project and recognised it as very useful to their teaching- learning process.

Another factor that was largely influenced by the project location was the project completion time. But this was largely a reflection of the capability of contractors in those particular zones, especially in phase-1. Projects in Zone 1 and Zone 2, which had been carried out by contractors of highly capable, were completed earlier than projects in other zones.

7.4.2. Contract Award Method

Different methods of contracting, determined by different phases of the programme, had a major influence on the project success factors. One of the project success factors that was particularly affected by this project characteristic was the completion time. The phase-1 method led to longer times as there was a substantial delay in the work commencement due to the complex mobilisation required for such high volume contracts. Conversely, the phase-2 contract approach resulted in shorter completion times, at least for the construction component, as the contractors had no heavy mobilisation burden before commencing the projects. Ideally, the phase-2 approach would better if all the three project components were packaged in the same contract and awarded the same way as construction component; it would be more easily synchronised and reduce the completion time. However, this approach would still involve a large number of separate contracts and a great administrative burden.

The ‘modified’ approach would not solve all of the existing problems with the phase-2 approach. As the contract requires each contractor to be attended individually, it was very time consuming and providing good supervision and guidance was difficult. Indeed, one of the major difficulties arose from the management of the contract document as mentioned in 7.2.2.6. From this administrative respect, the phase-1 method is a better approach; a compromise would be to awarding a reasonably large number of projects to a fewer number of contractors, which would reduce the administrative burden for the government agencies while avoiding the programme management problems encountered by contractors trying to find the resources for large numbers of projects.

The user acceptance of facilities provided differed between the phases but this was not a result of the award method but the dates the facilities were provided. The phase-2 facilities were provided two years later than those of phase-1, and the level of user acceptance was higher. This reflected the better ICT facilities and furniture in terms of quality and specification, the revised building of the second phase was also better than of the first phase in terms of appearance. However, differences in user satisfaction did not affect their appreciation of the product; users recognised the project outcome as beneficial to them with no significant differences between the two phases. Despite few differences between the two phases in the product’s appearance, quality and specification, the teachers and students acknowledged that the facilities had greatly facilitated them in improving the teaching-learning process.

7.5. RESPONSES FROM THE INTERESTED PARTIES

As part of the process of validating this research, the findings and the preliminary conclusion were presented to various interested parties, comprising of representatives from the project planner, the project financier, and the project owner for their comments. The purpose of the presentation was to explicitly perform an external validation to support the earlier mentioned internal validation through triangulation which involved different data sources and different methods. Apart from few critical remarks on particular issues, the representatives basically agreed with the whole concept of this research and appreciated it as a great contribution to the project management practice in Malaysia. Their valuable comments are summarised here (but for the purpose of anonymity, their identities are not disclosed):

Project Planner's comments:

> *"I appreciate that this is an action research but in concluding this research, you should not see it only from your perspective as a project administrator; being a government officer, your conclusion should also reflect the government's perspective. Government's point of view is not always means political point of view. Any decision made by the government is meant for the national interest."*
>
> *"You are quite right to relate your studied factors with the project resources, and the affects of those factors were influenced by characteristics beyond our control. But I am not quite sure how to perform a resource projection as it is depending so much on the other elements including the other projects, which are also beyond our control. Isn't it another project characteristic?"*
>
> *"I am happy to hear that the users appreciated the computer laboratories. It is good if someone would enhance this study to find out the economic impact of this programme as well."*

Project Owner's comments:

> *"The other important aspect that we would like to see is the impact of this programme to the education system after the whole programme is completed; someone should carry out the evaluation, may be an educationalist."*

Project Financier's comments:

> *"Please be careful while discussing about integrity. I couldn't agree more with you that integrity is a critical issue in the project implementation and there are some exceptional practices in this project but it is not fair to say that it happened everywhere and in every project."*

> *"It is good that competition for resources is highlighted in your thesis but please bear in mind that not all factors studied in this research reflected the ordinary public sector projects. Large number of projects in a single programme, implemented simultaneously, is rarely happened. Thus, competition for some of the resources mentioned here, for instance cement or steel, is rarely happened. However, I agree with you that price fluctuation may happen from time to time. I also agree with you that competition for labour is quite tough as local labourers do not interested in that job. Overall, this research is very valid and very useful input to be used as a guideline for the future projects."*

7.6. SUMMARY

The study reveals that inadequacy in definition and planning had affected the implementation of the project. A better deployment of resources and an objective resource-time trade-off is essential in ensuring that projects are completed successfully and produce an acceptable deliverables within a realistic schedule. In order to make sure that the resource requirement is sensibly estimated and properly managed, the role of project management[18] is critically important. Additionally, there are project characteristicsthat have particular influences on project success. The characteristics may be beyond the control of the project management but the negative influences should be managed by anticipating them during the earlier stages. In the case of this study, it is

[18] Besides project supervising team, it is also referred to project commissioner who was the decision-makers.

obvious that resources were inadequately projected during the conceptualisation and planning stages of the project. The consequences of those deficiencies affected the implementation stage, notably in the form of project delay. Fortunately, in this programme the projects' products were well accepted by the users and their benefits were recognised by everyone involved. As a conclusion, even though the project management process needs improvement, the products of the projects were successful in the sense that they benefited the user and are well accepted by them.

CHAPTER 8:

CONCLUSIONS AND RECOMMENDATIONS

8.1. OVERVIEW

This chapter summarises the results of this empirical research, identifying specific recommendations for project management practice highlighting contributions to project management knowledge. The chapter relates the results to the original research questions and examines whether research objectives have been achieved. The limitations of the research are noted and areas of possible future study are suggested.

8.2. ANSWERING THE RESEARCH QUESTIONS

In undertaking this empirical research, three research questions were identified (presented in 1.4) and three associated research objectives were generated (presented in 1.5) to answer these questions. This section summarises the key results from the detailed discussion of Chapter 7 to answer the research questions and review the extent to which the research objectives were met.

8.2.1. Objective 1: Identifying the Project Management Success Factors

> *"To identify the project management success factors and determine whether they were adequately pursued throughout the project process."*

The research findings provide clear evidence that the first research objective was achieved. Seventeen factors were identified as contributing to project management success throughout the first three stages of project life cycle.All of the factors were critical to the project's success but they were only partially pursued throughout the project process. Despite a proper decision-making committee being formed to undertake the project conceptualisation and planning, the decision-makers had overlooked one of the most important prerequisites of project success, its clear definition.

8.2.1.1. Inadequate project definition

A committee was established to define the project. Ideally, in this definition stage the decision-makers determine the needs and direction of the project after considering views from all of the main stakeholders, and resources available. However, the results of the study indicate that the five critical success factors, identified as essential for this initial stage, were insufficiently pursued.

Only two of five critical success factors - project goal and mission, and project scope - were adequately defined by the committee during this stage. While a clear set of goals and a clear mission was established for the project, there was a major failure in conveying this important information to all stakeholders. The project scope was acceptable to all project stakeholders with asensible, simple specification for each project. Such a scope made the programme more manageable and cost effective as there were a large number of schools to be furnished with similar computer laboratories throughout the country. Despite the simple specification, the product of the project fulfilled the needs of the users. The decision to extend the programme to all government funded schools was radical: this was the first comprehensive school computerisation programme to cover the whole nation.

One important success factor - stakeholder's participation - was inadequately pursuedand the participation of some stakeholders was very limited. Furthermore, most of the decisions were not based on stakeholders' recommendations and some key decisions were made outside the committee, prior to the meetings. The exclusion of some of the main stakeholders in the committee reduced the opportunities for important consultation. Two factors - resources assessment and risk management - were not even considered by the committee.No specific assessment of the resource requirements was made prior to the project implementation. The failure to consider this factor had a major negative impact on the project success: competition for labourers and building material during the project implementation, and inadequate production of ICT equipment caused substantial project delays. The only resource requirement that the committee managed to anticipate and resolve was in the appointment of the project supervisor, whereby a company was appointed to fulfil the role normally performed by the PWD. The other failure in the decision-making of this stage was to omit any formal risk management;some of the problems might have been anticipated or contingency actions identified if a risk analysis had been completed at an early stage.

8.2.1.2. Poor project planning

As in definition stage, a committee was established to oversee the project planning. However, the planning was inadequate due to the time constraint imposed on the committee. While political and economic pressures implied a strong motivation to start the project quickly, proper project planning should not be sacrificed.

As a result, critical success factors which should take place during this planning stage were not properly pursued. Only two out of six success factors relevant to this stage were undertaken satisfactorily but even these needed some later enhancement: the project design and the project costing were largely successful, contributing to the overall project success. There were some problems related to the design, particularly in the layout and decoration in phase-1 buildings, but these were relatively minor and within the range of user acceptance:these design issueswereeventually resolved in the phase-2 building with some minor modifications. The other factor that positively contributed to the project success was the approach to project cost; the cost of each project in this programme was fixed based on the specified building model. The only stakeholders who were against the idea of fixed cost were the phase-2 contractors who claimed that they struggled to make a profit with the specified fixed cost. Although such a claim is perhaps inevitable, as they were the interested party, there are some related issues that deserve attention, notably the absence of any variation order element in the project cost. In order to ensure that the project was viable for all contractors, a limited variation order should be considered, for special circumstances where local conditions, such as unforeseen underground difficulties, impose significant additional costs.

The other four success factors of this stage- distribution of authority and responsibility, contractor selection, project scheduling, and project documentations - were improperly pursued. The limited time available to the planning committee was the main reason for these failures in project planning. A laissez-faire approach was another possible explanation. The change in the project implementation from privatisation to a government-funded approach should have prompted a change in the method of selecting the contractors. In addition to the seven companies that had originally made the privatisation proposal, other contractors should have been invited to tender. However, the committee members were told that the decision had been made ‘somewhere else’ by ‘somebody else’: the committee was just asked to endorse the decision to award the projectthrough direct-negotiation to the original seven contractors. As well as failing to undertake a proper tendering exercise, the evaluation of the contractors did not verify their ability to cope with such high volume contracts. This decision suggested that the more powerful stakeholders overruled the others, despite the distribution of authority and responsibility having been clearly allocated based on the existing OBS. The standard practice of project decision making was ignored: strategic political issues were dominant while key operational issues were not considered.

The committee also failed to exert proper judgement when determining the project schedule. The schedule was not based on any objective analysis and was highly questionable. This situation was aggravated by the contractors accepting the tender conditions without any debate. The schedule was always unrealistic and none of the contractors completed the project within schedule. Proper project scheduling should be based on the realistic availability of the project resources, particularly staff and material; this is especially important in large scale projects where mobilising the resources is a major task. In addition, the schedule failed to reflect the preparation of the contract documents. Contract documents should be treated seriously: even if they do not have a direct effect on project performance they affect other elements such as contractor progress payments.

8.2.1.3. Imperfect project execution

The project execution inherited the deficiencies of the previous two stages of the project life cycle. Only two factors in this stage - administrator effectiveness and external influences –positively contributed to the project success, or at least did not contribute to project failure.The other four factors critical to project execution- supervising team efficiency; contractor competence, communication and feedback, and integrity - negatively affected the project success. The selection of an inefficient project supervising team and incompetent contractors (specially the phase-1 contractors, phase-2 furniture supplier, and phase-2 ICT equipment supplier) could be traced to the improper contract award process. There were two elements that contributed to those deficiencies. Firstly, these contracts were awarded through a direct-negotiation method, which did not require the contractors to compete for the job, andthere was no formal evaluation of the contractors' abilities to perform the proposed work. This lack of evaluation was critical given the novel requirement to manage and synchronise such a large volume of projects. As well as a lack of management experience, the contractors did not have access to the resources necessary to undertake such a volume of work.

The phase-2 approach to the contract award was more acceptable in terms of a better distribution of projects to small-scale contractors. However, from the programme management and monitoring perspective, this approach created a great burden for the project administrator and supervisor with a large number of separate contracts. The burden was not only in monitoring, supervision and guidance but also in managing the documentation and progress payments.

Given the experience of these two approaches, the best method of awarding such a large volume of small projects would appear to be to adopt a compromise, using the phase-1 approach, i.e. to package all project components (construction, ICT and furniture supply) in a single contract and award it to several competence contractors, but with several modifications. The first modification is to select competent contractors through a proper selection procedure such as open tender or restricted tender, not direct-negotiation. Secondly, an appropriate evaluation must be carried out to determine the competentcontractors. Finally, the number of projects to be awarded to each contractor should not exceed a reasonable amount reflecting their ability to mobilise and manage the necessary resources. Such an approach would mean that the administrator and supervisor have fewer contracts to manage, compared to phase-2 but the problems associated with the near monopolies of phase-1 would be avoided.

A further source of problems in the studied programme was that the project supervisor was a commercial company attempting to maximise profits by reducing costs. Hence their workforce was below strength and often lacking the necessary experience. Although some credit should be given to the project committee for anticipating the burden of project monitoring at an early stage, the decision to award the supervisory role to an inexperienced company without proper evaluation was unacceptable.

The other negligence in the appointment of phase-1 contractors and phase-2 suppliers was the failure to identify the contractors' field of specialisation. None of the five phase-1 contractors was a construction contractor; all of them were ICT-based contractors. Since the construction component comprised the major portion of the project, the contract should have been awarded to construction companies or at least those with a joint-venture arrangement. The fact that Contractor A and Contractor B, which had strategic alliances with construction companies, were the first two to complete their allocated projectsdemonstrated the necessity of such collaboration. The two companies that just had construction sub-contractors, as opposed to a collaborative arrangement combining construction and ICT expertise,failed with their contracts being terminated due to non-performance. The phase-2 award of the furniture and ICT equipment supplycontracts to a single contractor was irrational. Eventually, the furniture contract was sub-contracted to other parties; the worst part of the arrangement was that the main supplier lost control over the furniture sub-contractor, resulting in numerous coordination problems and major delays in many projects.

Inevitably integrity is a sensitive issue and much of the information obtained about this topic was mainly hearsay.However, it was suggested that there were many examples of non-standard practices which had a serious negative impact on project success. For instance, there were suggestions of inappropriate external influences being applied in some cases; this only happened locally in certain areas and only a few projects may have been involved but the impact could be substantial.

8.2.2. Objective 2: Identifying the Project Product Success Factors

> *"To identify the project product success factors and determine whether these factors encompassed the different stakeholders' perspective of success."*

Three factors were identified as major contributors to the product success in the last stage of project life cycle.Despite some deficiencies in the project process management, the project products were viewed as successes. In general, all stakeholders were satisfied with all three components of the projects - building, furniture and ICT equipment. They also recognised the benefits of the project deliverables in enhancing the teaching and learning process. The project completion time was the only factor that did not fully contribute to project success; many of the projects in this SCLP were completed far later than scheduled. However, the different stakeholders had different perspectives about the completion time. While the members of project commissioner were concerned about the delay, the end users were more tolerant.

The laboratory building - the most crucial component in term of expenditure, work complexity and time taken to construct - was acceptable to all stakeholders. The furniture and ICT equipment were also well accepted by all users. Even though the facilities were not of the highest specification, they were sufficient to serve the needs of primary and secondary school education. The facilities were beneficial not only to the schoolchildren in improving their knowledge and skill but also to the teachers, providing an interesting mediumfor teaching and learning. In addition, the facilities provided a platform for better school administration.

8.2.3. Objective 3: Determining the Impact of the Project Characteristics

> *"To discover the impact of project characteristics, notably the different approaches of project award and the different geographical locations to project success factors."*

The impact of the project success factors was influenced by two underlying project characteristics - geographical location and project award method. The geographical location, determined by different zones of the programme,influenced three project success factors - supervisor's performance, user satisfaction and project completion time, while the contract award method, determined by different phases, affectedthree other project success factors.

8.2.3.1. Influences of geographical location

The geographical location, determined by the six zones across Malaysia, influenced three of the project success factors - supervisor's performance, user satisfaction and project completion time. The differences in the extent of supervision, which reflected supervisor's overall competence, were due to their inability to fulfil their role consistently across the zones. Their performance in the zones nearer to their head-office was better than in the remotezones. As they hada limited number of site offices, manpower and other facilities in the remote zones, they focused their work more in the urban and sub-urban zones.

