CAUSES OF DELAY IN MALAYSIAN IT PROJECTS

FANURUL KEMP BT. ABD. HAKIM

DEGREE OF PROJECT MANAGEMENT WITH HONORS

UNIVERSITI MALAYSIA PAHANG

Final Year Project Report

Approval for Binding Form

Student's Name: Fanurul Kemei bt. Abd Hakim Student's ID: PB10028

Programme: Project management

Project Title: Causes of Delay in Malaysian IT Projects

.....

Checklist: Tick [✓] if students have fulfilled the criteria below

1) Pass the Final Year Project II Presentation [✓]
2) Pass this subject BP*4514/4524 [✓]
3) All Chapters have been finalised and reviewed for binding [✓]
4) The Final Year Project Report print out for binding is in accordance with UMP Thesis arrangement and order *: [✓]

*According to UMP Thesis Guide, the layout and content of the thesis should be in following order:

1) Title Page
2) Examiners Approval Document
3) Supervisor's Declaration
4) Candidate's Declaration
5) Dedication
6) Acknowledgements
7) Abstract
8) Translation of Abstract
9) Table of Contents
10) List of Tables
11) List of Figures
12) List of Symbols
13) List of Abbreviations
14) Text (All Chapter 1, 2, 3, 4, 5)
15) References
16) Appendices.

Student is allowed to print and bind final year project report? Yes [✓] No [ ]

Supervisor's Name: LEE CHIA KUANG

Supervisor's Signature: ..... Date: 8/1/2014

LEE CHIA KUANG
LECTURER
FACULTY OF TECHNOLOGY
UNIVERSITI MALAYSIA PAHANG
LEBUHRAYA TUN RAZAK
26300 GAMBANG,KUANTAN
TEL : 09-5492445 FAKS : 09-5492167

SUPERVISOR'S DECLARATION

I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the degree of Project Management.

Signature

Name of Supervisor : MR LEE CHIA KUANG

Position : LECTURER

Date : 2 DECEMBER 2013

STUDENTS'S DECLARATION

I hereby declare that the work in this project is my own except for quotations and summaries which have been duly acknowledged. The project has not been accepted for any degree and is not concurrently submitted for award of other degree.

Signature

Name : FANURUL KEMP BT ABD HAKIM

ID Number : PB10028

Date : 2 DECEMBER 2013

This research project is specially dedicated to my parents, Abd. Hakim b. Abd. Rahman and Farah Norina Rashid, not forgetting my amazing sister, Fahareena Kemp, and also to my intelligent brother, Fanazrin Kemp for the never-ending support, encouragement, and constant love. I love you guys.

ACKNOWLEDGEMENTS

First and foremost, my gratitude to Allah (God) the Almighty, for His showers of blessings throughout my research project.

I would like to express my sincere gratitude to my supervisor Mr. Lee Chia Kuang for the continuous support to my research project, for his patience, motivation, enthusiasm, and great knowledge. His supervision has helped me throughout the two semesters and I could not imagine having a better supervisor for my research project. Without his advice and assistance it would be a lot tougher to completion.

This research project would not have been possible without the support of my friends especially Nur Iqalyana and Nurul Wahida, who were always willing to help and give their best ideas. Also to my significant other, Muhammad Ikram for his support and patience at all times, as always, for which my mere expression of thanks likewise does not suffice.

I acknowledge my sincere indebtedness and gratitude to my parents for their love, dream and sacrifice throughout my life. I am really thankful for their sacrifice, patience, and understanding that were inevitable to make this work possible. Their sacrifice had inspired me from the day I learned how to read and write until what I have become now. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to achieve my dreams.

I also would like to express very special thanks to Project Management lecturers of Faculty of Technology who guided us with valuable advices throughout the two semesters.

Lastly I would like to thanks those who contributed to my final year project directly or indirectly. I would like to acknowledge their comments and suggestions, which was crucial for the successful completion of this study.

ABSTRACT

Delay in Information Technology (IT) projects is considered as a problem that frequently happens in most of the places, not to forget Malaysia. The major intention of this study is to identify the causes and effects of delay in IT projects in Malaysia and to propose strategies against delay in IT Projects. A quantitative research design method is used to seek responses from a large number of respondents, thus few sets of questionnaires have been distributed. A total of 66 respondents participated in this survey. Seven most important causes of delay in IT projects in Malaysia were classified, which are: product-related cause, managerial-related cause, personnel-related cause, time-related cause, organization-related cause, cost-related cause and technology-related cause. While the proposed most important strategies against delay in IT projects in Malaysia are: product-related strategy, time-related strategy, personnel-related strategy, managerial-related strategy, organization-related strategy, cost-related strategy and technology-related strategy. The four most important effects of delay in IT projects in Malaysia are: litigation, abandonment, over cost and overtime. Correlation between all causes and effects was established.

ABSTRAK

Kelewatan projek IT dianggap sebagai masalah yang sering berlaku di kebanyakan tempat , tidak lupa juga di Malaysia. Tujuan utama kajian ini adalah untuk mengenal pasti punca-punca dan kesan-kesan kelewatan dalam projek IT di Malaysia, dan juga untuk mencadangkan strategi terhadap kelewatan dalam Projek IT. Satu penyelidikan kaedah reka bentuk kuantitatif digunakan untuk mendapatkan jawapan daripada sebilangan besar responden, dengan itu beberapa set borang soal selidik telah diedarkan . Seramai 66 responden telah mengambil bahagian dalam kajian ini. Tujuh perkara penting dalam kelewatan dalam projek IT di Malaysia telah dikelaskan , iaitu: punca yang berkaitan dengan produk , punca yang berkaitan dengan pengurusan, punca yang berkaitan dengan kakitangan, punca yang berkaitan dengan masa, punca yang berkaitan dengan organisas, punca yang berkaitan dengan kos dan punca yang berkaitan dengan teknologi. Cadangan strategi yang paling penting terhadap kelewatan dalam projek IT di Malaysia pula adalah: strategi yang berkaitan dengan produk , strategi yang berkaitan dengan masa , strategi yang berkaitan dengan kakitangan, strategi yang berkaitan dengan pengurusan, strategi yang berkaitan dengan organisasi, strategi yang berkaitan dengan kos dan strategi yang berkaitan dengan teknologi. Empat kesan paling penting dalam kelewatan dalam projek IT di Malaysia adalah: tindakan undang-undang , pembuangan , peningkatan kos dan kerja lebih masa. Korelasi antara semua sebab-sebab dan kesan-kesan telah dihasilkan.

TABLE OF CONTENTS

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CPM	Critical Path Method
EV	Earned Value
EVM	Earned Value Management
ICT	Information and Computing Technology
IHL	Institutes of Higher Learning
IT	Information Technology
MSC	Multimedia Super Corridor
PV	Planned Value
SPI	Schedule Performance Index
SPSS	Statistical Package for the Social Sciences
SV	Schedule Variance

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

A project by definition involves an established timeframe to achieve before completion, at the lowest cost, and at the greatest level of functionality. A project that is complete within time and cost, while giving out the best function is very critical for the success of projects. In IT projects, the three success factors that are time, cost and functionality are also known as the Iron Triangle (Ambler, 2006).

If a project fails to meet its time requirements, project delay arises and this is known as schedule slippage. It is well known that IT projects typically slip on their schedules. A delay is basically the change of a project's original stated period at the time of bidding in the contract and its overall actual contract period at the end of the project.

According to Ambler (2006), most IT projects fail because they have set unrealistic goals in terms of the Iron Triangle. Should the possibility of renegotiation of project specifications arise, the development team often then fails to inform the user of the possibility of not meeting the promised Iron Triangle goals.

This chapter will provide general ideas and information of this study. The sections that will be presented in this chapter are problem background, problem statement, research objectives, research questions, research hypothesis, scope, significance of study, and operational definition.

1.2 PROBLEM BACKGROUND

Information Technology (IT) projects have influenced organizations in making investments since the world has realized that investments in IT can create major advantages in a good competitive way in the market. In this era of globalization, influence of IT projects in the market and the surroundings has an effect on production market in so many ways. IT may support an organization by functioning as an enabler or driver of success or an organization may be damaged if IT functions as an inhibitor. In the extreme, positive case, IT can have a transformational effect on a business; IT can change a business in the area of process, product, service, management, and even environment. Regardless of fast developments in technology, the IT industry still makes every effort to develop any IT projects that meet their functionality, timeliness and budget constraints (Ichu and Nemani, 2011). The Information Technology sector is one of the important sectors that aid Malaysia's economic development.

Although the advantages of investing in IT are clear, IT projects are mostly known to have a lot of risks and the projects may be out of control, since they are often difficult to fulfill the projects' justifications in terms of time, cost and scope. The demand of an IT project to be without any errors is still a challenge to the IT industry. For so many years, the IT industry has been afflicted by schedule slippage. Delivering IT projects on time has become increasingly complex and difficult to manage due to the fast evolvement of the software industry, the large application sizes, the unpredictable software activities, and the varieties of software development processes and environments.

Estimating completion dates for information technology projects and bringing them in on time is tricky business. The success of an IT project is determined when an IT project meets its justification, whether the project is according to schedule, within

budget and according to its specification (Thorp, 2001). In 2003, Hackett Group reported that the completion time for IT projects have time overruns ranging between 24 and 100 percent (Perks, 2003).

1.3 PROBLEM STATEMENT

In this day and age, competition between companies has increased worldwide and clients want projects that are at the highest quality and have the shortest time. Completing projects on time is an important issue in IT companies. If the clients are not getting the project delivered on time, other companies might start that project before that. By this, the delayed project will not be successful. Project sponsors will encounter more strict procedure in approving the justifications that need them to ensure IT projects stay on track to satisfy the defined schedule, cost and functionality.

According to Imamoglu and Gozlu (2008) there are around 20 per cent of IT projects have been abandoned before their completion date and less than a third IT projects were completed according to schedule, budget, and functions. It is vital to find solutions for this issue. Delay denotes that there is a loss of earnings as claimed by the and for the owner or consumer (Haseeb et al., 2011).

Since delay in IT projects is counted as a problem that frequently happens, there is a need to do further exploration on what are the major causes that can lead to delays in IT project schedule which ultimately results loss in projects' profitability, thus finding the strategies that can be implemented to minimize delay in IT projects.

1.4 RESEARCH OBJECTIVES

The objectives of the research are:

1. To identify the causes of delay in IT projects in Malaysia.
2. To propose strategies against delay in IT projects.
3. To identify the effects of delay in IT projects.

1.5 RESEARCH QUESTIONS

This research is carried out to seek answers for:

1. What are the causes of delay in IT projects in Malaysia?
2. How to eliminate delays in IT projects?
3. What are the effects of delay in IT projects?

1.6 RESEARCH HYPOTHESIS

Based on the research questions the study works out on the following hypothesis:

H1 : There is a positive correlation between the causes and effects of delay in IT projects.

1.7 SCOPE

The population of this study refers to all MSC Malaysia status companies. They were chosen based on the availability of data from the online databases. MSC Companies Directory (accessible online at http://www.mscmalaysia.my/status_company) was used as reference for the sampling frame of the study. The online database helps in providing the companies' addresses in order for the survey to be sent.

According to the MSC Malaysia info, there are 2375 companies, which are categorized into 4 clusters that are creative multimedia, IHLs and incubators, InfoTech, and shared services outsourcing. According to Saunders et al. (2007), for a population of around 2000, the appropriate sample is 100. Thus, for a population of 2375 companies, a total of 100 companies were chosen to participate in this study.

1.8 SIGNIFICANCE OF STUDY

This study will enlighten people about the issues that cause the delay of IT projects and its strategies to reduce the occurrence of project delay. Although there are a few researches have been conducted to identify the reason behind the delay of projects, but the discovered results were unsatisfying. Besides, IT projects in Malaysia have no established guidelines related to this scenario. This study will also provide the effect of delay in IT projects.

1.9 OPERATIONAL DEFINITION

Projects that are delayed or behind schedule can be defined when SV<0 and SPI<1

Schedule variance (SV = EV−PV)
Schedule performance index (SPI = EV/ PV)

1.10 CONCLUSION

This chapter highlighted general ideas and information of this study that comprises problem background, problem statement, research objectives, research questions, research hypothesis, scope, significance of study, and operational definition.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

A review is performed to identify studies relevant to this topic. Chapter 2 discusses the distribution of four major sections, which are, definition of IT projects, project delay in IT, causes of delay, strategies to overcome project delay in IT projects, effects of delay in IT projects and theoretical framework.

2.2 IT PROJECTS

IT is the term that stands for Information Technology. Information Technology is the technology that is related to computing, software and networking that processes, stores and distributes data. Information Technology is widely used among people for different reasons such as communications, problem solving and economy. Projects that involve IT are now becoming one of the most complex types of project. According to Al-Ahmad et al. (2009), IT projects are synonym with failure for the last few years.

2.2.1 Software development project

Software consists of computer-readable object code that cannot be defined and interpreted by humans. It is created with programming languages, and associated utilities. According to Forselius (2005), there are 7 types of software development software:

1. **Customer specific new development project:**
   Creates completely new customer specific software.
2. **Software product new development project:**
   Creates a new software product that is always developed to be used by more than one customer. A software product may be either an independent packaged software or embedded part of any other product.
3. **Software version enhancement project:**
   Creates a new version of existing software. The existing software may be either customer specific software or a software product.
4. **ICT service development project:**
   Creates a contract-based continuous or temporary ICT service. The service may be, for example, either software or hardware related, and consists of maintenance, support, help desk, or operating service.
5. **Package software configuration project:**
   Result is installed, parameterized and, user configured software package.
6. **Data conversion project:**
   Data is moved from persistent data storage of one information system to persistent data storage of another information system.
7. **Software integration development project:**
   Creates software that provides interfaces services between two or more information systems.

2.3 PROJECT DELAY IN IT

Delays are always measured as expensive to all parties concerned in the projects and very often it will result in clash, claims, total desertion and much difficult for the feasibility and it slows the growth of information technology sector. About 20 per cent of the IT projects have been canceled before completion and less than a third completed on time, on budget, and with expected functionality.

Project delay arises if a project fails to meet its schedule requirements, this is known as schedule slippage. It is well known that IT projects typically slip on their schedules. Time is money. With forecasts, it is always important to identify and address

issues that can cause delays. In most conditions, the original predictions reasonably merge with actual performance. However, some delays may be unforeseen or unavoidable regardless of the best management practices. Delays could be due to lack of test tools, low response from clients, scope creep and inappropriate management in allocating resources.

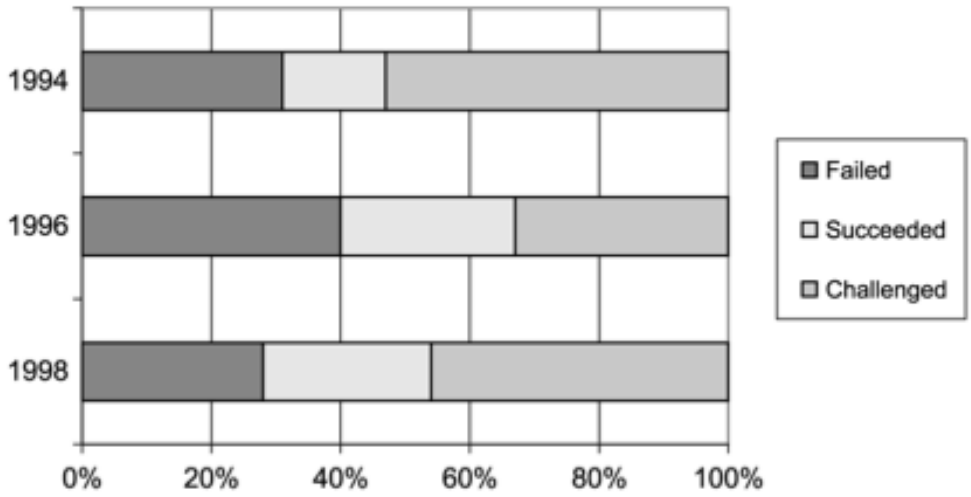

Figure 2.1 : Bar chart showing project failure, success and challenge.

Source: Chulkov and Desai (2005)

2.4 CAUSES OF DELAY

Collofello et al. (2000) suggested that all IT projects in an organization need technology, which enables the projects to be developed upon, product, which is the project that is to be developed, personnel, which is the development team to run the wok, management, the people in charge of running the project, and organization, which is the atmosphere where the projects are conducted.

The causes are classified into seven causes, which are technology-related causes, product-related causes, personnel-related causes, managerial-related causes, organization-related causes, time-related causes and cost-related causes.

2.4.1 Technology-related causes

Failure rate for IT projects are very high among all industries. Murray (2006) stated that IT projects frequently end in disappointment. Business and technology executives are displeased with their ability to accurately estimate project schedules. On-time delivery is an important intention for the all industries, especially in technology. Yet, the information technology industry continues to be overwhelmed by schedule slippage. This is because producing software on time has become increasingly complex and difficult to manage due to the fast evolvement of the software industry, the large application sizes and the varieties of software development processes and environment, the complexity and intangibility of software. Today, most of the causes that are related to technology are due to development and test tools instruments are behind time or unavailable (Collofello et al., 2000). Fong et al. (2000) also agreed that the reason of schedule slippage is because of technological obsolescence. Late deliveries and late data were the most commonly reported causes of schedule delays associated with inputs to the development process. Late deliveries of hardware, software and major equipment items were frequently identified as late inputs to the development stage. Late data, generally in the form of interface data or customer data was also a common reason for delay. Grant et al., (2003) indicated that it is also worth noting that the activities impacted by these delays in the development stage include the preparation of technical manuals, provisioning, logistic support planning and training.

The fast developments in technology demand high attention to change order process to deal with technological changes. Fong et al. (2000) proposed that improvements in technology and performance affect the schedule of a project. New technologies are difficult to use or predict. Occasionally adopting different kind of technology might cause a project to fail, although it has been verified, using the technology for a first trial is considered risky.

2.4.2 Product-related causes

Change in project requirements and change in project design and implementation will become a major problem in projects if they are continuously

changing. The continuous changing requirements can affect the cost, schedule and quality of an IT project. Inability to manage the changing requirements may lead failure of the project. Khan et al. (2012) proposed that the impact of a particular change in requirements propagates from one phase of the project development life cycle to another phase. If the feedback from early phase is delayed, this may cause the next phase will also be delayed causing the entire project to be delayed.

One of the causes of delay that is related to product is a late requirement. Some of the customers may not be as responsive to the requirements and design. They need time to digest what the project managers have given to them. The customers may have questions for clarification or they may want to get feedback from others. All of this adds to the quality of the final solution, but it does insert delays into the project (Cotterel and Hughes, 2006). Customers are not always conscious of that they are expected to make a considerable contribution to the realization of a project. When customers do not react on time to areas in which they must be involved, projects can come to a stop. There may be case that the team proceeds on the project without discussing with the customer, which will lead to conflicts between them later on.