Geographical locationalso affected user satisfaction of the project product. The users in the remote zones showed a higher degree of satisfaction compared with their colleagues in the zones nearer to big cities. The diversity in satisfaction appears to be due to different levels of socio-economic standardsand expectations between people in the remote and urban areas. In particular, people in the urban or sub-urban areas tended to have greater accessto computers at home compared to those in the rural area. Differences in the levels of user satisfaction, however, did not affect their recognition of the benefits of the facilities provided by the government to improve their teaching and learning process.

Especially in the phase-1 projects, completion time was the other project success factor that was largely influenced by the project location. In fact, this difference was due to the performance of the contractors in the particular zones rather than the project location itself. This was confirmed by the analysis of phase-2 and its multitude of individual contractors where there was no correlation between location and project completion time.

8.2.3.2. Influences of the project award approach

Radically different contract award approaches were adopted in the different phases of the programme. Given the similarity of other aspects of the programme across the phases, this provided an opportunity to assess the merits and problems of the two approaches. In phase-1a large number of projects was awarded to each of five contractors with the construction, ICT equipment and furniture components all packaged in a single contract for each contractor. In contrast, phase-2 had a large number of construction contractors,each of them being awarded just a single project; the ICT equipment and furniture supply components were separated from the construction components and awarded to a single contractor.

The factor most obviously affected by the different contract award method was the project completion time. The phase-1 contract method, with a large number of projectsawarded to a small number of contractors, resulted in longer project completion times compared to the phase-2 approach. The major reason was that the phase-1 projects required a longer time to actually start work, requiring a complex mobilisation of resources to cope with the large volume of projects awarded to each contractor. Conversely, in the phase-2 contract, where each contractor was awarded a single project, less time was required to prepare before starting workresulting in shorter project completion times.However, the shorter completion time in phase-2 projects applied only to the construction component contract; in many cases there were substantial delays in the supply and installation of the ICT equipment and furniture. The overall project completion times of phase-2 suffered from poor co-ordination across the contracts and basic failings in the supply contractor, aggravated by the decision to use a single supplier.

The other feature largely influenced by the contract award method was the bureaucratic burden on the project administrator and project supervisor. From this perspective, the contract method for phase-1 was better than phase-2 since there were far fewer contracts to manage.In the phase-2 contractmethod, where a large number of contractors involved, the project administrator and project supervisor were burdened with a much heavier workload compared with phase-1, impairing the effectiveness of the supervision and guidance offered by these agencies.

User preference also differed across the phases.However, the higher user satisfaction in the phase-2 projects was not directly influenced by the difference in contract award method; it was due to the delivery date of the product. The phase-2 facilities were provided two years later than those of phase-1, thusthey were better in terms of appearance, quality and specification. Moreover, problems in the specification of the phase-1 product were resolved in phase-2. However, differences in user satisfactiondid not interfering their appreciation of the facilities.

8.3. LIMITATIONS OF THE RESEARCH

The research involved the collection of large amounts of primary and secondary data. While much of the research was undertaken without major difficulties, the current work inevitably has some limitations. Some of these, especially those that related to data collection exercise have been discussed in detail in 4.6.1. These limitations, however, do not affect the quality and validity of this empirical research.

The first limitation is related to the sources of data. This study covers only phase-1 and phase-2, not the whole spectrum of the SCLP programme. During the data collection exercise, phase-3 had just started and it could not be included in this study sinceinsufficient data were available. The remaining phases adopted different approaches and these could have provided more comparisons of project and programme management practice.

Although the research analysed the experience of many hundreds of individual projects, they were ultimately all part of a single programme, the SCLP. A more comprehensive result could be obtained through comparisons with other public sector projects.Inevitably extrapolating the findings from a single programme requires caution: other public sector projects may be significantly different in nature, size, implementation approach, stakeholders and location. However, it was not possible to examine other projects in any detail due to time and monetary constraints as discussed in 4.6.1.

In 4.4.1.5, it was noted that the unit of analysis was the individual school project of the SCLP. There were some difficulties in organising data as they were obtained from various sources (e.g. end users and contractors); these were merged to provide a rich data setdescribing each school project. The full analysis required linking the data describing the experience at each school from each of the primary and secondary sources. While this full linkage was possible in phase-2, there were some restrictions in phase-1 limiting the range of quantitative analyses.

8.4. CONTRIBUTIONS TO KNOWLEDGE

The study offers a number of potential contributions to the extant project management body of knowledge.The research demonstrates the value of the concept of duality and developsthe notion ofstrictly distinguishing the project process and project product. In particular this concept helps develop a deeper appreciation of “project success” and the diverse perspectives of different stakeholders. A few authors (Baccarini1999, Cooke-Davies 2002) acknowledge the importance of the distinction between project process and product but this research should help encourage a greater use of this key concept.

Furthermore, the current literature fails to fully recognise the value of explicitly linking the project cycle to project success. In order to define the project success factors and their impact more precisely, the relevantstage in the project life cycleassociated with each project success factor should be identified: some factors may be critical at some stages but unimportant in others. Despite making a distinction between project management success and product success, the LFM model (Baccarini 1999) did not incorporate the project life cycle.The BB model (Lim & Mohamed 1999) does emphasise the project life cycle but fails to adopt the duality concept distinguishing management success and product success.This study fills this gap in the body of knowledge by adopting both concepts, duality and the linkage to the project life cycle, resulting in deeper insights and enabling each project success factor tobe defined more precisely.

Mapping the success factors on to the project life cycle also emphasises how the impact of some factors in later stages of project life cycle are inherited from related factors in the earlier stages, particularly the conceptualisation and planning stages. In this respect this study contributes to expanding the theory (Jiang et al.1996, Shenhar et al.1996, Cooke-Davies 2004) that resource projection is crucially important during the project formulation: assessing the resource requirements – human, material and money - is a prerequisite to ensuring that the project is completed successfully.This study suggests that other project success factors can also have substantial ramifications across the stages of the project life cycle.

8.5. RECOMMENDATIONS FOR PUBLIC SECTOR PROJECT MANAGEMENT PRACTICE

In addition to general contribution, the study identified a number of specific recommendations for improving the management of future similar projects and programmes. This summary focuses on the Malaysian public sector, reflecting the current case study, though some of the recommendations may have a more general application. In the context of Malaysia, this empirical study added a new dimension in the strategies used to manage the implementation of public sector projects.With the world's tallest twin-tower building, KLCC, Malaysia is not lagging behind in the experiences of mega-project implementation but there is a need to learn from those experiences.

The project definition should be managed by a proper committee with transparent decision making.This recommendation is supported by others (Webster 1999) who suggest that good management of the success factors in this stage is essential in order to form a strong foundation for the overall project success.In defining the project and its scope, the committee should consider all aspects of project appraisal, notably stakeholder analysis, economic analysis, financial analysis and social analysis. Adequate time should be devoted to this critical task otherwise major delays may be experienced later in resolving foreseeable problems.

The typical experiencein the Malaysia public sectorproject and programme is thatthe project initiation is usually a top-down approach. This study suggests that this approach needs a major transformation. It is essential that the views of all key stakeholders are collected at an early stage. This can help identify the real needs and possible constraints.The study provides clear evidenceto complement the present premise (Gil et al. 2004, Olander & Landin 2005)that the involvement of all relevant parties during the early stages of a project is vital in identifying their differing requirements. Compromises may be agreed in an objective manner and unnecessary problems avoided. The study recognises the practical difficulty in confronting the different stakeholders with opposing priorities (Gil & Beckman 2007) but it not an excuse to avoid this important project success factor, as the stakeholders' views are essential for the ultimate good of the project.

Furthermore, the study suggests that the project goals and missions should be conveyed to all stakeholders so that everyone is working with a common mission. Projects should have clear, realistic and attainable goals and missions,as emphasised in present theory (Fortune & White 2006). The findings confirm the existing suggestion (Naaranoja et al. 2007) that communicating the project goals and missions to all important stakeholders is critical in reducing the conflicts arising from differences in priorities amongst the different project stakeholders.

Project completion time is dependent on many factors but the availability of resources is crucial to the schedule (Wideman 2002). The study identifies the need for a thorough analysis of resource requirements: this is especially true for large programmes where competition for resources may be intense (Jiang et al. 1996, Cooke-Davies 2004). The analysis should include a time-resources trade-off as part of the process of determining an objective compromise of project scope and schedule given the resources available. The study confirmed the view(Nicholas 2004) that it is essential that the project has a realistic schedule as a basis for monitoring and controlling progress. The research illustrates the problem identified in other projects (Chan & Kumaraswamy 1997) that in some circumstances, delayis not question of poor performance but a result of over-ambitious planning by the project decision-makers.

The other major recommendation from this empirical research is that an experienced project supervising team is selected, as suggested by other authors (Shtub et al. 1994, Long et al. 2004, Turner 2003). The supervising team's monitoring and feedback is potentially one of the major contributions to project performance (Iyer & Jha 2005). The experience of this study, confirming observations in other projects (Lonsdale & Cox 2000), suggests that outsourcing the monitoring and supervising role is a mistake.

The successful completion of a project relies greatly on the competency of contractors (and suppliers). This success factoris itself dependent onanother factor, the contractor selection procedure. This study confirms the recommendations (Russell & Skibniewski 1988, Long et al. 2004) that selecting the contractors without proper and transparent process results in major problems for the project. In the case of the SCLP,the phenomenon was also noted inthe suppliers' and project supervisor selection. Whilst open tender is inappropriate in some circumstances (Hatush & Skitmore 1998, Odeh & Battaineh 2002), offering the contract through direct-negotiation is not agood approach either. The study supports the view (Della-Porta &Vannuci 1999) that projects suffer when power is abused in selecting the contractor without due regard to the project's needs.

This empirical research illustrated the challenges of defining success in projects (Baccarini 1999, Cooke-Davies 2004):a project can be a product success despite discrepancies in the project process. The study demonstrates that at least in public sector project, the users may be very satisfied with the product of the project (Pinto & Slevin 1988, Torbica & Stroh 2001, Maloney 2002, Yasamis et al. 2002) despite certain shortfalls in the project management and late delivery. User acceptance is usually associated with quality (Turner 1993) and the ultimate benefits (Lim & Mohamed 1999): project management problems may well be overlooked by many stakeholders as long as the product meets their needs (Turner 1993). This should not imply that poor project management is excusable but when assessing the success of a project the real needs of the end users should be paramount.

8.5.1. Managing Multi-Project Programmes

The other recommendations from the study relate to the management of large scale, multi-project programmes.The SCLP was divided into smaller groups of projects, namely phases and zones but even this division did not make the programmemanageable: each group still involved a large number of projectsThe study confirmed the view (Assaf 2002, Søreide 2006) that awarding a large number of projects to a small number of contractors can result in near monopoly contracts: such programmes need a more competitive approach. The alternative approach, illustrated by phase-2 in this study, is to deal directly with a multitude of small scale contractors, each being awarded one contract. Such an approach can result in more rapid mobilisation and an earlier start to work but the administrative burden is large. Effective supervision is difficult resulting in delays in the later stages of the projects.

Experience from this study suggests that a compromise may be better, awarding a more manageable number of projects to competitively selected contractors, and ensuring that all aspects (construction, ICT equipment and furniture in this case) are included within the contract to avoid co-ordination problems.A comparison between phase-1 award method, phase-2 award method and a recommended project award method for future is illustrated in Figure 8-1.

8.6. RECOMMENDATIONS FOR FURTHER RESEARCH

The basis for this study was sufficient to offer some clear contributions to the body of knowledge and recommendations for improving project and programme management practice. However, there are some limitations which could be addressed in further research. As mentioned in 4.6.1 and 8.3, one of the limitations of this study was in its coverage of the SCLP's phases. This research covered only phase-1 and phase-2 of the programme, while phase-3 and the remaining phases of the programme were excluded due to the unavailability of data. It is recommended that further research on this case should cover the whole spectrum of the programme. This could be particularly valuable since it would provide an opportunity to compare further approaches to contract award and programme management. One prospect for such further research is a comparison between the PMC and the PWD approaches to project supervision

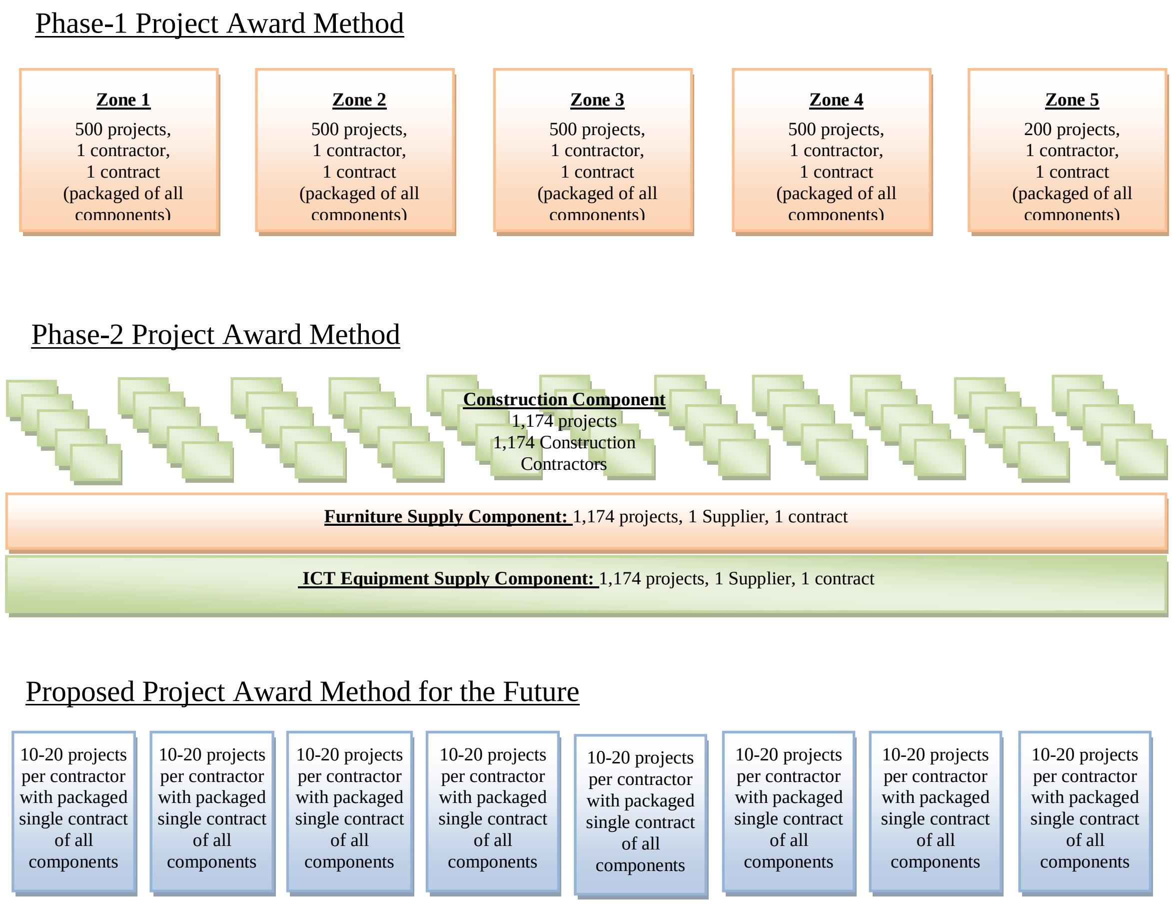

Figure 8-1: Comparison between Phase-1, Phase-2 and the Proposed Project Award Method

This programme had two major objectives. From the social perspective, the aim was to furnish public schools with computer laboratories and enhance ICT skills. Howeverthe programme also had an economic objective, helping boost economic recovery after recession. This study just examined the first objective, and even then it was unable to explore the longer term impact on education. Further study might attempt to examine the longer term impact and also discover whether the second objective was achieved. This would be challenging but useful since it is typical for public sector projects to have such a range of objectives.