Poor design will also cause delays in IT projects. The poor awareness of designs leads to delays, as it requires many revisions at later stages. What the customer wants should be clearly documented and keep in mind that what the project manager believes the customer wants is sometimes different than what the customer believes they've asked for. The customers change their minds according to the importance of the requirements to them, especially once they know the budget and schedule consequences (Firesmith, 2004).

It's problematic if the stakeholders assume that every party will get everything that they want. If so, there will be arguments with each other by their differences preferably than undergoing argument resolution at the beginning of the project. The IT developers will reveal the stakeholders' conflicting differences because programmers are not able to generate an ambiguous system.

2.4.3 Managerial-related causes

Collofello et al. (2000) suggested that over optimistic planning in managing IT projects is one of the causes of schedule slippage. Being too confident in the schedule planning place significant pressure on the project team. The team will initially attempt to reach unrealistic deadlines. These kinds of efforts lead to work that has so many slacks and fallacy, which will cause additional extension on the project. The need to complete a project as soon as possible sometimes result from for primarily strategic reasons which is if it is not feasible, however, it should not be undertaken. The project will not proceed more quickly and the product will then damage.

Unplanned activities in projects may also cause projects to be delayed (Collofello et al., 2000). The occurrence of an unplanned activity may cause other activities to be delayed. Under resource constraints, the delays are due to the resource usage by the unplanned activity or activity that requires a new order of activities to adjust additional predecessor constraints (Archer, 2008).

Weak project leadership cause project delays. Kumar (2000) found that failure was connected to the organizational context and could attribute to the low leadership skills, organizational culture, the lack of integration, and the poor of commitment by senior management. Leadership will have an impact on corporate culture, project culture, strategy for a project, and project team commitment (Shore, 2005). It also affects systems design and development, software selection, implementation, and maintenance. Without appropriate leadership, the risk of project disappointment will increase (Shore, 2005).

One of the causes of delay that is related to managerial is sinking team spirit. Sinking team spirit will affect productivity and efficiency of a project, thus causing delays to the entire project. According to McDonald and Zack (2004), productivity is the measurement of productivity of people to complete the required job. This occurs due to acceleration of the schedule and also the pressure to complete the work. In addition, delays caused by IT mistakes will need rework and this leads to a significant increase in

the amount of work the laborers are required to complete. This directly reduces the productivity and efficiency of the team.

Next, communication problems will also cause delay in IT projects. Poor communication decreases the ability of the project members to be alert of the activities of the people working on other departments, and leads towards coordination breakdown, integration problems and, eventually, defects in the system under development, hence, increasing the project development time. As the complexity and size of software increases, the necessity for informal communication increases too (Cataldo and Herbsleb, 2008).

Project scope should not be underestimated. Scope is the term that defines the entire justifications that is required at the end of a project to deliver products and services with stated functions. Therefore, logically, it can be said that all project plans, estimation, schedule and base lines are usually designed base in the initial project scope. Thus, any change in the project scope during execution will mean that the entire initial project plan will have to be reviewed such that schedule will have to be developed. This means more time and resources will be needed as against the initial baseline. Another way scope errors could lead to delay could be seen in the fact that project scope estimations are done base on the produced designs, as such, having errors in design in a form of oversight or misrepresentation that will lead to extra works and change order (Ambituuni, 2011). Scope creep is the uncontrolled and unexpected changes in user expectations and requirements as a project progress. Thus will result in project delay and cost overrun.

2.4.4 Organization-related causes

One of the causes of delay that is related to organization is change in economic environments. Economic inflation results to a progressive increase in the prices of resources needed as the input for the projects. Because the project parties have no control over this factor, they can only minimize delays in the project so that cost overruns due to this factor are minimized, since inflation is a time bound factor (Apolot et al., 2011).

Insufficient software quality assurance also cause project schedule slippage. Quality assurance requires planned and systematic detailed activities to satisfy the justifications for a project that is carried out in a quality system at each step. The planning stage for the quality assurance may contain a designated team that is going to outline the tasks and allocate the tasks to individuals. The responsibilities might be reviewing the quality of products, tools, services as per the requirements, standards and guidelines, audit project processes or outputs that the organization is aiming for. The team could also set up the quality objectives, define the tests and verify activities, and prepare the evaluation of processes. Checking, on the other hand could involve evaluating the project. If the quality does not comply with the standards, or requirement, they will be informed and reported to the right department. The problems will then be fixed and then are sent for testing by the quality control team. This will ensure that the quality will comply with the standards as well as to determine whether the aims are achieved. The acting stage is when senior management of the organization and their stakeholders will review the process. One of the reasons of quality control in IT projects is made is to help developers monitor IT projects whether it is on compliance with the standards. Standards arise either from official standard activities (de jure standards) or by force of practice (de facto standards and publicly available specifications (PASs)) (Opiyo et al., 2002). Therefore, if the software does not comply with standards, the quality of the software should be improved then another evaluation should be made, which is causing delay to the entire project.

Improving the process to reduce rework can be done by using prototyping and evolutionary development and by using formal specification methods, modern programming practices, and inspections (Marciniak, 2001). Modern programming practices causes delay in IT projects when so many rework need to be done. Rework is normally done because of additional or changes in customer requirements, product flaws, and miscommunication between project members.

2.4.5 Personnel-related causes

One of the causes of delay that is related to personnel are inexperienced developers. Inexperienced developers can result in time required for learning to be

underestimated, causing delays in the development process. They also may cost a lot of money on the developers just to get the similar tasks done since the inexperienced developers could not perform well. Since experienced developers are able to handle tasks that are complex, no matter how long the time they have, there will be some tasks that inexperienced developers could not perform.

Inexperience developers could also lead to the ignorance of quality standards, making the project source difficult to read cause problems in the output. Vinod et al., (2009) stated that the high numbers of experienced developers has a significant relationship to the capability of the IT product, meaning that high numbers improve the quality of the output.

Personnel that have little experience also will cause delay in IT projects. Technical and practical knowledge of the task of the project are important knowledge needed in the project. Farshchi et al. (2012) proposed that human factors, such as lower programmer capability and lack of experience, are the main causes of delay IT projects.

2.4.6 Time-related causes

Time is important to project managers, IT developers and customers. Project delay extends the time of the whole project. Poor schedule planning and estimation will cause a lot of problems. One common problem is during the creation of the Work Breakdown Structure. Most of the scheduler assumes that the time on task is equal to the duration of the project. The time on task is the exact time of the task to completion without any disturbance, while duration is the time of the task undertake to finish including disturbances. Time on task is not used to estimate schedule. Most project managers usually do this mistake.

Besides that, improper planning using Critical Path Method (CPM) is not practiced in the project. CPM enables projects to be completed more quickly since it involves plotting the most efficient sequence of tasks, sparing the public unnecessary delays and safety risks. CPM planning also allow project managers to indicate what and which activities are critical in finishing the project, what activities that should be

performed at the early start and finish dates of the projects to prevent delays in completing the project. By focusing on the most critical tasks it is guaranteed that the project is on schedule and is on the track with the schedule arrangement (Stelth and Le Roy, 2009).

2.4.7 Cost-related causes

A project delay can represent a costly occurrence for any organization. When projects are behind schedule, they will be lengthy which need an additional amount of money. A successful project manager has to be particular about money. Not enough budget is forever the main reason for not achieving goals and objectives of IT projects within the quality that has been set. Therefore, project manager must make sure that a project meets its cost objectives.

However, it is challenging to make sure that the project is not under budget or over budget. Most of the time, if the project is under budget, the duration of the project will be lengthen, thus causing the project to be delayed. For a project that is problematic in terms of labor or natural phenomena, the project will end up to be over budget since the organization has to recruit new workers, and may has to repair some of the software and hardware that are either not functioning or defected. This problem will need a mitigation to be done before it can proceed to the next phase, hence the project will be delayed.

Besides that, no proper cost estimation is done before the projects start or in the planning stage such as Earned Value Management (EVM). EVM measures Budget at Completion (BAC), Budgeted Cost for Work Scheduled (BCWS), Budgeted Cost for Work Performed (BCWP), Actual Cost of Work Performed (ACWP). EVM is considered as the most efficient time-cost combination method to track project's progress and characterize project's performance (Ming and Ming, 2011).

2.5 STRATEGIES AGAINST DELAY IN IT PROJECTS

Projects to be completed without going beyond the budget and schedule is undoubtedly the most significant current drawback for project managers and IT personnel. It is critical for an organization to understand how to prevent delays from occurring.

The strategies to reduce delays in IT projects are classified into seven strategies, which are technology-related strategies, product-related strategies, personnel-related strategies, managerial-related strategies, organization-related strategies, time-related strategies and cost-related strategies.

2.5.1 Technology-related strategies

Since test tools instruments are unavailable, apart from the awareness of producing software according to schedule has become very difficult to IT personnel, the organization is advised to purchase a different test tools that has the same function as the test tools that are unavailable. Changing of test tool to a new one might be challenging and involves hard work and money (Desikan and Ramesh, 2006). However, to ensure that the project is not behind schedule, changing of test tool is advisable to an organization.

The use of appropriate computing language may also reduce project delay in IT by its function that is user friendly and it is easier to understand and use. This advantages may reduce the time to operate the projects. Many languages have been developed for achieving different variety of tasks, some are fairly specialized others are quite into their general purpose.

2.5.2 Product-related strategies

Poor design of the software project often cause delay to the entire project. The design of the software should be based on customer specifications to meet the project objectives. Customer specifications are usually the detailed instructions. Customer

needs must be prioritized and the services should not be any lacks. According to Devedzic (2002), the specifications of the project must be concerned with the user's real requirements, not concerning the project team and the project managers.

Design complexity should also be reduced to prevent delay in IT projects. When the projects are complex, the IT personnel could not stay completely focus on the functional requirements of the software project. By increasing the complexity of the project, the duration for the project to meet its completion stage will take longer. The more complex the specification of the project, the more the requirements need to be added to the project, thus causing project delay. Complex projects are also sometimes difficult to understand and use.

2.5.3 Managerial-related strategies

The key recommendation here is that rarely to form a team of more than five members, instead opting to form multiple teams working on individual objectives. Furthermore, each of these smaller teams has a manager, who is himself part of a management team. In extreme cases multiple management teams exist and an executive team is formed. The focus of each team is strictly enforced and rigorous in definition.

Choosing a communication plan in the planning phase can prevent miscommunications or communications problems. Communication plan can identify those who have interest in the project which are the stakeholders. Communication planning also helps everyone who needs to be informed about project activities and results gets the information and know what to do. Project managers are in charge to identify if there are any communication needs and to decide whether a formal communication plan is needed. According to Trump (2009), good communications plan helps in reducing delays and deliver messages on time and precisely.

IT projects that suffer from scope creep should have a project manager that understands project trade-offs and make the right decisions related to resources, features and time schedule even though the requirements are changed. He should be alert of the changes of risks and the risks that are not changing and should have the capability to

balance the risks making any decisions on what to do. One solution is to establish a rationally stable requirements baseline before any other work goes forward. However, even the baseline is set, there may be scope creep on the requirements, since nobody can design a process that believes that requirements are steady. Although the project scope has been agreed, scope creep will still appear (Wankel and DeFillippi, 2005). Projects could be headed for trouble if developers and processes are not change-friendly, or if there are poorly established guidelines that determine how and when requirements can be added, removed, and implemented and who will accept the price of changes.

2.5.4 Organization-related strategies

Large IT projects normally imply change, so this requires an effective change management. Prosci (2007) stated that if efficiency of change management is ranked as excellent, 88 percent of projects achieved their objectives, while on the contrary, if change management was ranked as poor, 83 percent of projects failed to achieve their objectives and follow the deadlines. The time and effort required for effective change management varies with the number of people impacted by the change, but best practices indicate 10 to 15 percent of the total project budget should be allocated to change management. To overcome project delay, project managers should find ways to improve the process.

In many organizations, the relationship between business clients and IT has a master-servant dynamic that causes strain, frustration, anger and failure to meet expectations. Therefore, in order to create a conducive work environment since IT projects are only successful if all parties are working together as partners, striving towards the same goals and objectives.

2.5.5 Personnel-related strategies

Success or failure of a project is determined by the skills and level of effectiveness of the manpower involved, their skill to give full attention on the project, team dynamics and change-friendly. IT projects also fail due to a low focus level among project team. Sometimes, not even one person on the team is giving full attention on the

project. The low focus level on a project can result to slow response to stakeholders' needs as well as other problems (Knapp, 2010).

One way to overcome IT projects from getting behind the schedule is to hire good developers or programmers. The developers and programmers need to have a lot of skills and experience in the technology industry before putting a trust on them. Therefore they must be chosen wisely. Besides, managers cannot perform if they are handling projects that are not their capability. The project manager, on the other hand should have more skills and experience, which is better that they have gone through similar projects in the past, to ensure that no same mistakes will be repeated. Projects that are handled with high technology require managers with solid technical skills.

Secondly, by hiring many staffs the delay of IT projects may be overcame. For a larger project, the need for more manpower will be greater so that they can do proper planning, do not miss any oversight, very good in organization, and communications skills because not all excellent IT personnel have these skills. The solution to skill-driven challenges is easy to define but difficult and expensive to achieve is to attract and retain the most highly skilled, experienced and productive worker.

2.5.6 Time-related strategies

Making a project schedule is an important element of managing a project. A project schedule helps in planning, executing and controlling the tasks of a project and to do tracking and monitoring on the progress of the project. It also defines timelines and all the assumptions for the progress and completion of the project. The project sponsor and stakeholders are the ones who need to do all the setting on overall completion dates. The project manager helps by giving knowledge on the justifications for the tasks to complete. The project manager is also appointed to monitor the progress of the project and if they are any problems, project manager needs to revise the schedule, together with meeting with project team members who will be doing the entire job. Critical Path Method (CPM) is the best method for project scheduling. According Stelth and Le Roy (2009), CPM is the method to analyze projects by defining the longest series of tasks through a project network.

Beside that, Statement of Work (SOW) also aids in preventing delay in IT projects. The SOW lets the project manager to monitor and control progress as the project is still going on. It is essential for the project manager to keep all workers informed as to current schedule status. Good schedule estimation is a must to perform a successful project. The project plan schedule should contain elements that are associated to IT other than the whole project tasks and milestones.

2.5.7 Cost-related strategies

Projects that has problems with money may be solved be having a detailed requirement of the entire project, the resources for the project to start, and extra information regarding the project that will be conducted. Next, try to brainstorm and resolve any risks that will involve money that can be fixed. This will keep the project to be on budget. For the project that can be seen for making a loss to the organization, it is advisable to cancel it at the very beginning.

To prevent delay in terms of budget, Earned Value Management (EVM) is suitable to use. EVM helps in integrating project cost, schedule and performance from quantitative information on the present status of the project together with giving predictions on future cost performance based on the previous project performance achieved to date.

According to Vanhoucke (2009), an Earned Value Management (EVM) develops three basic measures:

- Planned Values (PV), previously known as the Budgeted Cost of Work
- Scheduled (BCWS) Actual Cost (AC), previously known as the Actual Cost of Work Performed (ACWP)
- Earned Value (EV) previously known as the Budgeted Cost of Work Performed (BCWP).

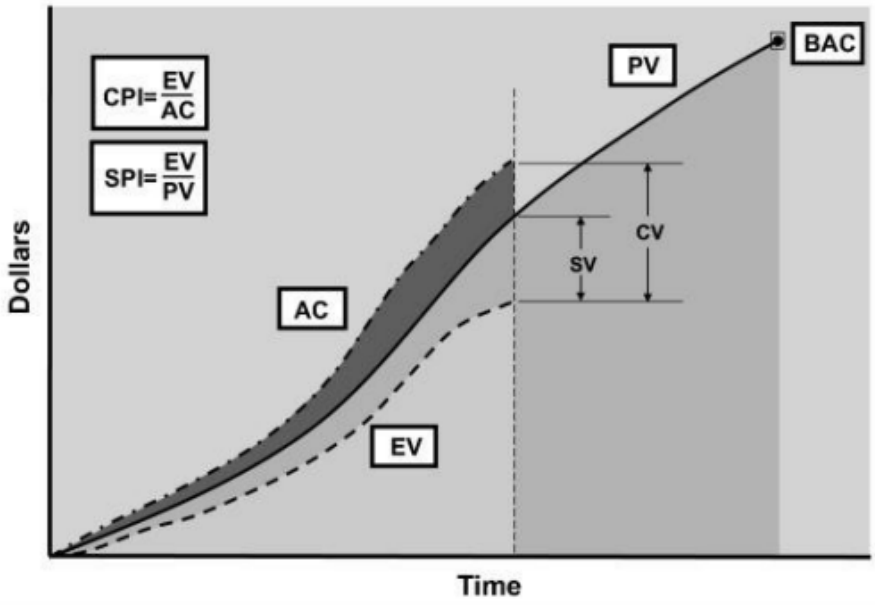

Figure 2.2 : Earned Value Basics

Source : Vanhoucke (2009)

2.6 EFFECTS OF DELAY IN IT PROJECTS

Delay affects the organization in so many ways, which are overtime, over cost, abandonment and litigation.

2.6.1 Overtime

Overtime happens when a project is delayed in a very extensive period of time. It causes interruptions in the work environment. IT project is well known to experience from unintentional overtime, which causes stress in IT personnel and can lead to poor quality software with higher deficiencies (Ferrucci et al., 2010).

Overtime is usually caused by the projects that involve the scope and requirements that are always changing. To ensure that the projects are going to be done on time, the project team is often required to work overtime to so that project delay will not occur. The requirements that have changed and also the limitations need to be taken care of, which requires hard work. Project team experiences risk problems that are

estimating of tasks is unreliable, deficient of risk management strategies, addition and changes of project scope, and baseline determinants that are badly arranged (Olson and Swenson, 2011). The extra burden forces the project team to spend more time on the project in order to achieve the completion date that has been set.

The burden carried by the project team leads to fatigue that is caused by lack of sleep, since they are working without having any rest and sleep for more than a day, or have only short period of sleeping time. Fatigue will then lead to a non-productive working environment, causing a problem to the quality of the project, therefore causing additional delay on the project.

2.6.2 Over cost

Software development project is an expensive work and effort. Besides, the time needed to design, develop and program the systems to be stored in the project are lengthy since the information systems nowadays have becoming more complex and integrated. If there are problems involving the software development project, the price for the project automatically is higher.

Moreover, the problems that occur may also need the software developers to rework in order to redesign, redevelop, and reorganize adjustments to the software. Sadly, all these rework activities must be completed with utilizing more expensive resources, hence, radically increasing the costs (Westland, 2004). Whilst putting too much effort on the quality and functions, the cost of the project is also very critical to the project team, since the sum of faults involved in the project is directly associated with the cost of the project.

2.6.3 Abandonment

Project abandonment arises when project managers choose to discontinue temporarily or permanently an ongoing project or a system that is currently in operation. This will lead to a total loss of the project.