Further research should also compare the contract award methods of SCLP with other possible approaches such as open tender, restricted tender and privatisation. This would involve examining a greater range of public sector projects. Such comparisons could provide a basis for developing guidelines for selecting the best approach for future programmes. Comparison between the public sector and private sector projects might also offer useful insights, identifying good practice that might be transferred between the sectors.

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Appendix 1: Definitions of Terms

The followings are definitions of terms used in this thesis:

Term	**Definition**
Certificate of fitness (CF)	approval given by local authority and public utility authority in order to occupy the new building after all requirement fulfilled
Completion date	The calculated date for completion derived from estimating, planning and risk evaluation taking into account contingencies for identified risks
Completion Time	Number of days, calculated starting from seven days after the issuance of the Letter of Award until the hand over of the project.
Computer Laboratory	A building, equipped with furniture and ICT equipment, built in a particular school compound. In some circumstances, it might be referred to (and interchangeably used) as *a project* to show that it is part of particular higher level programme. Since each computer laboratory is allocated to a particular school, it is named after the respective school where it is located. Each project could be of Model 1, Model 2 or Model 3, depending on the school size. See also project.
Development order (DO)	an approval given by local authority for the project to take off after the contractor fulfilled all requirement.
Impact	The relative harm or damage to a project if a risk becomes a problem, usually expressed either as a dollar amount or on a scale from 1 to 10
Issue	Any area of concern that presents an obstacle to achieving project objectives
Phase	Division of project based on starting time of *project*. The programme being studied is staggered into several phases (as of 2006, there are three phases). Different phases were implemented with different method of project award; thus, different method of project implementation.
Programme	The whole of computer laboratory projects. The whole programme is staggered by phase and divided by geographically by zone. Each phase and zone consists of numbers of similar *projects.*
Project	A single computer laboratory; since each computer laboratory is allocated to a particular school, a project also indirectly referred to a particular school where it is located. In some circumstances, it might be referred (and interchangeably used) as *computer laboratory*. Depending on the school size, the project could be of Model 1, Model 2 or Model 3. See also Computer Laboratory
Project commissioner	The three-party agencies comprise the Economic Planning Unit, the Treasury, and the Ministry of Education, that performed the key decision-making role of the programme.

Term	**Definition**
Project Director	The authorised officer, normally the highest ranked civil servant in the relevant agency, who control all related matters concerning the project, including administration, contractual, and progress of the project.
Project Management	System of procedures, practices, technologies, and know-how that provides the planning, organizing, staffing, directing, and controlling necessary to successfully manage a project
Project Management Consultant (PMC)	A generic name referring to the company appointed by government to supervise the projects on behalf of the government. The project-based one-off appointment is to overcome the manpower shortage faced by the Public Work Department (PWD) that normally played this role.
Risk	The possibility of an act or event occurring that would have an adverse effect on the state, an organization, or an information system. Risk involves both the probability of failure and the possible consequences of a failure
Risk Management	A process used to identify potential problems before they occur, so that actions can be taken to reduce or eliminate the likelihood or impact of these problems should they occur
Scheduling	Determining the start and stop time of each activity and task in the project, taking into account the precedence relations among tasks, the dependencies of tasks on external events, the required milestone dates, and the resources available
Stakeholder	Any individual or group who • cares about the effort and cost of a project, • wants to see the agency use the results of the product, • needs to provide time and effort to make the product usable
Supply	Provide and fitting the laboratory with furniture and equipment.
Verification	Determining whether the products of a given phase of the life cycle meet the requirements established during the previous phase (Are we building the product right?)
Work Breakdown Structure (WBS)	The complete list of activities that need to be done for a project, used for estimation and scheduling the work
Zone	Geographical divisions of the programme; it is based on administrative state in Malaysia, whereby a zone comprises one or more states.

Appendix 2: Brief Facts of Malaysia

Adopted from: DOS (2008)[19], Tourism Malaysia (2008)[20], CIA (2006)[21], National Geographic (2006)[22]

Malaysian Crest

Malaysian Flag

Background: Malaysia was formed in 1963 through the merging of Malaya (independent in 1957) and Singapore, both of which formed West Malaysia, and Sabah and Sarawak in north Borneo, which composed East Malaysia.

Long form: The Federation of Malaysia

Short form: Malaysia

Former: Persekutuan Tanah Melayu (Federation of Malaya**)** – before 16 September 1963.

Location: Southeastern Asia, peninsula and northern one-third of the island of Borneo; bordering Indonesia, Thailand, Brunei and the Philippines.

Geographic coordinates: 2 30 N, 112 30 E

Area: 329,750 sq km (*land:* 328,550 sq km, *water:* 1,200 sq km)

Land boundaries: 2,669 km (*border countries:* Brunei 381 km, Indonesia 1,782 km, Thailand 506 km)

Coastline: 4,675 km (Peninsular Malaysia 2,068 km, East Malaysia 2,607 km)

Maritime claims: *continental shelf:* 200-m depth or to the depth of exploitation; specified boundary in the South China Sea; *exclusive economic zone:* 200 nm; *territorial sea:* 12 nm

Data code: MY

Government type: constitutional monarchy

Capital: Kuala Lumpur

Administrative divisions:13 states[23] (Johor, Kedah, Kelantan, Melaka, Negeri Sembilan, Pahang, Perak, Perlis, Pulau Pinang, Sabah, Sarawak, Selangor, and Terengganu) and 3 federal territories (Kuala Lumpur, Labuan, and Putrajaya)

Independence: 31 August 1957 (from the UK)

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[19] DOS. (2008). Key Statistics, Department of Statistics Malaysia. Retrived from http://www.statistics.gov.my/portal/index.php 08/08/08

[20] Tourism Malaysia. (2008). Fast facts about Malaysia, Malaysia Tourism Promotion Board, Ministry Of Culture, Arts and Tourism. Retrieved from http://www.tourism.gov.my/en/about/facts.asp. 07/03/06.

[21] CIA. (2006). The world factbook, The Central Intelligence Agency. Retrieved from http://www.cia.gov/cia/publications/factbook/indexgeo.htm. 11/08/06.

[22] National Gegraphic. (2006). Malaysia Facts, the National Gegraphic. Retrieved from http://travel.nationalgeographic.com/travel/countries/malaysia-facts. 08/08/08

[23] in Malay language called 'negeri'.

Legal system: based on English common law; judicial review of legislative acts in the Supreme Court at request of supreme head of the federation; has not accepted compulsory ICJ jurisdiction

Suffrage: 21 years of age; universal

Head of state*:* the Yang Dipertuan Agong (the King); paramount ruler and deputy paramount ruler elected by and from the hereditary rulers of nine of the states for five-year terms

Executive branch: *Head of government:* Prime Minister, designated from among the members of the House of Representatives; following legislative elections, the leader of the party that wins a plurality of seats in the House of Representatives becomes Prime Minister. Cabinet appointed by the Prime Minister from among the members of Parliament with consent of the paramount ruler. Election is to be held once within every five years.

Legislative branch: Bicameral Parliament[24] consists of Dewan Negara[25] and the Dewan Rakyat[26]

Judicial branch: Federal Court, Court of Appeal, High Court of Malaya (on peninsula Malaysia), and High Court of Sabah and Sarawak (sates of Borneo). Judges appointed by the Yang Dipertuan Agong on the advice of the Prime Minister.

International organization participation: ADB, APEC, APT, ARF, ASEAN, BIS, C, CP, EAS, FAO, G-15, G-77, IAEA, IBRD, ICAO, ICC, ICRM, IDA, IDB, IFAD, IFC, IFRCS, IHO, ILO, IMF, IMO, IMSO, Interpol, IOC, IPU, ISO, ITSO, ITU, ITUC, MIGA, MINURSO, MONUC, NAM, OIC, OPCW, PCA, PIF (partner), UN, UNAMID, UNCTAD, UNESCO, UNIDO, UNIFIL, UNMIL, UNMIS, UNMIT, UNWTO, UPU, WCL, WCO, WFTU, WHO, WIPO, WMO, WTO

Flag description: 14 equal horizontal stripes of red (top) alternating with white (bottom); there is a blue rectangle in the upper hoist-side corner bearing a yellow crescent and a yellow fourteen-pointed star; the crescent and the star are traditional symbols of Islam.

Climate: tropical; annual southwest (April to October) and northeast (October to February) monsoons

Terrain: coastal plains rising to hills and mountains

Elevation extremes: *lowest point:* Indian Ocean 0 m, *highest point:* Gunung Kinabalu 4,100 m

Natural resources: tin, petroleum, timber, copper, iron ore, natural gas, bauxite

Land use: 3% *arable land,* 12% *permanent crops,* 68% *forests and woodland,* 17% *other*

Irrigated land: 2,941 sq km

Population: 25,715,819 (as of 2008)

Age structure: 35% aged *0-14 years*, 61% aged *15-64 years*, 4% aged *65 years and over.*

Nationality: Malaysian

Ethnic groups: Malay and other indigenous 58%, Chinese 26%, Indian 7%, others 9%

Religions: Islam, Buddhism, Daoism, Hinduism, Christianity, Sikhism

Languages: Bahasa Melayu (Malay) is an official language and understood by the whole population. English is widely spoken. Thai, Chinese, Tamil, Panjabi etc. are only spoken by particular ethnics. Several indigenous languages are spoken in East Malaysia, the largest of which are Iban and Kadazan.

Literacy (definition: age 15 and over can read and write**):** 83.5% of total population, 89.1% of male, 78.1% of female

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[24] 'Parlimen' in Malay

[25] Dewan Negara is House of Senate, i.e. the upper house of the Parliament of Malaysia. The member of the House is known as senator. There are 70 members; 26 are elected by the states, with two senators for each state in the Federation, and the other 44 are appointed by the Yang di-Pertuan Agong. The role of Dewan Negara is to review legislation that has been passed by the lower house.

[26] Dewan Rakyat is House of Representatives, i.e. the lower house of the Parliament of Malaysia. Members of the Dewan Rakyat, referred to as Members of Parliament or MPs are elected once within 5 years through general election. Currently the Dewan Rakyat has 222 elected members,

Economy - overview: Malaysia is one of the world fastest growing since independence in 1957; transformed itself since the 1970s from a producer of raw materials into an emerging multi-sector economy. Made a quick economic recovery in 1999 from its worst recession since independence. GDP grew 5%, responding to a dynamic export sector, which grew over 10% and fiscal stimulus from higher government spending. The large export surplus has enabled the country to build up its already substantial financial reserves. This stable macroeconomic environment, in which both inflation and unemployment stand at about 3%, has made possible the relaxation of most of the capital controls imposed by the government in 1998 to counter the impact of the Asian financial crisis.

GDP: MYR 1364.3 billion purchasing power parity (2008), 4.6% real growth rate (2008), MYR 53,900 per capita (2008).

GDP - composition by sector (2008): 10.1 % agriculture, 42.3 % *industry*, 47.6% *services*

Population below poverty line: 5.1% (2002)

Inflation rate (consumer prices): 2.8% (1999)

Labor force: 10.73 million (2007)

Labor force by sector: manufacturing 27%, agriculture, forestry, and fisheries 16%, local trade and tourism 17%, services 15%, government 10%, construction 9% (1999 est.)

Unemployment rate: 3.3% (2005)

Budget: \$23.2 billion *revenues*, \$27.6 billion *expenditures*

Industries: Peninsular Malaysia (rubber and oil palm processing and manufacturing, light manufacturing industry, electronics, tin mining and smelting, logging and processing timber); Sabah (logging, petroleum production); Sarawak (agriculture processing, petroleum production and refining, logging)

Industrial production growth rate: 8.5% (1999 est.)

Agriculture products: Peninsular Malaysia (rubber, palm oil, rice); Sabah (subsistence crops, rubber, timber, coconuts, rice); Sarawak (rubber, pepper, timber)

Exports: \$83.5 billion (1999 est.)

Exports - commodities: electronic equipment, petroleum and liquefied natural gas, chemicals, palm oil, wood and wood products, rubber, textiles

Exports partners: US 23%, Japan 11%, Hong Kong 5%, Netherlands 5%, Taiwan 5%, Thailand 3% (1999)

Imports: \$61.5 billion (1999 est.)

Imports commodities: machinery and equipment, chemicals, food, fuel and lubricants

Imports partners: Japan 21%, US 18%, Taiwan 5%, South Korea 5%, Thailand 4%, China 3% (1999)

Currency: Ringgit (RM, sometimes written as MYR). RM 1 = 100 sen.
Exchange rates (2008): US\$1 = RM3.3, UK£1 = RM5.8.

Telephone: 4.292 million for mainlines (2008), 27.125 million (2008) for mobile. *Telephone system:* modern system; international service excellent.

Radios: 9.1 million (1997). *Radio broadcast stations:* AM 35, FM 391, shortwave 15

Televisions: 3.6 million (1997). *Broadcast stations:* 88 (Peninsula 51, Sabah 16, Sarawak 21) (2006)

Internet: 16.903 million (2008). *Service Providers (ISPs):* 8 (1999). *Country code:* .my

Roadways: 98,721 km (including 1,821 km of high-class expressways)

Railways: 1,849 km

Waterways: 7,296 km (Peninsular Malaysia 3,209 km, Sabah 1,569 km, Sarawak 2,518 km)

Ports and harbors: Bintulu, Kota Kinabalu, Kuantan, Kuching, Kudat, Labuan, Lahad Datu, Lumut, Miri, Pasir Gudang, Penang, Port Dickson, Port Kelang, Sandakan, Sibu, Tanjung Kidurong, Tawau

Airports: 118 (2008)

Appendix 3: Summary of Phase-1 Project

Contractor	Zone	No. of Schoolw (projects)				Contract Value	
		Model 1	**Model 2**	**Model 3**	**Total@**	**Malaysian Ringgit (MYR)**	**British Pound (GBP)**
Contractor A	Zone 1	119	163	218	**500**	141,880,000	22,520,635
Contractor B	Zone 2	139	207	154	**500**	129,040,000	20,482,540
Contractor C	Zone 3	68	239	193	**500**	139,805,000	22,191,270
Contractor D	Zone 4	179	184	137	**500**	123,895,000	19,665,873
Contractor E	Zone 5	68	58	74	**200**	71,941,500	11,419,286
Contractor F#	Zone 6	45	68	87	**200**	76,740,750	12,181,071
	TOTAL	**618**	**919**	**863**	**2,400**	**683,302,250**	**108,460,675**

<u>Project Cost by Laboratory Model</u>

Model 1: RM165,000

Model 2: RM215,000

Model 3: RM165,000

Note:

withdrew due to some disagreement with the offer terms.

@ due to some constraints, the actual number of projects is reduced to 1,932

Appendix 4: Work Breakdown Structure

Main Item	**Sub-item**	**Model 1**	**Model 2**	**Model 3**
I - Building & External Work		**60%**	**57%**	**52%**
1 - Preliminaries	preliminaries, design, approval, fees etc.	6%	6%	5%
2 - Substructure	work below lowest ground floor	8%	8%	6%
3 - Superstructure	frame	5%	5%	4%
	Roof & rain water goods	8%	8%	6%
	Walls & Partitions	4%	3%	2%
	Doors	1%	1%	1%
	Windows	2%	2%	2%
4 - Finishes	Floor Finishes	3%	3%	4%
	Wall Finishes	3%	3%	3%
	Ceiling	4%	4%	3%
5 - Services	Plumbing & Sanitary Installation	0%	0%	0%
	Mechanical Installation	9%	7%	8%
	Electrical Installation	5%	5%	7%
6 - External Work	Surface water drainage	2%	2%	1%
II - Furniture		**5%**	**5%**	**3%**
	Supply			
	Assemble			
III - ICT Component		**35%**	**38%**	**45%**
	Supply			
	Installation			
	Commissioning			
	Training			
	TOTAL	**100%**	**100%**	**100%**

Source: Phase-1 contract document.