The development process of the project should have the involvement of defined aims and objectives as the guide for the information requirement phase (Mensah, 1997). If the aims and objectives are failed to be satisfied, the project may lead to waste of efforts and the team will not be fully focused to perform the rest of the development. Abandonment may happen if the aims and objectives are hard to achieve and the changing of requirements may also lead to the cancellation of the project.

It is a role for the top management to ensure the project is working. The lack of team focus may be enhanced if the top management knows how to handle the team so that the working environment is good.

2.6.4 Litigation

Litigation is the worse case scenario. If litigation happens, it is required for the management to compile and analyze all the documentations and store the information in the database. Gaining and copying documents process can be so expensive.

Abedi et al. (2011) states that litigation is normally the last resort for the personnel involved in the project to resolve the conflicts.

2.7 CAUSES AND EFFECTS DIAGRAM

The causes and effects diagram of this study is presented in Figure 1.1, It explains the relationship between the causes and effects of project delay in Malaysian IT projects.

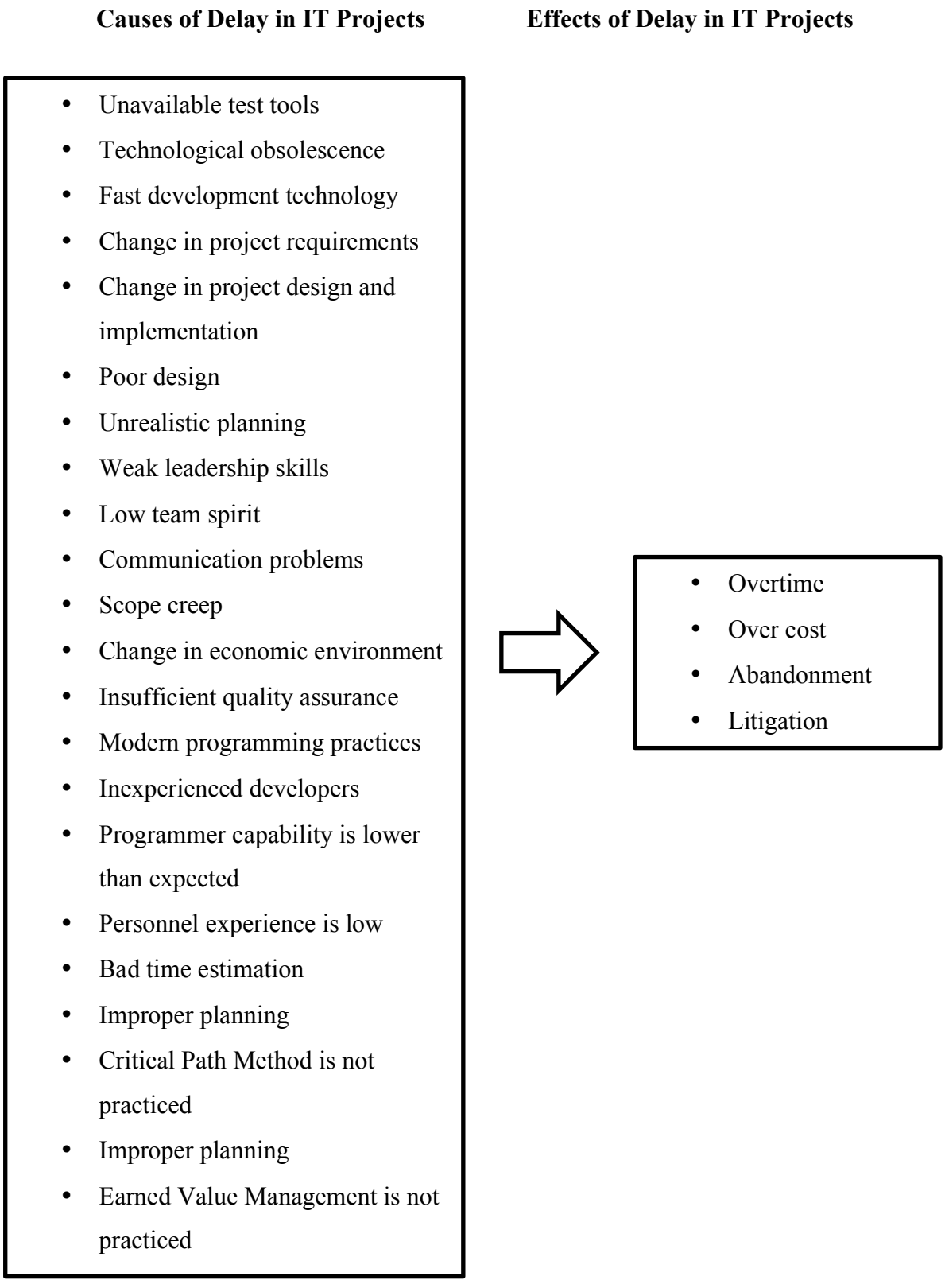

Figure 2.3 : Causes and effects diagram that conceptualized relationships among causes and effects of delay in Malaysian IT projects

2.8 CONCLUSION

The literature reviews showed definition of IT projects, project delay in IT, causes of delay, strategies to overcome project delay in IT projects, effects of delay in IT projects and theoretical framework that shows the relationship between causes and effects of delay in IT projects.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The aim of this chapter is to describe the most suitable methods of investigation, the nature of the research instruments, the sampling plan and the types of data. This chapter will provide an introductory discussion on the research methodology and design strategy to be used in the study and will focus on the research design, sampling, data collection method, and data analysis method which is related to the study at hand.

3.2 RESEARCH DESIGN

The study used a quantitative research design method since it wanted to seek responses from a large number of respondents. By using a quantitative method of research, the study came up with responses from the sample regarding the causes of delay in IT projects, strategies against project delay, and effects of delay in IT projects. The responses from the sample were varied and some responses have been grouped together in order to come up with percentages and figures of the statistics. Such statistics have been analyzed to develop conclusions in terms of the causes of project delay in Malaysian IT projects, strategies against project delay, effects of delay in Malaysian IT projects and also the correlation between causes of IT project delay and effects of IT project delay.

3.3 SAMPLING PROCEDURE

The population of this study refers to all MSC Malaysia status companies. They were chosen based on the availability of data from the online databases. MSC Companies Directory (accessible online at http://www.mscmalaysia.my/status_company) was used as reference for the sampling frame of the study. The online database helped in providing the companies' addresses in order for the survey to be sent. According to the MSC Malaysia info, there are 2375 companies, which are categorized into 4 clusters that are creative multimedia, IHLs and incubators, InfoTech, and shared services outsourcing. MSC Malaysia is chosen because MSC Malaysia is the largest Malaysian's information technology industry and it has transformed the ICT industry in Malaysia and has helped to improve the country's economy.

According to Saunders et al. (2007), for a population of around 2000, the appropriate sample is 100. Thus, for a population of 2375 companies, a total of 100 companies were chosen to participate in this study. Since there are four clusters of companies, the 100 companies were divided to 4 and 25 companies were chosen for each clusters. After interpreting the low feedback rate in Malaysia (Sanuri, 2007) and to overcome the probability of not getting the appropriate response, the numbers of survey questionnaires that have been sent out were doubled than the intended sample needed.

A systematic sampling procedure was used in this study. By using this method, a sample is chosen by selecting a random starting point and then picking every Kth element in sequence from the sample frame (Abd Aziz and Mahmood, 2011). Similar to the simple random sampling, each element in the population has a known and equal chance of being selected. However, systematic sampling is more accurate than the simple random sampling when the ordering of the elements is related to the characteristics of interest because the sample will be more representative of the population (Aaker et al., 1998). In this study, every 7th name was automatically selected from the list in the sampling frame. For example, the sample included the 7th name, the 14th, the 21st, and so forth.

3.4 DATA COLLECTION METHOD

In this study, a quantitative research approach has been developed, while a cross-sectional research design has been adopted. Cross-sectional design implicates the gathering of information, only once, from any given sample of population elements (Malhotra, 1996). This study also employed the survey method. Therefore, a set of questionnaires has been used. Survey method has a quite high level of validity since questions can be presented directly addressing the underlying nature of a construct (Lyon et al., 2000). Respondents selected for this study were the IT personnel in the company. IT personnel were chosen because they are the people that will be studied.

A total of 200 questionnaires has been mailed, 50 each for 4 clusters of companies along with a cover letter and self addressed stamped return envelope. The paper that has been used is plain white A4 paper, since it has been found that coloured paper will not improve response rates (Newby et al., 2003). Respondents were asked to complete the questionnaire and return it before the deadline given. The posting questionnaire survey is chosen because it can collect data covering a wide geographic area, while saves money in terms of travelling (Sekaran, 2003).

However, this method may also have a low response rate (Sekaran, 2003). In order to prevent low response rate, two forms of questionnaires have been set. An online survey form has been designed using Google Doc since most of the IT personnel have frequent access to the Internet. This method has saved money since it does not use any paper and since Google Doc is a free hosting service from the Internet. The questionnaire has been set online and the link has been sent by e-mail to companies to be distributed to their IT personnel.

Preparations of the questionnaire were related to the study discussed in Chapter 2. The questionnaire uses structured questions, consisting of approximately 20 questions divided into four sections, which are section ‘A’, ‘B’, ‘C’ and ‘D’. Section ‘A’ consists of questions seeking for the biographical details of the respondents. Section ‘B’ consists of eleven questions covering the first research question, that is, the causes of delay in IT projects. Section ‘C’ consists of seven

questions seeking to answer the second research question, that is, the strategies against delay in IT projects whereas Section ‘D’ consists of four questions covering the third research question, that is, the effects of delays in IT projects.