Appendix 5: Brief Specification and Per Unit Cost for Building

	Description	Computer Laboratory Model		
		Model 1	**Model 2**	**Model 3[+]**
Specification	Student population	less than 400	400 to 800	more than 800
	Floor Size	30' x 50'	30' x 55'	30' x 110'
	Number of room	1 computer room, 1 administrator room, 1 server room, 1 store room	1 computer room, 1 administrator room, 1 server room, 1 store room	2 computer room, 1 administrator room, 1 server room, 1 store room
	No. of PC	12 (10 students, 1 teachers, 1 server)	22 (20 students, 1 teachers, 1 server)	43 (40 students, 2 teachers, 1 server)
	Wiring	3 Phase	3 Phase	3 Phase
	Air-condition power[@]	2 x 3.5 Hp	2 x 3.5 Hp	4 x 3.5 Hp
	Size and air-condition power for administrator room	10' x 8' x 4' 1.5 Hp	10' x 8' x 4' 1.5 Hp	10' x 8' x 4' 1.5 Hp
	Size and air-condition power for server room	10' x 8' x 4' 1.5 Hp	10' x 8' x 4' 1.5 Hp	10' x 8' x 4' 1.5 Hp
	Size of store	10' x 8'	10' x 8'	10' x 8'
	Lightning Arrester	Yes	Yes	yes
	Dry Powder fire extinguisher	2 x 9 kg	2 x 9 kg	4 x 9 kg
Unit cost in Malaysian Ringgit (Approx. in British Pound)	Building construction	RM105,600 *(GBR16,762)*	RM107,500 *(GBR17,064)*	RM200,000 *(GBR31,747)*
	Furniture	RM5,000 *(GBR795)*	RM10,000 *(GBR1,587)*	RM20,000 *(GBR3,175)*
	ICT equipment	RM54,400 *(GBR8,635)*	RM97,500 *(GBR15,476)*	RM180,000 *(GBR28,571)*
	TOTAL	**RM165,000** ***(GBR26,191)***	**RM215,000** ***(GBR34,127)***	**RM400,000** ***(GBR63,492)***

Note:

[+] building changed from single-storey in phase-1 to double-storey in phase-2 but floor size remain the same

[@] unit power changed to 4.0 Hp in phase-2 but quantity remain the same

Detail specification of ICT equipment is contained in **Appendix 6**
Brief specification of furniture is contained in **Appendix 7**

Source: MOE (2000)

Appendix 6: ICT Equipment Specification

a) **List and per unit cost of ICT equipment**

Item	**Cost per Unit in Ringgit (MYR)**	**App. cost per Unit in Pound (GBP)**	**Nos of Equipment per Lab**		
			Model 1	**Model 2**	**Model 3**
Server	10,400	1,576	1	1	1
Teacher's Computer	3,250	492	1	1	2
Student's Computer	3,050	462	12	20	40
Colour Laser Printer	5,250	795	1	1	2
Flatbed colour scanner	930	141	1	1	2
LCD Projector + screen	9,600	1455	1	1	2
Digital Camera + accessories	1,650	250	1	1	2
24 Ports Switch	1,000	152	1	1	2
Rack	1,600	242	1	1	1
Structured cabling	160	24	15	23	46
Modem	Internet package	Internet package	1	1	1
Internet connection	Provided by STMB	Provided by STMB	1	1	1
Training for teachers	400	61	2	2	2
	4,350 (model 1,2) 4,500 (model 3)	659 (model 1,2) 682 (model 3)	1	1	2

b) Full ICT equipment specification

PHASE-1 SPECIFICATION

A – SERVER (MIMOS PERFORMA SERIES)

- Intel Pentium III 750MHz (minimum)
- Intel IIILE Chipset with 133 MHz Front Side Bus
- Dual Processor Capability
- 512KB Level 2 Write back Cache Memory
- 1GB PC133MHz SDRAM ECC DIMM
- 2 X 18.2GB Dual Channel Wide Ultra2 SCSI with hot swap
- Standard 1.44MB Diskette Drive
- 52 Speed IDE CD-ROM Drive
- Standard 2MB Video Memory / ATI Range IIC SVGA with 4MB video controller
- Fast Ethernet NIC (embedded) 10/100 Wake On LAN / Intel Pro 10/100
- Netscroll Mouse & Mouse Pad
- Keyboard suitable for 19” equipment rack / Server keyboard (14” – 15”)
- 1 Parallel, 2 Serial & 2 USB Ports
- Tower Server Chassis
- 15” SVGA Color Monitor Low Radiation, Non-Interlaced & MPRII
- Windows 2000 Server with Service Pack 2
- Client Access License (qty according no. pcs in the lab)
- Anti-Virus for Server with upgrade features / McAfee Anti Virus for Windows 2000 Server
- 600VA, 400Watts UPS / InvenSys 3110 400 Watts
- Proxy Server: ProxyNow (from Internet Now) at least version 2.64

B – TEACHER’S COMPUTER (MIMOS MILLENIA SERIES)

- Intel Pentium III, 1.6GHz Processor (minimum)
- Intel 845 Chipset, Socket 478 Motherboard
- 256KB L2 Cache
- 128MB SDRAM, PC 133
- 20GB(min) Ultra ATA100 Hard Disk Drive
- Standard 1.44MB Diskette Drive
- 52 Speed CDROM Drive
- Min. 32MB AGP Card / nVdia TNT2 M64 32MB AGP
- Integrated 16 Bit Stereo Sound Card / On board, AC’97
- Fast Ethernet NIC 10/100 Wake on Lan
- Win 98 Keyboard & Netscroll Mouse with mouse pad
- Mini Tower Chassis / Micro ATX Casing 250 Watt
- 1 set HeadPhone with Mic.
- 15” Color Monitor Low Radiation, Non-Interlaced & MPRII
- Microsoft Windows 98
- Microsoft Office XP (AE)
- Anti-Virus with upgrade features / McAfee Anti Virus for Windows 98
- 600 VA AVR 3 Socket / MIMOS AVR 3 Socket
- Video Capture Card / Unknown
- Student Teacher Interactive Software / Net Support School for teacher

C – STUDENT’S COMPUTER (MIMOS MILLENIA SERIES)

- Intel Pentium III, 1.6GHz Processor (minimum)
- Intel 845 Chipset, Socket 478 Motherboard
- 256KB L2 Cache
- 128MB SDRAM, PC 133
- 20GB(min) Ultra ATA100 Hard Disk Drive
- Standard 1.44MB Diskette Drive

- 52 Speed CDROM Drive
- Min. 32MB AGP Card / nVdia TNT2 M64 32MB AGP
- Integrated 16 Bit Stereo Sound Card
- Fast Ethernet NIC 10/100 Wake on Lan
- Win 98 Keyboard & Netscroll Mouse with mouse pad
- Mini Tower Chassis / Micro ATX Casing 250 Watt
- 2 set HeadPhone with Mic. + splitter
- 15" Color Monitor Low Radiation, Non-Interlaced & MPRII
- Microsoft Windows 98
- Microsoft Office XP (AE)
- Anti-Virus with upgrade features / McAfee Anti Virus for Windows 98
- 600 VA AVR 3 Socket / MIMOS AVR 3 Socket
- Student Teacher Interactive Software / Net Support School for student

D –LASER PRINTER (Epson Aculaser C1000 Color Laser Printer)

- 200MHz RISC Processor
- 32MB Upgradeable to 256MB / 48MB
- Paper Size - A4
- 20 pages per minute for monochrome
- 5 pages per minute for color
- Ethernet Interface Card, USB & Parallel Port

E – COLOR SCANNER (Epson Perfection 1650 Photo Scanner)

- Flatbed 1 pass (color & monochrome)
- Page Size – A4
- Software available – software for scanner, OCR
- Connectivity – USB Port
- Scan Speed – less than 35 seconds
- Scan Image Up to 2400 dpi at 48 bit color
- Preview at 8 sec
- Film Adaptor

F –LCD PROJECTOR (Epson EMP 600)

- Min. 1100 ANSI Lumens / 1700 ANSI Lumens
- Portable color LCD Computer & Video / c/w audio & video interface
- RGB Input Resolution At Least SVGA (min. 800 x 600), Compressed XGA
- Short throw – for distance 60 inch ≈ 40 inch screen size (horizontal)
- Audible Noise Not More Than 38 db
- Digital Keystone Capability
- Standard accessories c/w wireless remote control, power cord, RGB cable (At least 5m)
- Laser Pointer
- Soft carrying case and manuals
- Come with 6' X 6' Projector Screen (Wall Mount)

G –DIGITAL CAMERA (Sony DSC-P3)

- 2.0 Million Pixels (minimum) / 2.8 million pixels
- 8MB Storage Memory
- Min. 1/2.7-inch CCD
- Come with software & USB interface cable

H - SWITCH (Lan Pro Edimax ES-3124 R Switch Hub)

- 24-port Switching Hub, 10/100 Mbps
- Stackable (Uplink port)
- 1U, 19" Rack Mount type

I –EQUIPMENT RACK (Rittal 33U)

- IT Rack based on Quick Rack, with welded frame, spray finished texture black

- Dimension – height 33U x W600mm x D600mm
- 1 vented glazed door of steel, front tempered glass with security lock & 130 degrees hinges
- 1 roof frame for 2 active ventilation fans
- 1 base frame with cable entry cut-out
- 4 leveling feet to compensate for floor irregularities, pre-integrated into the base frame
- 2 x 19” component mounting angles, depth variable
- 2 side panels
- 10 way power socket
- 19” with telescopic keyboard drawer

J –CABLING

- CAT 5e c/w Face Plate, RJ45 Modulator Jack
- Each cable must be label appropriately
- Cable Management Panel must be included trunking, casing etc. / half moon casing for floor cable
- Patch Panel

K – ISDN MODEM (direct deal between MOE and the internet provider, Syarikat Telekom Malaysia Berhad)

- ISDN Router
- Built-in Hub/Switch Ports
- 128Kbps max. (ISDN)
- 10/100 Mbps (LAN)
- Come with ISDN Lightning Isolator RJ45
- Build in terminator (NTU)

L –INTERNET CONNECTIVITY

- Must be register with available ISP
- Must be accessable from any workstation

M – SOFTWARE AND MANUALS

- Microsoft Windows 2000 CD for each lab
- Microsoft Windows 2000 Manuals for each lab
- Microsoft Windows 2000 Client Access License for each teacher’s and students’ PCs.
- Microsoft Windows 98 CD for each teacher’s and students’ PCs.
- Microsoft Windows 98 Manual for each teacher’s and students’ PCs.
- Microsoft Office XP Pro CD for each lab
- Microsoft Office XP Pro Manuals for each lab
- Microsoft Office XP Pro License for each teacher’s and students’ PCs.
- Proxy Server CD and Manuals
- Student-Teacher Interactive Software CD and Manuals for each lab.
- Operation Manuals for Server, Teacher & Student PCs, Laser Printer, Flatbed Scanner, LCD Projector, Digital Camera and ISDN modem
- InvenSys UPS CD and manuals + communication cable

N - TRAINING

- Target Group: 1 Lab Administrator, 2 Teacher for each lab
- Must provide all the necessary manuals

PHASE-2 SPECIFICATION

A – SERVER (MIMOS PERFORMA SERIES)

- Intel Pentium III Xeon 1.0GHz (minimum)
- Intel IIILE Chipset with 133 MHz Front Side Bus
- Dual Processor Capability
- 512KB Level 2 Write back Cache Memory
- 1GB PC133MHz SDRAM ECC DIMM
- 2 X 18.2GB Dual Channel Wide Ultra2 SCSI with hot swap
- Standard 1.44MB Diskette Drive
- 52 Speed IDE CD-ROM Drive
- Standard 2MB Video Memory / ATI Range IIC SVGA with 4MB video controller
- Fast Ethernet NIC (embedded) 10/100 Wake On LAN / Intel Pro 10/100
- Netscroll Mouse & Mouse Pad
- Keyboard suitable for 19” equipment rack / Server keyboard (14” – 15”)
- 1 Parallel, 2 Serial & 2 USB Ports
- Tower Server Chassis
- 15” SVGA Color Monitor Low Radiation, Non-Interlaced & MPRII
- Windows 2000 Server with Service Pack 2
- Client Access License (qty according no. pcs in the lab)
- Anti-Virus for Server with upgrade features / McAfee Anti Virus for Windows 2000 Server
- 600VA, 400Watts UPS / InvenSys 3110 400 Watts
- Proxy Server: ProxyNow (from Internet Now) at least version 2.64

B – TEACHER’S COMPUTER (MIMOS MILLENIA SERIES)

- Intel Pentium 4, 1.6GHz Processor (minimum)
- Intel 845 Chipset, Socket 478 Motherboard
- 256KB L2 Cache
- 128MB SDRAM, PC 133
- 20GB(min) Ultra ATA100 Hard Disk Drive
- Standard 1.44MB Diskette Drive
- 52 Speed CDROM Drive
- Min. 32MB AGP Card / nVdia TNT2 M64 32MB AGP
- Integrated 16 Bit Stereo Sound Card / On board, AC’97
- Fast Ethernet NIC 10/100 Wake on Lan
- Win 98 Keyboard & Netscroll Mouse with mouse pad
- Mini Tower Chassis / Micro ATX Casing 250 Watt
- 1 set HeadPhone with Mic.
- 15” Color Monitor Low Radiation, Non-Interlaced & MPRII
- Microsoft Windows 98
- Microsoft Office XP (AE)
- Anti-Virus with upgrade features / McAfee Anti Virus for Windows 98
- 600 VA AVR 3 Socket / MIMOS AVR 3 Socket
- Video Capture Card / Unknown
- Student Teacher Interactive Software / Net Support School for teacher

C – STUDENT’S COMPUTER (MIMOS MILLENIA SERIES)

- Intel Pentium 4, 1.6GHz Processor (minimum)
- Intel 845 Chipset, Socket 478 Motherboard
- 256KB L2 Cache
- 128MB SDRAM, PC 133
- 20GB(min) Ultra ATA100 Hard Disk Drive
- Standard 1.44MB Diskette Drive
- 52 Speed CDROM Drive
- Min. 32MB AGP Card / nVdia TNT2 M64 32MB AGP
- Integrated 16 Bit Stereo Sound Card

- Fast Ethernet NIC 10/100 Wake on Lan
- Win 98 Keyboard & Netscroll Mouse with mouse pad
- Mini Tower Chassis / Micro ATX Casing 250 Watt
- 2 set HeadPhone with Mic. + splitter
- 15” Color Monitor Low Radiation, Non-Interlaced & MPRII
- Microsoft Windows 98
- Microsoft Office XP (AE)
- Anti-Virus with upgrade features / McAfee Anti Virus for Windows 98
- 600 VA AVR 3 Socket / MIMOS AVR 3 Socket
- Student Teacher Interactive Software / Net Support School for student

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- 200MHz RISC Processor
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- Page Size – A4
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- Connectivity – USB Port
- Scan Speed – less than 35 seconds
- Scan Image Up to 2400 dpi at 48 bit color
- Preview at 8 sec
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F –LCD PROJECTOR (Epson EMP 600)

- Min. 1100 ANSI Lumens / 1700 ANSI Lumens
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- RGB Input Resolution At Least SVGA (min. 800 x 600), Compressed XGA
- Short throw – for distance 60 inch ≈ 40 inch screen size (horizontal)
- Audible Noise Not More Than 38 db
- Digital Keystone Capability
- Standard accessories c/w wireless remote control, power cord, RGB cable (At least 5m)
- Laser Pointer
- Soft carrying case and manuals
- Come with 6’ X 6’ Projector Screen (Wall Mount)

G –DIGITAL CAMERA (Sony DSC-P3)

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- 1 roof frame for 2 active ventilation fans

- 1 base frame with cable entry cut-out
- 4 leveling feet to compensate for floor irregularities, pre-integrated into the base frame
- 2 x 19” component mounting angles, depth variable
- 2 side panels
- 10 way power socket
- 19” with telescopic keyboard drawer

J –CABLING

- CAT 5e c/w Face Plate, RJ45 Modulator Jack
- Each cable must be label appropriately
- Cable Management Panel must be included trunking, casing etc. / half moon casing for floor cable
- Patch Panel

K – ISDN MODEM (direct deal between MOE and the internet provider, Syarikat Telekom Malaysia Berhad)