3.5 DATA ANALYSIS METHOD

The responses of the structured close-ended questions have been rated in percentages form. The percentage of respondents for each alternative has been given and analyzed. The data collected has been analyzed using the computer software known as Statistical Package for the Social Sciences (SPSS) Version 22. Before applying this analysis, the reliability of the research questionnaire has been examined using the values of Cronbach's Alpha. Cronbach’s Alpha is used to measure the consistency and reliability of the result, which involves only one test to provide a distinctive estimation of the reliability for the test (Gliem, 2003).

3.6 CONCLUSION

This chapter highlighted methodological implications of doing quantitative research, especially involving the questionnaire, which followed the research design, sampling, data collection method, and data analysis method, which is related to the study at hand.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

Definitions, causes, strategies and the effects of delay in IT projects have been discussed in detail in previous chapters. After recognizing why do IT projects facing delay based on the information gathered from sources such as journals and books, a further study is being made by analyzing all the data obtained from the set questionnaires which have been distributed to MSC status companies. The process of analyzing data is important to achieve the objectives of this study, which are to

Since the data may be varies from different place and situation, the information that have been gathered from sources such as journals and books have not been validated by the samples. The aim of this chapter is to validate all the data in literature review.

4.2 QUESTIONNAIRES DISTRIBUTION

The questionnaires of this study were distributed to the respondents of the companies by the way of mail and online, instead of using other distribution methods because both of the methods are time consuming and cost saving not only for the researcher, but also for the respondents.

Table 4.2 below shows the distribution of questionnaires to the respondents. The distribution methods of questionnaire, the number of distributed questionnaires and the number of completed questionnaires are also shown in the table below.

Table 4.2 : Response rate

Questionnaires Distribution Methods	Number of Questionnaires Distributed	Number of Completed Questionnaires	Response rate (%)
Mail	100	37	37.0
Online	100	34	34.0
Total	200	71	35.5

The response rate of the questionnaires shows only 35.5% of the total respondents. 35.5% of response rate is regarded as high for a research study as proposed by Sekaran (2003) that a study should analyze at least 30 % rate of response. In addition, to prevent biases in the sample, the rate of response of the study is recommended to be higher than 10 % (Roscoe, 1975).

4.3 RESPONDENTS' PROFILE

The respondent's profile of this study is attained from the questionnaire in section A : Biographical Details. In defining respondents' profile, demographic analysis was developed to identify the descriptive statistics of the respondents' gender, age, position and highest education level. The data analysis for demographic questions will only use the appropriate items to be analyzed. The frequencies and percentages for each item are presented in table 4.3.

Table 4.3 : Frequencies and Percentages of Demographic Analysis

Variables		Frequency	Percentage (%)
Gender			
i.	Male	42	59.2
ii.	Female	29	40.8
Age			
i.	21-25	26	36.6
ii.	26-30	38	53.5
iii.	31-35	7	9.9
iv.	36-above	0	0
Position			
i.	Project Manager	18	25.4
ii.	Project Lead	13	18.3
iii.	Software Engineer	27	38.0
iv.	Scheduler	13	18.3
Highest Education Level			
i.	Diploma	7	9.9
ii.	First Degree	64	90.1
iii.	Master	0	0
iv.	PhD	0	0

4.3.1 Gender

Table 4.3.1 : Gender

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	42	59.2	59.2	59.2
	Female	29	40.8	40.8	100.0
	Total	71	100.0	100.0	

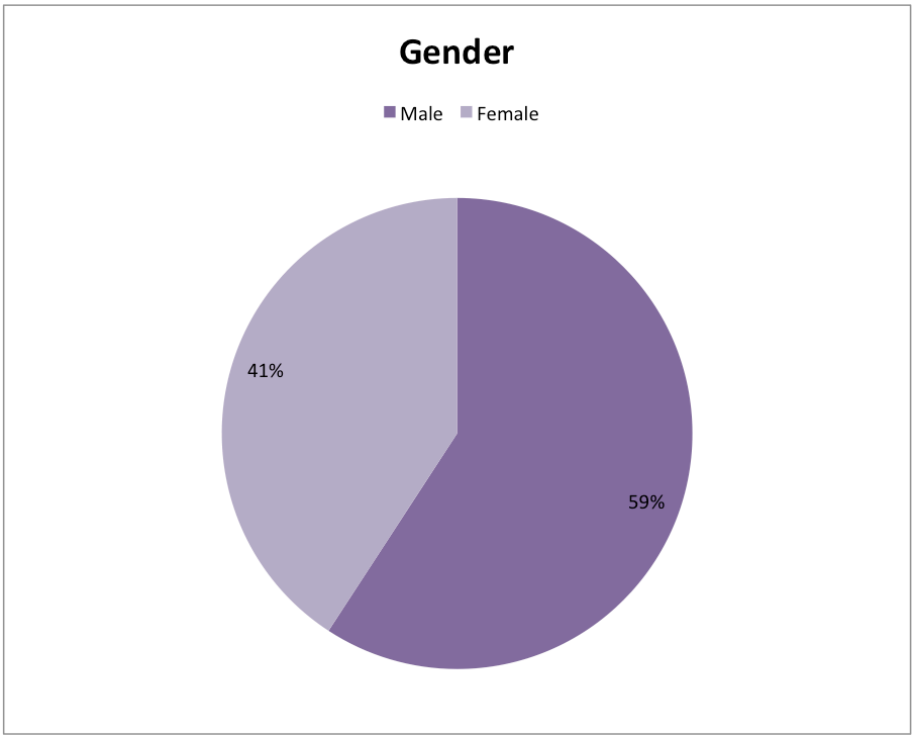

Figure 4.3.1 : Gender

Table 4.3.1 and figure 4.3.1 show that the respondents of this study consist mostly by male respondents with the percentage of 59.2% while only 40.8% of the respondents are female. This shows that most of the IT personnel are consist of male workers.

4.3.2 Age

Table 4.3.2 : Age

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-25	26	36.6	36.6	36.6
	26-30	38	53.5	53.5	90.1
	31-35	7	9.9	9.9	100.0
	Total	71	100.0	100.0	

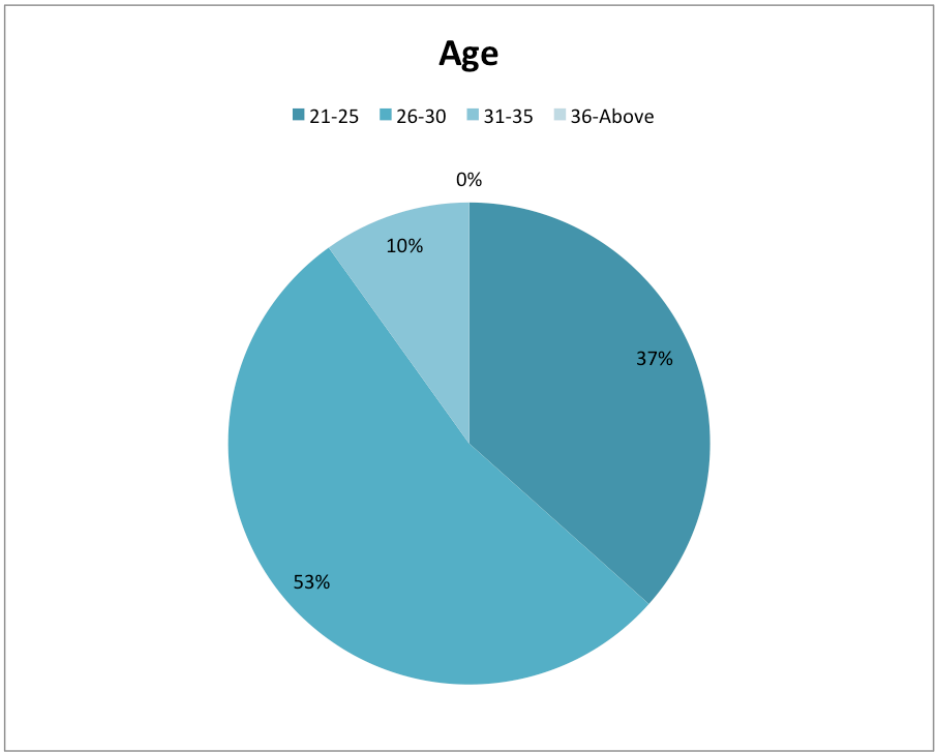

Figure 4.3.2 : Age

Respondents were divided into four age categories : 21 to 25 years old, 26 to 30 years old, 31 to 35 years old and above 36. Table 4.3.2 and figure 4.3.2 show that there were 53.5% respondents at the range of age of 26-30, 36.6% respondents at the range of age of 21-25, while only 9.9% respondents at the range of age of 31-35, while the were none of respondents above 36 years old.

4.3.3 Position

Table 4.3.3 : Position

Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project Manager	18	25.4	25.4	25.4
	Project Lead	13	18.3	18.3	43.7
	Software Engineer	27	38.0	38.0	81.7
	Scheduler	13	18.3	18.3	100.0
	Total	71	100.0	100.0	

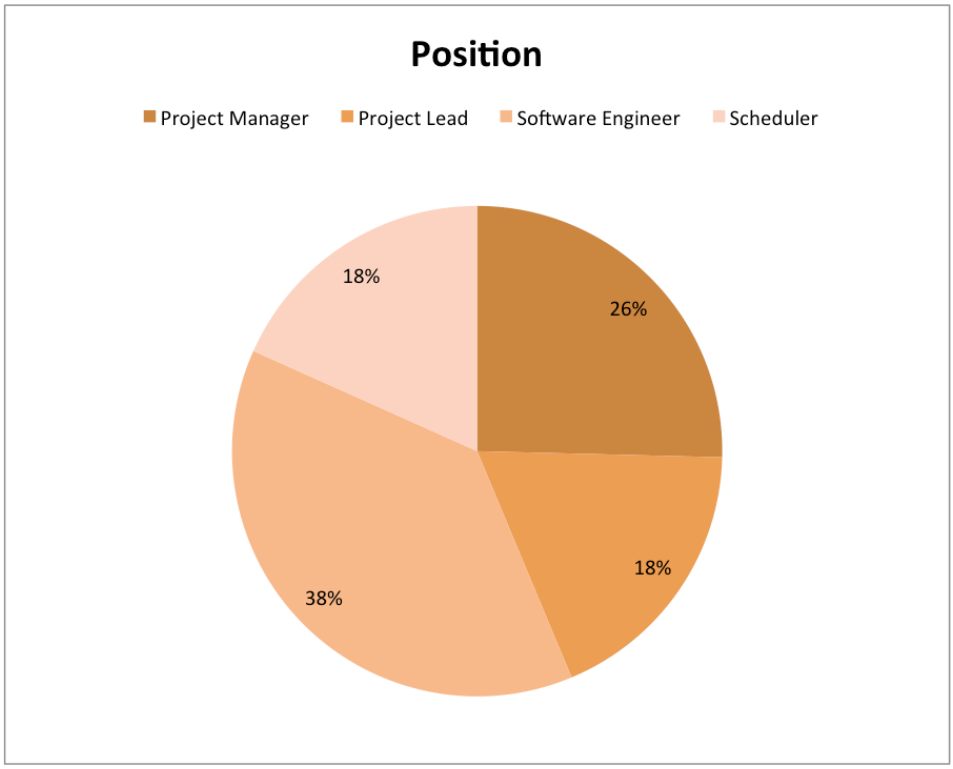

Figure 4.3.3 : Position

Table 4.3.3 and figure 4.3.3 show that the respondents were 38% of the respondents were software engineers, 25.4% of the respondents project managers, and both of the project lead and scheduler were 18.3% of the total respondents, showing there are the minority in this study. Every party chosen was those who are involved directly with IT project.

4.3.4 Highest Educational Level

Table 4.3.4 : Highest educational level

Highest educational level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	7	9.9	9.9	9.9
	First Degree	64	90.1	90.1	100.0
	Total	71	100.0	100.0	

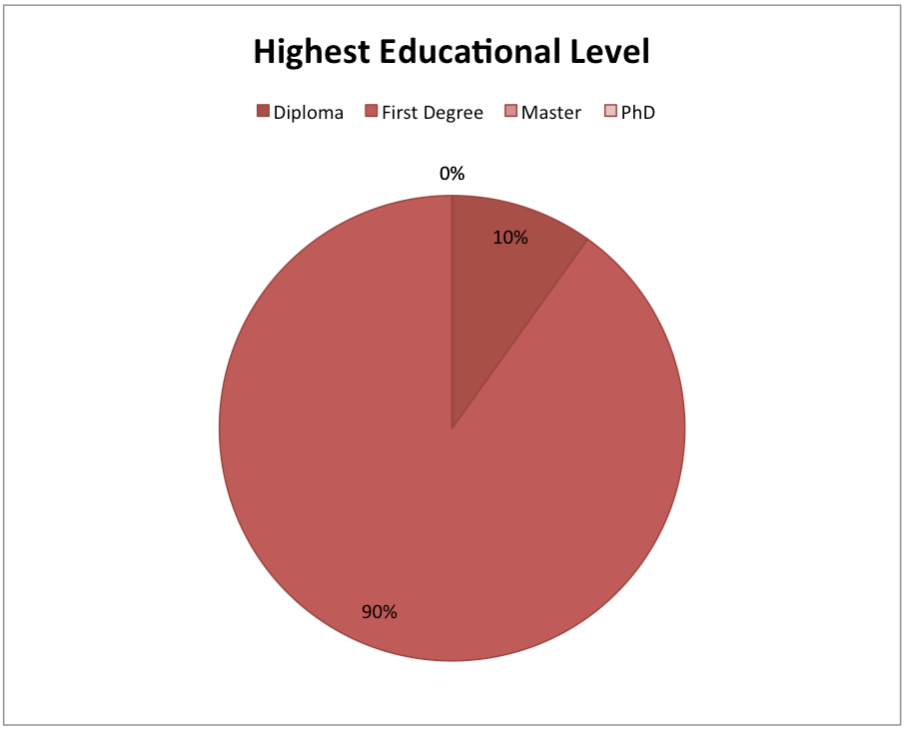

Figure 4.3.4 : Highest educational level

Table 4.3.4 and figure 4.3.4 show the percentage of the highest educational level of the respondents. Respondents who have first degree were the highest which was 90.1% of the respondents, followed by the respondents who have diploma, which was 9.9% of the respondents whereas there was none of the respondents who have master or PhD.

4.4 RELIABILITY ANALYSIS

The reliability analysis of the questionnaires that have been distributed for this study was measured by using Cronbach's alpha in Statistical Package for the Social Sciences (SPSS) Version 22. Cronbach's alpha is used to assess the internal consistency of the data in the set of questionnaires. In addition, it also measured Cronbach's Alpha if Item Deleted so that amendments to the questionnaires can be done to the questionnaire if the data of the questionnaire does not achieved the acceptable level. According to Streiner & Norman (2008), the acceptable level of the internal consistency of the data in the questionnaires shows Cronbach's alpha value within 0.5 to 0.7 and the

best level of Cronbach's alpha should have the value of more than 0.7. The Cronbach's Alpha was computed for each variable of this study.

4.4.1 Causes of Delay in IT Projects

There are seven variables of causes of delay in IT Projects that are technology-related, product related, managerial-related, organization-related, personnel-related, time-related and cost-related. The reliability analysis of 10 respondents is measured using Cronbach's alpha to analyze the reliability of the questionnaire.

Table 4.4.1 : Reliability analysis of causes of delay in IT projects

Causes	Cronbach's Alpha	N of Items	Item Deleted
Technology-related Cause	0.726	4	0
Product-related Cause	0.722	3	0
Managerial-related Cause	0.705	5	0
Organization-related Cause	0.766	3	0
Personnel-related Cause	0.703	4	0
Time-related Cause	0.743	4	0
Cost-related Cause	0.756	3	0

Table 4.4.1 shows the reliability of causes of delay in IT projects. The Cronbach's alphas of the variables of the causes of delay in IT projects were analyzed accordingly according to each variable. The first variable that is technology-related cause has four sub-variables shows a Cronbach's alpha of 0.726. The second variable that is product-related cause, it has three sub-variables and shows a 0.722 Cronbach's alpha. Managerial-related cause has five sub-variables, and the cause shows a Cronbach's alpha of 0.705. Organization-related cause has three sub-variables and shows a 0.766 Cronbach's alpha. Personnel-related cause shows a Cronbach's alpha of 0.703, has four sub-variables under the cause. Time-related cause's Cronbach's alpha is 0.743 has four sub-variables. Lastly, cost-related cause has three sub-variables showing a Cronbach's alpha of 0.756. All of the causes of delay in IT projects show more than 0.7 Cronbach's alpha, therefore saying that the items in section B of the questionnaire

that is questioning about causes of delay in IT projects are reliable. There were none of item deleted in this section.

4.4.2 Strategies Against Delay in IT Projects

Table 4.4.2 : Reliability analysis of strategies against delay in IT projects

Strategies	Cronbach's Alpha	N of Items	Item Deleted
Technology-related Strategy	0.734	2	0
Product-related Strategy	0.793	2	0
Managerial-related Strategy	0.814	2	0
Organization-related Strategy	0.766	2	0
Personnel-related Strategy	0.918	2	0
Time-related Strategy	0.706	2	0
Cost-related Strategy	0.757	2	0

Table 4.4.2 shows the reliability analysis of strategies against delay in IT projects which is a question in section C of the study's questionnaire. The Cronbach's alphas of the seven variables of the strategies against delay in IT projects were analyzed accordingly of each variable. All of these variables have two sub-variables. The first variable that is technology-related strategy shows a Cronbach's alpha of 0.734. The second variable that is product-related strategy, shows a 0.793 Cronbach's alpha. Managerial-related strategy shows a Cronbach's alpha of 0.814. Organization-related strategy shows a 0.766 Cronbach's alpha. Personnel-related strategy shows a Cronbach's alpha of 0.918. Time-related strategy's Cronbach's alpha is 0.706, while last but not least cost-related strategy showing a Cronbach's alpha of 0.757. All of the strategies against delay in IT projects show more than 0.7 Cronbach's alpha, therefore saying that the items in section C of the questionnaire are reliable. There were also none of item deleted in this section.

4.4.3 Effects of Delay in IT Projects

Table 4.4.3 : Reliability analysis of effects of delay in IT projects

	Effects	Cronbach's Alpha	N of Items	Item Deleted
i.	Overtime	0.705	4	0
ii.	Over cost			
iii.	Abandonment			
iv.	Litigation			

Table 4.4.3 shows the reliability analysis of section D of the research's questionnaire that is the effects of delay in IT projects. All of the effects were combined in on reliability test since there are no sub-variable for the effects. The variables are overtime, over cost, abandonment and litigation. The Cronbach's alpha of the effects of delay shows 0.705. Therefore, this shows that all of the items in section D are reliable. There were no items deleted as well.