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- Microsoft Office XP Pro CD for each lab
- Microsoft Office XP Pro Manuals for each lab
- Microsoft Office XP Pro License for each teacher’s and students’ PCs.
- Proxy Server CD and Manuals
- Student-Teacher Interactive Software CD and Manuals for each lab.
- Operation Manuals for Server, Teacher & Student PCs, Laser Printer, Flatbed Scanner, LCD Projector, Digital Camera and ISDN modem
- InvenSys UPS CD and manuals + communication cable

N - TRAINING

- Target Group: 1 Lab Administrator, 2 Teacher for each lab
- Must provide all the necessary manuals

c) **Value-added in phase-2 ICT equipment**

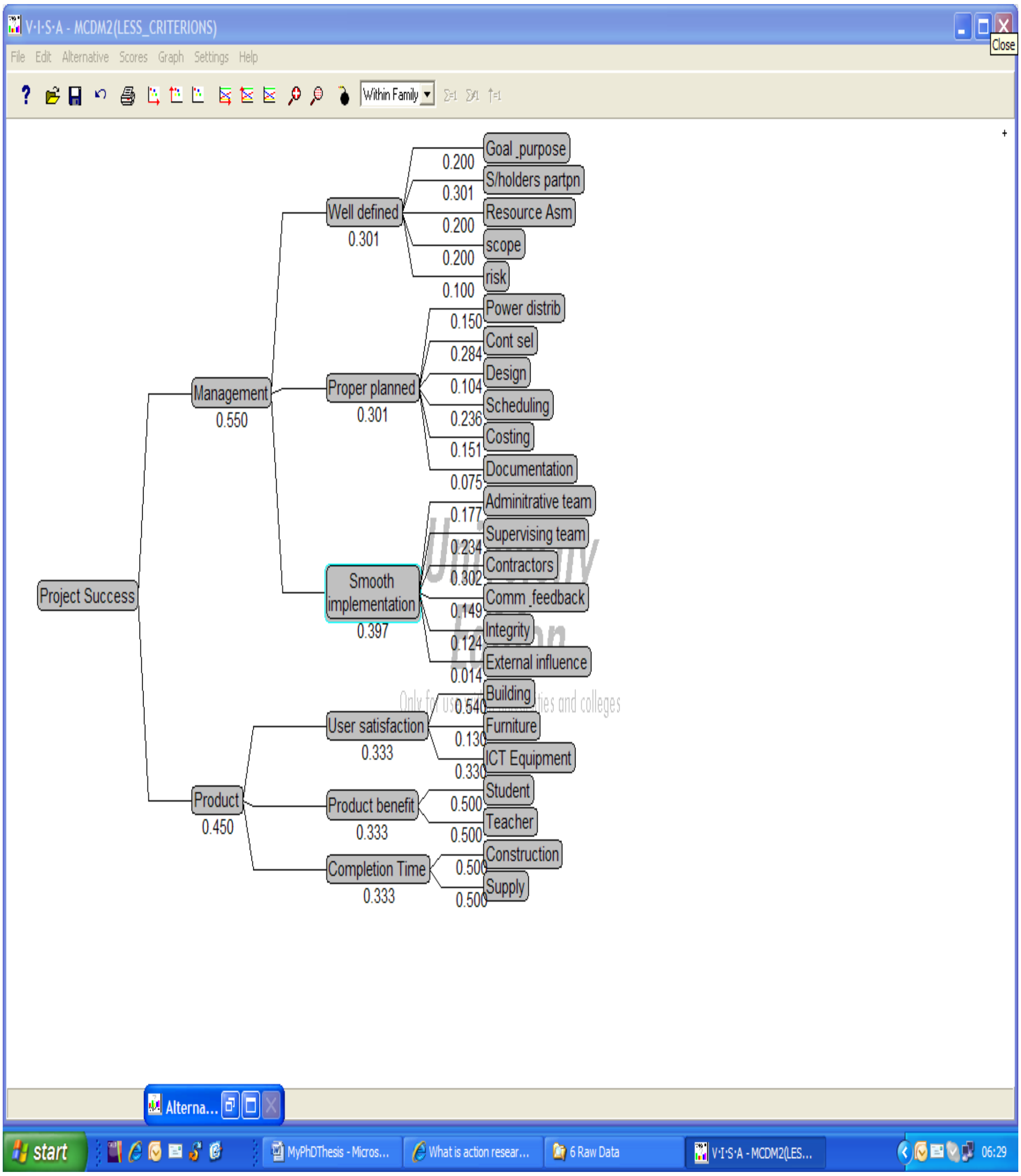
Item	**Phase-1**	**Phase-2**
Server		
Processor	Intel Pentium III	Intel Pentium III
Processor speed	866 MHz	1.0 GHz
Memory (RAM)	256 MB	512 MB
Teacher's/ Student's PC		
Processor	Intel Pentium III	Intel Pentium 4
Processor speed	667/866 MHz	.1.4 GHz
Memory	64 MB	128 MB
Hard disk capacity	10 GB	20 GB
Software	MS Office 2000	MS Office XP
Numbers (student's PC)	10 (for model 1)	12 (for model 1)
Projector		
ANSI Lumen	700	1000
short throw and low noise	Not specified	specified
numbers	0 for Model 1 1 for Model 2 1 for Model 3	1 for Model 1 1 for Model 2 2 for Model 3
Modem		
type	PSTN	ISDN
Security alarm system		
number	Not available	1 unit in Model 1 and 2 2 units in Model 3

Appendix 7: Brief Specification and Per Unit Cost for Laboratory Furniture

Job Descriptions		Nos per Lab			Cost/Unit (RM)
		Model 1	Model 2	Model 3	
1.	**Computer table and accessories for Secondary School** as per Architect Drawing no: TR0125/CL/DET/TA-01, TR0125/CL/DET/TA-02.	3	5	10	2,650.00
2.	**Computer table and accessories for Primary School** as per Architect Drawing no:TR0125/CL/DET/TA-01, TR0125/CL/DET/TA-02.	3	5	10	2,650.00
3.	**LCD Projector,s Trolley** as per drawing TRO 125/CL/DET/TA-03 & 03(a)	1	1	2	380.00
4.	**Supervisor's Table** as per drawing TRO 125/CL/DET/TA-04 & 04(a)	1	1	1	540.00
5.	**Teachers Table** as per drawing TRO 125/CL/DET/TA-05 & 05(a)	1	1	2	560.00
6.	**White board** 4' x 8' x 1/2" as stated in the spesification	1	1	2	200.00
7.	**Cork board** 4' x 8' x 1/2" as stated in the spesification	1	1	2	400.00
8.	Design, supply, assemble and arrange **Printer Table** 450mm x 500mm x 660mm as stated in specification.	1	1	2	180.00
9.	Design, supply, assemble and arrange **secondary school student's chair** as stated in specification.	12	20	40	110.00
10.	Design, supply, assemble and arrange **primary school student's chair** as stated in specification.	12	20	40	110.00
11.	Design, supply, assemble and arrange **teacher's chair** as stated in specification.	1	1	2	150.00
12.	**Pegeon box** cabinet - 44 holes	1	1	2	3,800.00
13.	Full height **steel cabinet**	1	1	1	560.00

Note: the above cost is including cost for transportation and assemble of the furniture

Appendix 8: Criteria Tree for Multi-Criteria Decision Analysis



Appendix 9: Data Mapping and Weighting for Studied Factors

Factors/ Items	Sources			Weight				
	Questionnaires (Appendix 10)	**Interviews** (Appendix 12)	**Documents** (Appendix 13)	Level 5	Level 4	Level 3	Level 2	Level 1
1. PROJECT MANAGMENT FACTOR								0.55
1.1. PROJECT DEFINITION							0.30	
1.1.1. Goal and missions	n.a.	2.5, 3.4, 4.2	a1,			0.20		
1.1.2. Stakeholders' participation	n.a.	2.1, 2.4, 2.10, 3.1				0.30		
1.1.3. Resource assessment	n.a.	1.6, 2.6				0.20		
1.1.4. Scope	n.a.	1.7, 2.7	a1			0.20		
1.1.5. Risk management	n.a.	1.8, 2.8				0.10		
1.2. PROJECT PLANNING							0.30	
1.2.1. Distribution of authorities and responsibilities	n.a.	2.10, 3.5,4.7	a2 to a7			0.15		
1.2.2. Contractor selection	n.a.	2.11, 3,6				0.28		
1.2.3. Design	n.a.	2.12, 3.7	a8, a9, b4			0.10		
1.2.4. Scheduling	n.a.	2.13, 3.8	a2, a8, a9			0.24		
1.2.5. Costing	n.a.	2.14, 3.9	a2, a8 to a12, c2			0.15		
1.2.6. Documentation	n.a.	2.15, 3.10	a8, a9			0.08		
1.3. PROJECT IMPLEMENTATION							0.40	
1.3.1. Administrators		2.16, 3.11	b1-b3			0.20		
1.3.1.1. bureaucracy/ cooperation	A.2.25				0.21			
1.3.1.2. knowledgeable/ experience	A.2.8				0.28			
1.3.1.3. strength/ workload	A.2.9				0.20			
1.3.1.4. commitment	A.2.7				0.31			
1.3.2. Supervising Team		2.17, 3.13	a12, b5, b6			0.24		
1.3.2.1. staff adequacy	A.2.11				0.23			

Factors/ Items	Sources			Weight				
	Questionnaires (Appendix 10)	**Interviews** (Appendix 12)	**Documents** (Appendix 13)	Level 5	Level 4	Level 3	Level 2	Level 1
1.3.2.2. facilities adequacy	A.2.10				0.12			
1.3.2.3. response time	A.2.12				0.22			
1.3.2.4. knowledge/ skill to supervise	A.2.13				0.15			
1.3.2.5. number of visit	A.2.14				0.16			
1.3.2.6. commitment	A.2.15				0.12			
1.3.3. Contractors		1.18, 2.18, 3.14	b5, c1			0.26		
1.3.3.1. number of years since the formation of the company (experience)	A.1.1				0.08			
1.3.3.2. number of project constructed within 5 years before this project (experience)	A.1.3				0.11			
1.3.3.3. contract value of all project constructed within 5 years before this project (experience)	A.1.4				0.11			
1.3.3.4. company's paid-up capital during this project award (capital strength)	A.1.2				0.22			
1.3.3.5. number of workers on site (workers strength)	A.1.5				0.24			
1.3.3.6. capable to compete with other project (for workers & material)	A.2.20				0.12			
1.3.3.7. profitable	A.2.21				0.12			
1.3.4. Communication and Feedback		1.19, 2.19, 3.15				0.12		
1.3.4.1. good relationship between all parties	A.2.16				0.22			
1.3.4.2. good flow of information among parties	A.2.17				0.43			
1.3.4.3. enough meeting to trobleshoot the problem	A.2.18				0.25			
1.3.5. Integrity		1.20, 2.20, 3.16				0.11		
1.3.5.1. get project through proper channel	A.2.3				0.25			
1.3.5.2. get all approval straightforwardly	A.2.26				0.19			
1.3.5.3. follow all rules and regulations	A.2.27				0.56			
1.3.6. External Influence		1.21, 2.21, 3.17, 4.10				0.07		
1.3.6.1. irrelevant parties	A.2.19				0.36			

Factors/ Items	Sources: Questionnaires (Appendix 10)	Sources: **Interviews** (Appendix 12)	Sources: **Documents** (Appendix 13)	Weight: Level 5	Weight: Level 4	Weight: Level 3	Weight: Level 2	Weight: Level 1
1.3.6.2. environment	A.2.22				0.18			
1.3.6.3. site	A.2.23				0.41			
1.3.6.4. economic	A.2.24				0.05			
2. PRODUCT FACTOR								0.45
2.1. ACCEPTABLE PRODUCT							1.00	
2.1.1. USER SATISFACTION						0.28		
2.1.1.1. Building		2.22, 3.18, 4.12, 4,13	b6		0.54			
2.1.1.1.1. Quality & Durability	B.1.1.1			0.31				
2.1.1.1.2. Finishes and decoration	B.1.1.2			0.13				
2.1.1.1.3. Layout and design	B.1.1.3			0.24				
2.1.1.1.4. Air-conditioner & lighting	B.1.1.4			0.11				
2.1.1.1.5. 3-phase electricity	B.1.1.5			0.21				
2.1.1.2. Furniture		2.22, 3.18, 4.124.13			0.13			
2.1.1.2.1. Supervisor’s table	B.1.2.1			0.09				
2.1.1.2.2. Supervisor’s chair	B.1.2.2			0.11				
2.1.1.2.3. Teacher’s table	B.1.2.3			0.09				
2.1.1.2.4. Teacher’s chair	B.1.2.4			0.10				
2.1.1.2.5. Student’s table	B.1.2.5			0.21				
2.1.1.2.6. Student’s chair	B.1.2.6			0.25				
2.1.1.2.7. LCD projector’s troley	B.1.2.7			0.03				
2.1.1.2.8. Steel cabinet	B.1.2.8			0.05				
2.1.1.2.9. Pigeon box	B.1.2.9			0.04				
2.1.1.2.10. Printer table	B.1.2.10			0.03				
2.1.1.3. ICT Equipment		2.22, 3.18, 4.12, 4.13			0.33			
2.1.1.3.1. Computer and components	B.1.3.1			0.12				
2.1.1.3.2. Printer	B.1.3.2			0.19				
2.1.1.3.3. Scanner	B.1.3.3			0.12				

Factors/ Items	Sources			Weight				
	Questionnaires (Appendix 10)	**Interviews** (Appendix 12)	**Documents** (Appendix 13)	Level 5	Level 4	Level 3	Level 2	Level 1
2.1.1.3.4. Modem	B.1.3.4			0.06				
2.1.1.3.5. Network	B.1.3.5			0.06				
2.1.1.3.6. Digital camera	B.1.3.6			0.07				
2.1.1.3.7. LCD projector	B.1.3.7			0.10				
2.1.1.3.8. Server	B.1.3.8			0.05				
2.1.1.3.9. Internet connection	B.1.3.9			0.03				
2.1.1.3.10. Internet performance	B.1.3.10			0.06				
2.1.1.3.11. Software	B.1.3.11			0.02				
2.1.1.3.12. Compiled user manual	B.1.3.12			0.11				
2.1.1.3.13. Training	B.1.3.13			0.03				
2.1.2. PRODUCT BENEFIT		4.12, 4.13				0.42	0.42	
2.1.2.1. Benefit to the Students					0.53			
2.1.2.1.1. improves knowledge in computer literacy	B.2.1.1			0.11				
2.1.2.1.2. dev knowledge & skill in ICT related subjects	B.2.1.2			0.33				
2.1.2.1.3. dev students knowledge & skill in non-ICT subjects	B.2.1.3			0.33				
2.1.2.1.4. tools for student to explore to more information and knowledge	B.2.1.4			0.23				
2.1.2.2. Benefit to the Teachers					0.47			
2.1.2.2.1. improves teaching in ICT related subjects	B.2.2.1			0.36				
2.1.2.2.2. improves teaching in non-ICT subjects	B.2.2.2			0.20				
2.1.2.2.3. creates interesting teaching & learning med	B.2.2.3			0.25				
2.1.2.2.4. improves classroom management efficiency	B.2.2.4			0.19				
2.1.3. COMPLETION TIME		2.13, 2.22, 3.8	b6, c1			0.30	0.30	
2.1.3.1. Completion of Construction Component	n.a.				0.55			
2.1.3.2. Completion of Supply Component	n.a.				0.45			

Appendix 10: Questionnaires

Serial Number: _______________

SET A: QUESTIONNAIRE FOR CONTRACTOR

PART 1. THE COMPANY
Please tick (√) the appropriate answers about your company

A.1.1. This company was registered in

( ) 1979 or before ( ) 1980-1984 ( ) 1985-1989 ( ) 1990-1994 ( ) 1995-1999 ( ) 2000 or after

A.1.2. Company's paid-up capital prior to project award (in RM)

( ) 100,000 or less (specify________) ( ) 100,001 - 500,000 ( ) 500,001 - 1,000,000
( ) 1,000,001 - 5,000,000 ( ) 5,000,001 - 10,000,000 ( ) 10,000,001 or more (specify______)

A.1.3. Number of contracts been awarded to the company in the last 5 years before the award of this contract

( ) none ( ) 1-2 ( ) 3-4 ( ) 5-6 ( ) 7-8 ( ) more than 8 (specify ______)

A.1.4. Value of contracts been awarded to the company in the last 5 years before the award of this contract (in RM)

( ) 10,000,000 or less (specify_____) ( ) 10,000,001 - 20,000,000 ( ) 20,000,001 - 30,000,000
( ) 30,000,001 - 40,000,000 ( ) 40,000,001 - 50,000,000 ( ) 50,000,001 or more (specify______)

A.1.5. Number of field workers (excluding professionals)

( ) 5 or less ( ) 6-10 ( ) 11-15 ( ) 16-20 ( ) 21-25 ( ) more than 25 (specify________)

PART 2. THE PROJECT
Please tick (√) the appropriate answers to indicate your reactions to the following statements

A.2.1. The company that I registered to construct this project, is purely my company

( ) Yes ( ) No

A.2.2. In constructing this project I have

( ) carried out <u>all</u> parts of construction work without any kind of sub-contracting
( ) <u>sub-contracted part</u> of the works within the scope that I supposed to do
( ) <u>sub-contracted the whole spectrum</u> of works that I supposed to do

A.2.3. Contractor selection for this project were done through proper procedure

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.4. I have made some profit from this project

( ) yes ( ) No

A.2.5. Time allocated for me to complete this project is fairly sufficient

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.6. Based on my experiences, the ideal time needed by contractor to fully complete such a project is

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.7. The government officers who involved in this project are approachable and willing to listen

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.8. The government officers who involved have sufficient knowledge in handling this project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.9. Number of the government officers who involved are sufficient to handle this project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.10. The project management consultant (PMC) has monitored the project well

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.11. Number of the PMC personnel are sufficient to monitor this project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.12. The PMC personnel are available within reasonable time whenever needed for advice and approval

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.13. The PMC personnel have sufficient knowledge and skill to monitor this project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.14. For the whole period of project, PMC has visited the project

( ) 15 times or more ( ) 13-15 times ( ) 10-12 times ( ) 7-9 times ( ) 4-6 times ( ) 3 times or less

A.2.15. In my opinion, the PMC has the capability to monitor this project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.16. Relationship and communication between all parties in the project were good

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.17. There were appropriate meetings between authorities and the contractors in solving the problems

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.18. Numbers of meeting held to overcome the problems are adequate.

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.19. The implementation of this project was influenced by the other party(s)

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.20. Competition with the other projects for <u>material and equipment</u> has affected the project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.21. Competition with the other projects for <u>workers</u> has affected the project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.22. Environmental factors (e.g weather etc) has affected the project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.23. Site related factors (e.g. access road, existing structure etc) has affected the project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.24. Economic related factors (e.g. exchange rate, commodity price etc) has affected the project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.25. Factor related to authorities' approval has affected the project

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.26. There were some bad bureaucratic practices in this project.

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.27. I have to give some 'gift' in order to get approval or particular arrangement

( ) Strongly agree ( ) Agree ( ) Somewhat agree ( ) Somewhat disagree ( ) Disagree ( ) Strongly disagree

A.2.28. In dealing with with this project, I have given particular 'gift' to these parties (tick all that apply)

☐ Ministry of Education (MOE)
☐ State Education Department (SED)
☐ Project Management Consultant (PMC)
☐ School
☐ Others (please specify ___________________)

PART 3. OTHERS

A.3.1. Please give your comment on the other factors that are not covered in the questions above (please continue on other sheet if necessary)

____
____
____

Many thanks for your co-operation

Serial Number: _______________

Phase: ______ Model: ______

SET B: QUESTIONNAIRE FOR SCHOOL

PART 1. THE PRODUCT

Please indicate your level of satisfaction to the products of this project using scale below (please circle the number)

1-Very satisfied	2-Satisfied	3-Somewhat satisfied	4-Somewhat dissatisfied	5-Very dissatisfied	6-Completely dissatisfied

B.1.1. Building and component

B.1.1.1.	Building quality and durability	1	2	3	4	5	6
B.1.1.2.	Building finishes and decoration	1	2	3	4	5	6
B.1.1.3.	Building layout and design	1	2	3	4	5	6
B.1.1.4.	Air-conditioner & Lighting	1	2	3	4	5	6
B.1.1.5.	3-phase electricity connection	1	2	3	4	5	6

B.1.2. Furniture

B.1.2.1.	Supervisor's table	1	2	3	4	5	6
B.1.2.2.	Supervisor's chair	1	2	3	4	5	6
B.1.2.3.	Teacher's table	1	2	3	4	5	6
B.1.2.4.	Teacher's chair	1	2	3	4	5	6
B.1.2.5.	Student's table	1	2	3	4	5	6
B.1.2.6.	Student's chair	1	2	3	4	5	6
B.1.2.7.	LCD projector's troley	1	2	3	4	5	6
B.1.2.8.	Steel cabinet	1	2	3	4	5	6
B.1.2.9.	Pigeon box	1	2	3	4	5	6
B.1.2.10.	Printer table	1	2	3	4	5	6

B.1.3. ICT Component

B.1.3.1.	Teacher computer	1	2	3	4	5	6
B.1.3.2.	Student computer	1	2	3	4	5	6
B.1.3.3.	Software	1	2	3	4	5	6
B.1.3.4.	Modem	1	2	3	4	5	6
B.1.3.5.	Server	1	2	3	4	5	6
B.1.3.6.	Network/ cabling	1	2	3	4	5	6
B.1.3.7.	Internet performance	1	2	3	4	5	6
B.1.3.8.	Printer		2	3	4	5	6
B.1.3.10.	Scanner		2	3	4	5	6
B.1.3.12.	LCD projector	1	2	3	4	5	6
B.1.3.13.	Digital camera	1	2	3	4	5	6
B.1.3.14.	Training (by supplier)	1	2	3	4	5	6
B.1.3.15.	Compiled user manual	1	2	3	4	5	6

PART 2. THE USAGE AND BENEFIT

Please indicate your level of satisfaction to the products of this project using scale below (please circle the number)

1-Very satisfied	2-Satisfied	3-Somewhat satisfied	4-Somewhat dissatisfied	5-Very dissatisfied	6-Completely dissatisfied

B.2.1. Benefit to the Student

B.2.1.1.	improves knowledge in computer literacy	1	2	3	4	5	6
B.2.1.2.	develops students knowledge and skill in ICT related subjects	1	2	3	4	5	6
B.2.1.3.	develops students knowledge and skill in non-ICT subjects	1	2	3	4	5	6
B.2.1.4.	tools for student to explore to more information and knowledge	1	2	3	4	5	6

B.2.2. Benefit to the Teacher

B.2.2.1.	improves teaching in ICT related subjects	1	2	3	4	5	6
B.2.2.2.	improves teaching in non-ICT subjects	1	2	3	4	5	6
B.2.2.3.	creates interesting medium for teaching & learning	1	2	3	4	5	6
B.2.2.4.	improves efficiency in classroom management	1	2	3	4	5	6

PART 3. OTHERS

Please give your comment on the other factors of this project that are not covered in the questions above

____

____

____

Many thanks for your co-operation

Appendix 11: Questionnaires (Translated Version) - with Covering Letter

a) For Contractor (Set A)

University of Stirling
Department of Management and Organisation
Faculty of Management
Stirling FK8 4LA
United Kingdom

Tel: +44 (0) 1786 467310

Email: manorg@stir.ac.uk

Tuan/ puan,

Sukacita dimaklumkan bahawa soal-selidik ini bertujuan untuk mendapatkan maklumbalas daripada tuan/ puan mengenai projek pembinaan makmal komputer di sekolah-sekolah.

2. Maklumbalas tuan/ puan ini adalah merupakan sebahagian daripada bahan penyelidikan untuk tesis PhD di Universiti of Stirling, United Kingdom yang berjudul "**Success factors of Malaysian Government Projects**". Matlamat penyelidikan ini adalah untuk mencadangkan model terbaik dalam pelaksanaan projek-projek Kerajaan di Malaysia.

3. Sebagai seorang daripada kontraktor yang terlibat dalam pembangunan projek tersebut, maklumbalas tuan/puan amat berguna dalam memperbaiki projek Kerajaan pada masa akan datang.

4. Kerjasama tuan/puan adalah dipohon untuk menjawab soalan-soalan ini dengan seikhlasnya. Soal-selidik ini adalah untuk tujuan akademik dan penyelidikan semata-mata. Identiti tuan/ puan serta syarikat tuan/puan tidak akan didedahkan.

5 Jika terdapat sebarang kemusykilan mengenai soal-selidik ini, sila hubungi penyelidik melalui email farazi@msn.com atau telefon 019-252 8273. Kerjasama tuan/ puan amat dihargai

Terima kasih.

Mohamad Farazi Johari
Pelajar PhD

Prof. John A. Bowers
Head of Department
(Supervisor)

Nombor Siri: _______________

SET A: BORANG SOAL-SELIDIK UNTUK KONTRAKTOR

PART 1. MAKLUMAT SYARIKAT

Sila tanda (√) pada jawapan yang paling tepat mengenai syarikat tuan

A.1.1. Syarikat ini didaftarkan pada tahun

( ) 1979 atau sebelumnya ( ) 1980-1984 ( ) 1985-1989 ( ) 1990-1994 ( ) 1995-1999 ( ) 2000 atau selepasnya

A.1.2. Modal berbayar syarikat semasa mendapat tawaran projek ini adalah sebanyak

( ) kurang daripada RM2,000 ( ) RM2,001 – RM4,000
( ) RM4,001 – RM6,000 ( ) RM6,001 – RM8,000
( ) RM8,001 – RM10,000 ( ) melebihi RM10,000 (sila nyatakan _____________)

A.1.3. Bilangan semua kontrak yang dilaksanakan sepanjang 5 tahun terakhir sebelum kontrak ini

( ) tiada ( ) 1-2 ( ) 3-4 ( ) 5-6 ( ) 7-8 ( ) melebihi 8 (nyatakan______)

A.1.4. Nilai semua kontrak yang dilaksanakan sepanjang 5 tahun terakhir sebelum tawaran kontrak ini

( ) tiada ( ) kurang daripada RM200,000
( ) RM200,001 – RM400,000 ( ) RM400,001 – RM600,000
( ) RM600,001 – RM800,000 ( ) melebihi RM800,000 (sila nyatakan _____________)

A.1.5. Bilangan pekerja di tapak bina

( ) tidak melebihi 5 ( ) 6-10 ( ) 11-15 ( ) 16-20 ( ) 21-25 ( ) melebihi 25 (nyatakan________)

PART 2. PROJEK

Sila tanda (√) pada jawapan yang sesuai mengenai diri atau syarikat tuan terhadap kenyataan di bawah

A.2.1. Syarikat yang melaksanakan projek ini adalah milik saya

( ) Ya ( ) Tidak

A.2.2. Saya telah melaksanakan projek ini

( ) sendiri tanpa sub-kontrak kepada pihak lain
( ) dengan sub-kontrak sebahagian kerja
( ) dengan sub-kontrak keseluruhan kerja

A.2.3. Pemilihan kontraktor untuk projek ini telah dibuat mengikut prosidur yang betul

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.4. Saya telah mendapat keuntungan daripada projek ini

( ) Ya ( ) Tidak

A.2.5. Masa yang diperuntukkan bagi saya menyiapkan projek ini adalah mencukupi

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.6. Berdasarkan pengalaman saya, masa yang diperlukan untuk menyiapkan projek seperti ini adalah

( ) tidak lebih 6 bulan ( ) 7-12 bulan ( ) 13-18 bulan ( ) 19-24 bulan ( ) 25-30 bulan ( ) 31 bulan atau lebih

A.2.7. Pegawai-pegawai kerajaan yang mengendalikan projek ini mesra dan senang dihubungi

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.8. Pegawai-pegawai kerajaan yang mengendalikan projek ini mempunyai pengetahuan tentang projek

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.9. <u>Bilangan</u> pegawai yang ditugas mengendalikan projek ini adalah mencukupi

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.10. Perunding Pengurusan Projek (PMC) telah menyelia projek ini dengan baik

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.11. Perunding Pengurusan Projek (PMC) mempunyai <u>bilangan</u> kakitangan yang mencukupi untuk menyelia projek

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.12. Perunding Pengurusan Projek (PMC) <u>hadir dalam tempoh yang munasabah</u> bila diperlukan untuk nasihat atau kelulusan

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.13. Perunding Pengurusan Projek (PMC) mempunyai <u>pengetahuan</u> dan <u>kemahiran</u> yang baik untuk menyelia projek

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.14. Sepanjang tempoh projek ini, PENYELIA PROJEK telah melawat tapak projek sebanyak

( ) lebih 15 kali ( ) 13-15 kali ( ) 10-12 kali ( ) 7-9 kali ( ) 4-6 kali ( ) tidak lebih 3 kali

A.2.15. Pada pandangan saya, PENYELIA PROJEK mempunyai kemampuan menyelia projek ini

( ) sangat mampu ( ) mampu ( ) agak mampu ( ) kurang mmpu ( ) tidak mampu ( ) sangat tidak mampu

A.2.16. Hubungan antara semua pihak dalam projek ini adalah baik

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.17. Terdapat mesyuarat di antara kontraktor dengan pihak berkuasa untuk menyelesaikan masalah projek

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.18. Bilangan mesyuarat yang diadakan untuk menyelesaikan masalah adalah mencukupi

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.19. Pelaksanaan projek ini dipengaruhi/ diganggu oleh pihak lain

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.20. Saingan untuk mendapatkan <u>bahan binaan</u> telah mengganggu kelancaran projek ini

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.21. Saingan untuk mendapatkan <u>pekerja binaan</u> telah mengganggu kelancaran projek ini

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.22. Faktor <u>alam sekitar</u> (contoh: cuaca, banjir dll) telah mengganggu kelancaran projek ini

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.23. Faktor <u>tapak bina</u> (contoh: halangan di tapak, jalan masuk dll) telah mengganggu kelancaran projek ini

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.24. Faktor <u>ekonomi</u> (contoh: perubahan harga barang dll) telah mengganggu kelancaran projek ini

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.25. Faktor <u>kelulusan daripada pihak berkuasa</u> telah mengganggu kelancaran projek ini

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.26. Terdapat karenah birokrasi dalam urusan pelaksanaan projek ini

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.27. Saya perlu memberi 'hadiah' untuk memastikan kelulusan atau urusan berkaitan projek ini berjalan lancar

( ) sangat setuju ( ) setuju ( ) agak setuju ( ) kurang setuju ( ) tidak setuju ( ) sangat tidak setuju

A.2.28. Dalam urusan mengenai projek ini, saya telah memberi 'hadiah' kepada pihak berikut (tandakan semua yang berkaitan)

- [ ] Kementerian Pelajaran Malaysia (KPM)
- [ ] Jabatan Pendidikan Negeri (JPN)
- [ ] Perunding pengurusan projek (PMC)
- [ ] Sekolah
- [ ] Lain-lain (sila nyatakan ___________________)

PART 3. LAIN-LAIN

A.3.1. Sila beri pandangan atau ulasan tuan/puan mengenai sebarang perkara berkaitan projek ini (sila gunakan helaian tambahan jika perlu)

____

____

____

____

Terima kasih di atas kerjasama tuan/puan

b) For User

University of Stirling
Department of Management and Organisation
Faculty of Management
Stirling FK8 4LA
United Kingdom

Tel: +44 (0) 1786 467310

Email: manorg@stir.ac.uk

Tuan/ puan,

Sukacita dimaklumkan bahawa soal-selidik ini bertujuan untuk mendapatkan maklumbalas daripada tuan/ puan mengenai makmal komputer di sekolah-sekolah.

2. Maklumbalas tuan/ puan ini adalah merupakan sebahagian daripada bahan penyelidikan untuk tesis PhD di Universiti of Stirling, United Kingdom yang berjudul "**Success factors of Malaysian Government Projects**". Matlamat penyelidikan ini adalah untuk mencadangkan model terbaik dalam pelaksanaan projek-projek Kerajaan di Malaysia.

3. Sebagai seorang yang terlibat penggunaan makmal komputer tersebut, maklumbalas tuan/puan amat berguna dalam memperbaiki kemudahan seumpama ini pada masa akan datang.

4. Kerjasama tuan/puan adalah dipohon untuk menjawab soalan-soalan yang ini dengan seikhlasnya. Sayugia dinyatakan bahawa soal-selidik ini adalah untuk tujuan akademik dan penyelidikan semata-mata dan identiti tuan/ puan serta sekolah tuan/puan tidak akan didedahkan.

5. Jika terdapat sebarang kemusykilan mengenai soal-selidik ini, sila hubungi penyelidik melalui email m.f.johari@stir.ac.uk atau telefon 019-252 8273. Kerjasama tuan/ puan amat dihargai

Terima kasih.

Mohamad Farazi Johari
Pelajar PhD

Prof. John A. Bowers
Head of Department
(*Supervisor*)

Nombor Siri: _______________

Phase: ______ Model: ______

SET B: BORANG SOAL-SELIDIK UNTUK SEKOLAH

PART 1. PENILAIAN TERHADAP HASIL PROJEK

Nyatakan tahap penilaian tuan/ puan terhadap makmal komputer ini menggunakan skala di bawah
(sila bulatkan jawapan tuan/puan)

1-sangat memuaskan 2-memuaskan 3-agak memuaskan 4-kurang memuaskan 5-tidak memuaskan 6-sangat tidak memuaskan

B.1.1. Bangunan dan komponennya

B.1.1.1.	Kualiti dan ketegapan bangunan	1	2	3	4	5	6
B.1.1.2.	Kemasan dan kecantikan bangunan	1	2	3	4	5	6
B.1.1.3.	Susun-atur dan rekabentuk bangunan	1	2	3	4	5	6
B.1.1.4.	Pendingin-hawa dan lampu	1	2	3	4	5	6
B.1.1.5.	Sambungan elektrik 3-fasa	1	2	3	4	5	6

B.1.2. Perabot

B.1.2.1.	Meja penyelia	1	2	3	4	5	6
B.1.2.2.	Kerusi penyelia	1	2	3	4	5	6
B.1.2.3.	Meja guru	1	2	3	4	5	6
B.1.2.4.	Kerusi guru	1	2	3	4	5	6
B.1.2.5.	Meja pelajar	1	2	3	4	5	6
B.1.2.6.	Kerusi pelajar	1	2	3	4	5	6
B.1.2.7.	Troli projektor LCD	1	2	3	4	5	6
B.1.2.8.	Kabinet besi	1	2	3	4	5	6
B.1.2.9.	Pigeon box	1	2	3	4	5	6
B.1.2.10.	Meja pencetak	1	2	3	4	5	6

B.1.3. Peralatan ICT

B.1.3.1.	Komputer guru	1	2	3	4	5	6
B.1.3.2.	Komputer murid	1	2	3	4	5	6
B.1.3.3.	Software	1	2	3	4	5	6
B.1.3.4.	Modem	1	2	3	4	5	6
B.1.3.5.	Server	1	2	3	4	5	6
B.1.3.6.	Network/ pendawaian	1	2	3	4	5	6
B.1.3.7.	Prestasi internet	1	2	3	4	5	6
B.1.3.8.	Pencetak	1	2	3	4	5	6
B.1.3.9.	Pengimbas	1	2	3	4	5	6
B.1.3.10.	Projektor LCD	1	2	3	4	5	6
B.1.3.11.	Kamera digital	1	2	3	4	5	6
B.1.3.12.	Latihan (oleh pembekal)	1	2	3	4	5	6
B.1.3.13.	Panduan pengguna	1	2	3	4	5	6

PART 2. PENGUNAAN DAN FAEDAH

Please indicate your level of satisfaction to the products of this project using scale below (please circle the number)

1-Very satisfied	2-Satisfied	3-Somewhat satisfied	4-Somewhat dissatisfied	5-Very dissatisfied	6-Completely dissatisfied

B.2.1. Faedah kepada pelajar

B.2.1.1.	Meningkatkan pengetahuan dalam literasi ICT	1	2	3	4	5	6
B.2.1.2.	Mengembangkan pengetahuan dan kemahiran pelajar dalam matapelajaran berkaitan ICT	1	2	3	4	5	6
B.2.1.3.	Mengembangkan pengetahuan dan kemahiran pelajar dalam matapelajaran bukan ICT	1	2	3	4	5	6
B.2.1.4.	Sebagai alat untuk pelajar menimba maklumat dan pengetahuan	1	2	3	4	5	6

B.2.2. Faedah kepada guru

B.2.2.1.	Meningkatkan pengajaran dalam matapelajaran berkaitan ICT	1	2	3	4	5	6
B.2.2.2.	Meningkatkan pengajaran dalam matapelajaran bukan ICT	1	2	3	4	5	6
B.2.2.3.	Persekitaran yang menyeronokkan untuk pengajaran dan pembelajaran	1	2	3	4	5	6
B.2.2.4.	Meningkatkan kecekapan dalam pengurusan bilik darjah	1	2	3	4	5	6

PART 3. LAIN-LAIN

Sila berikan ulasan tuan/ puan mengenai projek ini yang pada pandangan tuan belum disentuh dalam soalan-soalan di atas (sila gunakan ruang pada muka belakang helaian ini jika ruang yang disediakan tidak mencukupi)

____
____
____
____
____
____

Terima kasih di atas kerjasama tuan/ puan

Appendix 12: Interview Questions

SET 1. **: INTERVIEW QUESTION FOR THE PROJECT COMMISIONNER**

PROJECT DEFINITION

1.1. **Were you part this project during its initial stage?**

1.2. **"Project definition (conceptualisation)"; what does that term means to you?**

- ***What was your agency's role in the project definition process?***
- ***How importance the project definition is to the project success?***

1.3. **How do you find the process of defining the project?**

- ***How did the committee respond to your views during the project decision-making process?***
- ***What were the problem (if any) faced by your agency during the project definition process?***

1.4. **Were all relevant parties invited to air their views during the project definition?**

- ***Who were the parties involved?***
- ***Did the committee consider all views in making the decision of the way project should go about?***

1.5. **What was the project goal and mission?**

- ***Is the project goal and mission made known to all parties prior to project implementation?***

1.6. **How the decision-making committee assess resources before implementing the project?**

- ***Is this project part of long-term plan?***

1.7. **Did project scope sufficiently brainstormed before the decision made?**

- ***Did the building specification,, ICT equipment specification, and furniture fulfilled the needs?***
- ***Between building and ICT component, which one is more critical in fulfilling the project goal?***
- ***Converting existing class-room into computer laboratory would be much cheaper approach rather than constructing new building; do you agree? Why this approach not been considered?***

1.8. **Was there any element of risk management been considered during the project planning?**

- ***Leaning from this project, what are possible risk that need attention during project definition?***

PROJECT PLANNING

1.9. **After setting a clear concept through definition process, there was another stage, that is, project planning. How do you find this stage been carried out prior to implementation?**

- ***Were you (or your agency) part of the project planning committee?***
- ***In which phase of the project you involved in planning?***

1.10. **How was authority and responsibility among the parties in this project distributed?**

- ***Was there any overlapping in authority and responsibility?***

1.11. **How was the contractors selected?**

- ***Has the selection gone through normal tender procedure?***
- ***Between phase-1 and phase-2 approach, which one is better?***

1.12. **How was the design of the project determined?**

- ***Who design the project?***

1.13. **How long each contractor was given to complete the project?**

- ***What is your opinion about the think time allocated for the contractors to complete the project?***

1.14. **What is the cost of the project?**

- ***Do you think the project cost fair enough to the contractor?***

1.15. **Do you think all documentations related to this project were properly managed?**

- ***Who prepare the project documents (TOR, LOI, LOA, agreement)?***
- ***Was time given to those who prepare the documents sufficient?***

PROJECT IMPLEMENTATION

1.16. **How do you see the overall administration of the project**

- ***Do you have any formal training in project management?***
- ***How long have been involved in managing the project?***

1.17. **How was the project being managed/ monitored/supervised?**

- ***Can you explain briefly about the appointment of the PMC?***
- ***How do you find the performance of the project's PMC?***
- ***What is the basis for selecting this company as the PMC?***
- ***What is the rationale behind offering job to the same for both phases of the project?***

1.18. **How do you see the overall performance of phase-1 and phase-2 contractors?**

- ***How do you find the capability of the selected contractors?***

1.19. **How do you see the communication among the parties involved in the projects?**

- ***Did the parties in the project a have good relationship?***
- ***How efficient was information from one party reaching the other parties?***
- ***How fast and adequate was action taken in responding to the request?***
- ***Did you ever face a problem of misunderstanding or misinterpretation?***

1.20. **What is your comment about the integrity of all parties in this project?**

- ***Have all procedure fulfilled throughout the whole project life span?***
- ***Have all procedure fulfilled in the process of awarding of the project?***
- ***Have all procedure fulfilled in the process of getting the approval?***
- ***Was there any kind of non-standard practice that comes to your knowledge?***

1.21. **Was there any external factor that influences the implementation of the project?**

- ***What are the factors?***
- ***How they influence the project?***

PRODUCT

1.22. **How do you find the product of the project?**

- ***Do you satisfy with the outcome?***
- ***Has the product benefited the target group (users)?***

1.23. **Overall, how do you judge this project?**

- ***Is this project success? (if it is not, what is the main reason for that?)***
- ***Has the overall project goal fulfilled?***
- ***Is there any significant lesson/ experience learned?***
- ***If you were to do this kind of project again in the future, what is the most important thing that must be there?***

SET 2. **: INTERVIEW QUESTION FOR THE PROJECT SUPERVISOR**

PROJECT DEFINITION

2.1. **Were you part this project during its initial stage?**

2.2. **"Project definition (conceptualisation"); what does that term means to you?**

- ***What was your agency's role in the project definition process?***
- ***How importance the project definition is to the project success?***

2.3. **How do you find the process of defining the project?**

- ***How the committee respond to your views during the project decision-making process?***
- ***What were the problem (if any) faced by your agency during the project definition process?***
- ***How importance the project definition is to the project success?***

2.4. **Can you list down all relevant parties, which were invited to air their views during the project definition?**

- ***Who were the parties involved?***
- ***Did the committee consider all views in making the decision of the way project should go about?***

2.5. **What was the project goal and mission?**

- ***Is project goal and mission made known to you when you join the project?***

2.6. **How important resources assessment is before implementing the project?**

- ***Based on your experience in this project, has the resources been assessed wisely?***

2.7. **Did you involve in brainstorming the scope of this project?**

- ***Has the project scope sufficiently discussed before implementation?***
- ***Did you involve in suggesting the specification for building, ICT equipment, and furniture?***
- ***Between building and ICT facilities, which component is more important?***

2.8. **Was there any element of risk management been considered during the project planning?**

- ***Leaning from this project, what are possible risk that need attention during project definition?***

PROJECT PLANNING

2.9. **After setting a clear concept through definition process, there was another stage, that is, project planning. How do you find this stage been carried out prior to implementation?**

- ***Were you (or your agency) part of the project planning committee?***
- ***In which phase of the project you involved in planning?***

2.10. **What is your role in this project?**

- ***Is there any role that supposed to be yours but given to the others, and vice verca?***
- ***Do you think authority and responsibility over the project were fairly distributed?***
- ***Do you think you have done everything that you supposed to do?***
- ***Was there any overlapping in authority and responsibility?***

2.11. **How was the contractors selected?**

- ***Has the selection gone through normal tender procedure?***
- ***Was there any different between appointment of phase-1 contractors and phase-2 contractors?***

2.12. **How do you find the design of the project?**

- ***Who design the project?***

- ***Has the design suit all sites?***

2.13. **How long each contractor was given to complete the project**

- ***Was the time given reasonable?***
- ***Who was the party that advice the committee about the project time?***

2.14. **How is this project costed?**

- ***Was the project cost sufficient for the contractor to have reasonable profit margin?***
- ***Who was the party that advice the committee about the project cost?***

2.15. **Do you think all documentations related to this project were properly managed?**

- ***Did you involve in preparing any project documents (agreement etc)?***
- ***Did you manage to handle those documents properly?***

PROJECT IMPLEMENTATION

2.16. **How do you find the overall performance of the project administrator?**

- ***Do you have any formal training in project management?***
- ***How long have been involved in managing the project?***

2.17. **How do you manage to supervise such a big project?**

- ***Can you tell briefly about the appointment of your company as the project's PMC?***
- ***Do you have any experience in supervising the project?***
- ***How many staff do you have?***
- ***Are they (the staffs) experienced workers?***
- ***How good is their knowledge in managing project especially in supervising the contractors?***
- ***Do you have site office in each zone of the project?***
- ***should they need assistance or approval, how fast do you respond to the call?***
- ***How many visit your staffs pay for each site, in average?***

2.18. **How do you see the overall performance of phase-1 and phase-2 contractors?**

- ***For this kind of project, which type of contractor do you think is more suitable?***
- ***In terms of capability, do you see any differences between phase-1 and phase-2 contractors?***
- ***Were they experienced contractors?***
- ***Have they carried out the project themselves?***
- ***What were the main problems faced by the contractors in this project?***

2.19. **How do you see the communication among the parties involved in the projects?**

- ***How good was your relationship with the other parties in the project?***
- ***How fast and clear the information from the other parties reaching you?***
- ***How fast the relevant parties taken action to solve the problems after you raised it?***
- ***What was the machenisme used to solve the project problem?***

2.20. **What is your comment about all parties' integrity in this project?**

- ***Have all procedure being fulfilled throughout the whole project life span?***
- ***Was there any kind of misconduct come to your knowledge?***

2.21. **What external factor were significantly influences the implementation of the project?**

- ***How did they influence the project?***

PRODUCT

2.22. **How do you find the product of the project?**

- ***Does the outcome of the project is as planned?***

2.23. **Overall, do you evaluate this project?**

- ***Is this project success? (if it is not, what is the main reason for that?)***
- ***Do you learn any significant lesson from this project?***
- ***What do yo think the major mistake of yours in this project?***
- ***If you were to manage this project again from the beginning in the future, what is the most important thing that you think you should consider?***

SET 3. **: INTERVIEW QUESTION FOR THE CONTRACTOR AND SUPPLIER**

PROJECT DEFINITION

3.1. **Were you part this project during its initial stage?**

- ***Can you explain your involvement in this project?***

3.2. **Did you company involve in defining and planning stage of the project?**

- ***To what extend your company's involvement in the project definition?***
- ***To what extend you involve in the project definition?***
- ***How importance the project definition is to the project success?***
- ***What were the problem (if any) faced by your agency during the project definition process?***
- ***How the committee respond to your views during the project decision-making process?***

3.3. **Can you list down all relevant parties, which were invited to air their views during the project definition?**

- ***Who were the parties involved?***
- ***Did the committee consider all views in making the decision of the way project should go about?***

3.4. **What was the project goal and mission?**

- ***Is the project goal and mission made known to all parties prior to project implementation?***

PROJECT PLANNING

3.5. **Do you think that all parties in the project played their role efficiently?**

- ***Was there any overlapping in authority and responsibility?***

3.6. **Can you tell briefly the selection of your company to do this project?**

- ***Has the selection gone through normal tender procedure?***

3.7. **Do you have any comment for the project design?**

- ***Who design the project?***
- ***Was the design suitable for all situations?***

3.8. **How long was the time given for you to complete the project?**

- ***Do you think time allocated for the contractors to complete the project sufficient?***
- ***(If time given is not sufficient), what is the ideal time to complete such a project?***

3.9. **What is the cost of the project?**

- ***How much profit do you make from the project?***

3.10. **Do you think all documentations related to this project were properly managed?**

PROJECT IMPLEMENTATION

3.11. **How do you see the overall administration of the project?**

3.12. **How was the project being managed/ monitored/supervised?**

- ***How do you find the performance of the PMC in supervising the project?***
- ***Have they enough staff?***
- ***How do you find their experience and knowledge?***
- ***Were they approachable?***
- ***How far is their nearest office from your site?***

- ***How long they took to respond should you need them on the site?***
- ***Overall how many time they visited your site along the whole project life span?***

3.13. **How do you rate your company's performance in carrying out this project?**

- ***Do you have any formal training in project management?***
- ***How long have been involved in managing the project?***
- ***Has your company any experience in doing this kind of project?***
- ***How far is your office from the site?***
- ***How many workers do you have?***
- ***Are they experienced workers?***
- ***Have they any special training and special skill?***
- ***How many sub-contractors do you have?***
- ***Did you adopt a latest technology in this project?***
- ***Since the thousand of individual projects took place at the same time, how do you compete with the other contractors for project resources?***
- ***What are the main problems for your company in carrying out this project?***

3.14. **How do you see the communication among the parties involved in the projects?**

- ***How good was your relationship with the other parties in the project?***
- ***How fast and clear the information from the other parties reaching you?***
- ***How fast the relevant parties taken action to solve the problems after you report it?***
- ***What was the machenisme used to solve the project problem?***

3.15. **"Integrity is one of the prerequisites to ensure that the project moving smoothly"; do you have any comment about that?**

- ***Have you fulfilled all procedure throughout the whole project life span?***
- ***Was there any kind of misconduct come to your knowledge?***

3.16. **Was there any irrelavent factor that significantly influences the project implementation?**

- ***What are the factors?***
- ***How they influence the project?***

PRODUCT

3.17. **Do you satisfy with the product of your project?**

- ***Do you think the project is success?***
- ***Is there any room for you to improve the outcome?***

3.18. **Overall, how do you evaluate this project?**

- ***What was the most difficult problem you faced in this project?***
- ***Are there any significant lesson/ experience learned?***
- ***If you were to do this kind of project again in the future, what is the most important thing that must be there?***

SET 4. **: INTERVIEW QUESTION FOR THE THE USER**

PROJECT DEFINITION AND PLANNING

4.1. **Were you or your scholl part this project during its initial stage?**

- ***Can you explain your involvement in this project?***

4.2. **“Project definition (conceptualisation)”, what does that term means to you?**

- ***To what extend your school involvement in the project definition?***
- ***How importance the project definition is to the project success?***
- ***What is the goal and mission of this project?***

4.3. **What is the project planning?**

- ***Does this project adequately planned?***

4.4. **Overall, how do you find this project?**

4.5. **Did anybody come to consult you before or during the project implementation?**

4.6. **Have you sign any documentation related to the project?**

PROJECT IMPLEMENTATION

4.7. **Were you part of this project during the implementation?**

4.8. **How do you find the overall performance of the project?**

- ***Do you have any idea of how the project being administrated?***
- ***How do you find the performance of the contractor?***
- ***How do you find the performance of the PMC?***
- ***How long was the whole construction period of the project?***

4.9. **“Everybody who involved in this project have done their best to make sure the project success”, what is you comment?**

- ***Have you heard any improper arangement about this project throughout the project life span/***
- ***What kind of unusual practice is that?***

4.10. **Have you, during the project execution, asked for amendment to suit your school’s need?**

- ***What did you ask for?***
- ***Was any factors that badly influence or cause the project delay?***

PRODUCT

4.11. **Overall, how do you find this computer laboratory?**

- ***Do you have any comment about the computer laboratory building?***
- ***Do you satisfy with the project (building, furniture and ICT equipment)?***

4.12. **How does this computer laboratorty being used?**

- ***How does it benefited the students***
- ***Is there any improvement in teaching-learning compared to the time before the usage of this facilities***
- ***Is there any improvement in their computer knowledge?***
- ***How does it benefit the teachers?***

4.13. **In your opinion, is this project success?**

- ***If you were opportunity to give your view, how do you want this project to be?***

Appendix 13: List of Secondary Data

a) Project Documentations

1. Privatisation proposals from seven companies
2. Project Term of References
3. Letter of award to phase-1 contractor (first batch)
4. Letter of award to phase-1 contractor (second batch)
5. Letter of award to phase-1 contractor (third batch)
6. Letter of award to phase-2 contractor (first batch)
7. Letter of award to phase-2 contractor (second batch)
8. Letter of award to phase-2 contractor (third batch)
9. Contract between Government of Malaysia and the phase-1 contractor
   (5 contracts with 5 contractors)
10. Contract between Government of Malaysia and the phase-2 contractor
    (1,174 contracts with 1,174 contractors)
11. Contract between Government of Malaysia and the phase-2 furniture supplier
12. Contract between Government of Malaysia and the phase-2 ICT equipment supplier
13. Contract between Government of Malaysia and the PMC

b. Supporting Documents (prints)

1. Corresponding letters and minutes of meeting of 'defining' committee chaired by the EPU's Director-General (later moved to Treasury and chaired by Treasury's Secretary General).
2. Corresponding letters and minutes of meeting of the project steering committee at MOE, chaired by MOE's Secretary General, who is also the project director.
3. Corresponding letters and minutes of the project working committee at MOE chaired by MOE's Deputy Secretary General (Finance and Development), who is also the project director.
4. Tender Guide Kit from Treasury.
5. Company's corporate information from Companies Commission of Malaysia;
6. Series of project periodical progress reports from MOE.
7. Treasury circular on direct-negotiation, title 'Garis Panduan Permohonan Perolehan Secara Rundingan Terus', dated 17 April 2002.

c. Supporting Documents (softcopy)

1. List of projects which include contractor name, project start date, completion data etc.
2. Project budgeting and spending record

Note: due to confidential reason, the above data could not be attached in this thesis.

Appendix 14: Level of Power and Interest of Stakeholders to the Project

	Success Factors	Stakeholders									
		1 S	2 S	3 M	4 O	5 O	6 D	7 O	8 D	9 I	10 I
Under-control	Management team (appointment, team size etc)	**	***	**	-	-	-	-	-	-	-
	Staff expertise (training, experience, motivation etc)	**	**	**	-	-	-	-	-	-	-
	Project planning (scoping, budgeting, scheduling etc)	***	**	**	**	**	-	*	-	-	-
	Project finance (including payment schedule & method)	***	***	*	-	-	-	-	-	-	-
	Implementation (technology usage, site location, method etc)	**	*	**	-	-	**	*	-	-	-
	Contractor selection (including termination of non-performers)	**	***	*	-	-	*	-	-	-	-
	Competition for workers	**	-	-	-	-	-	**	-	-	-
	Competition for material	**	-	-	-	-	-	**	-	-	-
	Commodity price	**	*	-	-	-	-	*	-	-	-
Beyond Control	Geographical location	-	-	-	-	-	-	-	-	-	-
	Risk management	-	-	-	-	-	-	-	-	-	-
	Exchange rate	-	-	-	-	-	-	-	-	-	-
	Natural disaster	-	-	-	-	-	-	-	-	-	-

<u>Legends</u>

Stakeholder List

1	Federal Government	2	Central Agencies	3	Project owner	4	Statutory authorities	5	Local authorities
6	Local politicians	7	Contractors/ Suppliers	8	End users	9	Communities	10	Public

Stakeholders Category

S	Strategic: Determining the strategy which this system underpins - may sponsor the project
M	Managerial: Executes managerial control over elements of the system being implemented
O	Operational: Is involved in operating the system or parts of it
D	Direct impact: Is directly affected by outputs of the system but is not engaged in inputting to it
I	Indirect impact: Is only indirectly affected by the system if at all

Level of influence

***	highly influential (has power and tendency to act)
**	moderately influential (has power but less tendency to act, or has no appropriate power or might be overruled by other authorities)
*	Slightly influential (has ability to suggest for action but not necessarily be fulfilled)
-	no influence

Appendix 15: Data Collection Authorised Document

a) <u>Research pass</u>

Kepada Ketua-ketua Jabatan yang berkenaan:

Penyelidik yang namanya tersebut dan gambarnya tertera dalam pas ini telah berdaftar dengan Unit ini. Penyelidikan yang beliau akan jalankan atas tajuk berikut akan memberi faedah kepada negara ini. Diharap tuan dapat memberi beliau kerjasama yang difikirkan wajar tertakluk kepada peruntukan-peruntukan dalam Akta Arkib Negara, 1966 dan Akta Rahsia Rasmi, 1972.

"THE SUCCESS FACTORS OF MALAYSIAN GOVERNMENT PROJECT: THE EMPIRICAL STUDY OF SCHOOL COMPUTERISATION PROJECT"

Tarikh 15/3/06

UNIT PERANCANG EKONOMI JPM

b/p Ketua Pengarah
Unit Perancang Ekonomi
Jabatan Perdana Menteri

PNMB., K.L.

UNIT PERANCANG EKONOMI
Economic Planning Unit
JABATAN PERDANA MENTERI
Prime Minister's Department
BLOK B5 & B6.
PUSAT PENTADBIRAN KERAJAAN PERSEKUTUAN
62502 PUTRAJAYA
MALAYSIA

Telefon: 88883333
Fax: 603-88883798

Ruj. Tuan:
Your Ref.:

Ruj. Kami:
Our Ref.: UPE: 40/200/19/1436

Tarikh:
Date: 15 March 2006

Mohamad Farazi Johari
Flat 1, 53 King Street
Stirling FK8 1DN
United Kingdom

APPLICATION TO CONDUCT RESEARCH IN MALAYSIA

With reference to your application dated 12 December 2005, I am pleased to inform you that your application to conduct research in Malaysia has been approved by the **Research Promotion and Co-Ordination Committee, Economic Planning Unit, Prime Minister's Department.** The details of the approval are as follows:

Researcher's name :	**MOHAMAD FARAZI JOHARI**
Passport No. / I. C No:	**640320-02-5546**
Nationality :	**MALAYSIA**
Title of Research :	**THE SUCCESS FACTORS OF MALAYSIAN GOVERNMENT PROJECT: THE EMPIRICAL STUDY OF SCHOOL COMPUTERISATION PROJECT**
Period of Research Approved:	**THREE MONTHS**

2. Please collect your Research Pass in person from the Economic Planning Unit, Prime Minister's Department, Parcel B, Level 4 Block B5, Federal Government Administrative Centre, 62502 Putrajaya and bring along two (2) passport size photographs. You also required to comply with the rules and regulations stipulated from time to time by the agencies with which you have dealings in the conduct of your research.

3. I would like to draw your attention to the undertaking signed by you that you will submit without cost to the Economic Planning Unit the following documents:

a) A brief summary of your research findings on completion of your research and before you leave Malaysia; and

b) Three (3) copies of your final dissertation/publication.

4. Lastly, please submit a copy of your preliminary and final report directly to the State Government where you carried out your research.

ATTENTION

This letter is only to inform you the status of your application and **<u>cannot be used as a research pass</u>**.

Thank you.

Yours sincerely,

Munirah

(MUNIRAH ABD. MANAN)
b.p. Ketua Pengarah,
Unit Perancang Ekonomi,
(Seksyen Ekonomi Makro)
Email: munirah@epu.jpm.my
Tel: 88882809/2818/2827

C.c:

Pengarah
Bahagian Perancangan Penyelidikan & Dasar Pendidikan
Kementerian Pelajaran Malaysia
Aras 1-4, Blok E8
Kompleks Kerajaan Parcel E
Pusat Pentadbiran Kerajaan Persekutuan
62604 Putrajaya
(u.p: Dr. Amir bin Salleh @ Mohd. Saleh) · (Ruj. Tuan: KP(BPPP)603/008 (16)

Ketua Setiausaha
Kementerian Kewangan
Kompleks Kementerian Kewangan
Presint 2
Pusat Pentadbiran Kerajaan Persekutuan
62592 Putrajaya
(u.p: En. Muhamad Adli b. Mahmood) (Ruj. Tuan: KK/BP 10/173/491 Jld. 4(3)

Pengarah,
Institut Pengurusan Penyelidikan dan Perundingan
Universiti Malaya,
C 313, Bangunan IPS,
50603 Kuala Lumpur.

BAHAGIAN PERANCANGAN DAN PENYELIDIKAN DASAR PENDIDIKAN
KEMENTERIAN PELAJARAN MALAYSIA
ARAS 1-4, BLOK E8
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Rujukan Kami : KP (BPPP)603/008(16)
Tarikh : 12 Januari 2006

Ketua Pengarah
Unit Perancang Ekonomi,
Jabatan Perdana Menteri,
Blok B5 dan B6,
Kompleks Jabatan Perdana Menteri
Pusat Pentadbiran Kerajaan Persekutuan,
62502 PUTRAJAYA.

(up: Pn. Munirah bt Abd. Manan)

Tuan,

Permohonan Untuk Menjalankan Penyelidikan di Malaysia
MOHAMAD FARAZI JOHARI

Dengan hormatnya saya merujuk kepada perkara di atas.

2. Adalah saya diarah memaklumkan bahawa Bahagian ini tidak mempunyai apa-apa halangan dan menyokong penuh ke atas cadangan yang dikemukakan oleh penyelidik berkenaan untuk membolehkan menjalankan penyelidikan:
" The Success Factors Of Malaysian Government Project: The Empirical Study Of School Computerisation Project ".

3. Setelah selesai kajian dijalankan, penyelidik perlulah mengemukakan senaskah laporan dapatan kajian tersebut ke Bahagian ini.

4. Bersama-sama ini disertakan ulasan Bahagian ini ke atas cadangan penyelidikan yang dikemukakan.

Sekian dimaklumkan, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,

1436

(DR. AMIR BIN SALLEH @ MOHD SALEH)
Timbalan Pengarah, Sektor Penyelidikan Dasar
Bahagian Perancangan dan Penyelidikan Dasar Pendidikan
Kementerian Pelajaran Malaysia.

PENDAFTARAN SURAT
Jabatan Perdana Menteri
19 JAN 2006
Malaysia
UNIT PERANCANG EKONOMI

Ulasan Tentang Cadangan Kajian

Nama Penyelidik: **Mohamad Farazi Johari**

Institusi: **University of Striling, UK**

Tajuk Kajian: **The Success Factors of Malaysian Government Project: The Empirical Study of School Computerisation Project**

a) Setelah membaca cadangan kajian seperti yang dinyatakan di atas, padangan terhadap cadangan kajian adalah seperti berikut:

i. **Bidang yang akan dikaji: Sesuai**

Kajian ini meninjau amalan pengurusan projek dalam konteks projek pengkomputeran sekolah seperti yang dilaksanakan oleh Kementerian Pelajaran Malaysia.

ii. **Kawasan-kawasan kajian yang telah dikenalpasti: Sesuai**

Penyelidik ingin mengkaji faktor-faktor yang menyumbang kepada kejayaan projek pengkomputeran sekolah dengan melihat pihak-pihak yang terlibat dalam kejayaan ini serta aspek-aspek yang mengakibatkan kegagalan projek. Kawasan kajian bukanlah satu-satu perkara yang sensitif tetapi sebenarnya berlaku.

iii. **Faedah-faedah yang mungkin dapat diperolehi dari kajian ini: Berfaedah kepada Kementerian Pendidikan**

Dapatan daripada kajian ini adalah berguna kepada KPM kerana indikator kejayaan dan kegagalan projek pengkomputeran sekolah dapat memberi maklum balas kepada pemutus dasar di peringkat pengurusan atasan.

b) Bahagian ini tidak mempunyai apa-apa halangan bagi penyelidik menjalankan kajian ini di Bahagian-Bahagian Kementerian Pelajaran, Jabatan Pendidikan Negeri, dan sekolah.

(DR. SOON SENG THAH)
Unit Penyelidikan Dasar
Bahagian Perancangan dan Penyelidikan Dasar Pendidikan
Kementerian Pelajaran Malaysia.

Tarikh: 6 Januari 2006

UNIVERSITY OF
STIRLING

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11 February 2006

Dear Sir/Madam

PhD Student, Mohamad Farazi Johari

This is to certify that Mohamad Farazi Johari is a registered PhD student at the University of Stirling, conducting research titled *The Success Factors of Malaysian Government Projects: The Empirical Study of School Computerisation Project*. I have approved the data collection for this study to be conducted in Malaysia.

In order to complete this research, he needs to gather some information from the government agencies and private companies which involved in that particular project.

As his supervisor I am most grateful for your cooperation and participation in this study.

Thank you.

Yours faithfully

JABowers

Professor John Bowers

Professor John Bowers
Head of Department