4.5 CAUSES OF DELAY IN IT PROJECTS

The causes of delay in IT projects are classified into seven types of causes which are technology-related, product related, managerial-related, organization-related, personnel-related, time-related and cost-related. The mean of the causes of delay in IT projects were analyzed.

4.5.1 Technology-related causes

Table 4.5.1 : Mean of technology-related causes

Statistics

		Test tool unavailable	Technological obsolescence	Fast technology development	Insufficient resources
N	Valid	66	66	66	66
	Missing	0	0	0	0
Mean		3.61	3.17	2.42	1.26

Table 4.5.1 shows the mean of technology-related causes. There are four sub-variables in technology-related causes, which are test tool unavailable, technological obsolescence, fast technology development and insufficient resources. Each of the sub-variables shows a mean of 3.61, 3.17, 2.42 and 1.26 respectively.

4.5.2 Product-related causes

Table 4.5.2 : Mean of product-related causes

Statistics

		Change in project requirements	Change in project design and implementation	Poor design
N	Valid	66	66	66
	Missing	0	0	0
Mean		4.12	4.56	3.56

Table 4.5.2 shows the mean of product-related causes. There are three sub-variables in product-related causes, which are change in project requirements, change in project design and implementation and poor design. Each of the sub-variables shows a mean of 4.12, 4.56 and 3.56 respectively.

4.5.3 Managerial-related causes

Table 4.5.3 : Mean of managerial-related causes

Statistics

		Unrealistic planning	Weak leadership	Low team spirit	Communication problems	Scope creep
N	Valid	66	66	66	66	66
	Missing	0	0	0	0	0
Mean		4.08	3.47	3.08	3.52	4.06

Mean of managerial-related causes are shown in table 4.5.3. There are five sub-variables in managerial-related causes. First is unrealistic planning which has a mean of 4.08, weak leadership which has the mean of 3.47, low team spirit which has the mean of 3.08, communication problems which has 3.52 mean and last but not least, scope creep which has the mean of 4.06.

4.5.4 Organization-related causes

Table 4.5.4 : Mean of organizational-related causes

Statistics

		Change in economic environment	Insufficient software quality assurance	Modern programming practices
N	Valid	66	66	66
	Missing	0	0	0
Mean		2.88	3.18	3.00

Table 4.5.4 shows the mean of organizational-related causes. There are three sub-variables in organization-related causes, which are change in economic environment, insufficient software quality assurance and modern programming practices. Each of the sub-variables shows a mean of 2.88, 3.18 and 3.00 respectively.

4.5.5 Personnel-related causes

Table 4.5.5 : Mean of personnel-related causes

Statistics

		Inexperienced developers	Programmer capability is lower than expected	Personnel experience is low	Many workers
N	Valid	66	66	66	66
	Missing	0	0	0	0
Mean		3.92	3.76	4.17	1.65

Mean of personnel-related causes are shown in table 4.5.5. There are four sub-variables in personnel-related causes. First is inexperienced developers, which has a mean of 3.92, programmer capability is lower than expected which has the mean of 3.76, personnel experience is low which has the mean of 4.17 and lastly, many workers which has 1.65 mean.

4.5.6 Time-related causes

Table 4.5.6 : Mean of time-related causes

Statistics

		Bad time estimation	Improper planning of time	CPM is not practiced	Use CPM
N	Valid	66	66	66	66
	Missing	0	0	0	0
Mean		4.08	4.14	2.74	1.27

Mean of time-related causes are shown in table 4.5.6. There are four sub-variables in time-related causes. First is bad time estimation, which has a mean of 4.08, improper planning of time which has the mean of 4.14, CPM is not practiced which has the mean of 2.74 and last but not least, use CPM which has 1.27 mean.

4.5.7 Cost-related causes

Table 4.5.7 : Mean of cost-related causes

Statistics

		Improper planning of cost	EVM is not practiced	EVM reduces delay
N	Valid	66	66	66
	Missing	0	0	0
Mean		3.97	3.23	1.32

Table 4.5.7 shows the mean of cost-related causes. There are three sub-variables in cost-related causes, which are improper planning of cost, EVM is not practiced and

EVM reduces delay. Each of the sub-variables shows a mean of 3.97, 3.23 and 1.32 respectively.

Table 4.5.8 : Ranking of mean of causes of delay in IT projects

	Causes	Mean of Sub-Variables	Rank	Mean of Key Variables	Rank
Technology-related					
i.	Test tools unavailable	3.61	10	2.62	7
ii.	Technologcial obsolescence	3.17	16		
iii.	Fast development technology	2.42	21		
iv.	Insufficient resources	1.26	25		
Product-related					
i.	Change in project requirements	4.12	4	4.08	1
ii.	Change in project design and implementation	4.56	1		
iii.	Poor design	3.56	11		
Managerial-related					
i.	Unrealistic planning	4.08	5	3.64	2
ii.	Weak leadership planning	3.47	13		
iii.	Low team spirit	3.08	17		
iv.	Communication problems	3.52	12		
v.	Scope creep	4.06	6		
Organization-related					
i.	Change in economic environment	2.88	19	3.02	5
ii.	Insufficient software quality assurance	3.18	15		
iii.	Modern programming practices	3.00	18		
Personnel-related					
i.	Inexperienced developers	3.92	8	3.38	3
ii.	Programmer capability is lower than expected	3.76	9		
iii.	Personnel experience is low	4.17	2		

iv.	Many workers	1.65	22		
Time-related					
i.	Bad time estimation	4.08	5		
ii.	Critical Path Method (CPM) is not practiced	2.74	20	3.06	4
iii.	Improper planning of time	4.14	3		
iv.	Use Critical Path Method (CPM)	1.27	24		
Cost-related					
i.	Earned Value Management (EVM) is not practiced	3.23	14		
ii.	Improper planning of cost	3.97	7	2.84	6
iii.	Earned Value Management (EVM) reduces delay	1.32	23		

Table 4.5.8 shows the ranking of mean of causes of delay in IT projects. The cause that is ranked number 1 is product-related with the overall mean of 4.08. The sub-variables that contribute to the mean are change in project requirements, change in project design and implementation, and poor design. The rank is followed by managerial-related cause, personnel-related cause, time-related cause, organization-related cause, cost-related cause and technology-related cause with the overall mean of 3.64, 3.38, 3.06, 3.02, 2.84 and 2.62 respectively.

4.6 STRATEGIES AGAINST DELAY IN IT PROJECTS

The strategies against delay in IT projects are classified into seven types of strategies, which are technology-related, product related, managerial-related, organization-related, personnel-related, time-related and cost-related. The mean of the strategies against delay in IT projects were analyzed.

4.6.1 Technology-related strategies

Table 4.6.1 : Mean of technology-related strategies

Statistics

		Use other tools	Use appropriate computing language
N	Valid	66	66
	Missing	0	0
Mean		3.68	3.39

Mean of technology-related causes are shown in table 4.6.1. There are only two sub-variables in technology-related causes. First is use other tools which has a mean of 3.68 and use appropriate computing language has a mean of 3.39.

4.6.2 Product-related strategies

Table 4.6.2 : Mean of product-related strategies

Statistics

		Define better customer specification	Reduce design complexity
N	Valid	66	66
	Missing	0	0
Mean		4.39	3.94

Mean of product-related strategies are shown in table 4.6.2. The two sub-variables of product-related strategies are define better customer specification, and reduce design complexity. Define better customer specification has a mean of 4.39 while reduce design complexity has a mean of 3.94.

4.6.3 Managerial-related strategies

Table 4.6.3 : Mean of managerial-related strategies

Statistics

		Communication plan	Set a baseline preventing scope creep
N	Valid	66	66
	Missing	0	0
Mean		3.64	3.94

Table 4.6.3 shows the mean of managerial-related strategies. There are two sub-variables in managerial-related causes, which are communication plan and set a baseline preventing scope creep. Each of the sub-variables shows a mean of 3.64 and 3.94 respectively.

4.6.4 Organization-related strategies

Table 4.6.4 : Mean of organization-related strategies

Statistics

		Improve the working environment	Improve the process
N	Valid	66	66
	Missing	0	0
Mean		3.44	4.08

Table 4.6.4 shows the mean of organization-related strategies. There are two sub-variables in organization-related strategies, which are improve the working environment and improve the process. Each of the sub-variables shows a mean of 3.44 and 4.08 respectively.

4.6.5 Personnel-related strategies

Table 4.6.5 : Mean of personnel-related strategies

Statistics

		Hire good developers	Hire many staffs
N	Valid	66	66
	Missing	0	0
Mean		4.11	3.64

Table 4.6.5 shows the mean of personnel-related strategies. The two sub-variables of personnel-related strategies are hire good developers and hire many staffs. The mean of hire good developers is 4.11 while hire many staff has the mean of 3.64.

4.6.6 Time-related strategies

Table 4.6.6 : Mean of time-related strategies

Statistics

		Critical Path Method	Statement of Work
N	Valid	66	66
	Missing	0	0
Mean		3.88	3.97

Mean of time-related strategies are shown in table 4.7.6. The two sub-variables of time-related strategies are critical path method and statement of work. Critical path method has a mean of 3.88 while statement of work has a mean of 3.97.

4.6.7 Cost-related strategies

Table 4.6.7 : Mean cost-related strategies

Statistics

		Brainstorming	Earned Value Management
N	Valid	66	66
	Missing	0	0
Mean		3.71	3.77

Mean of cost-related strategies are shown in table 4.6.7. The two sub-variables of cost-related strategies are brainstorming and earned value management. Brainstorming has a mean of 3.71 while earned value management has a mean of 3.77.

Table 4.6.8 : Ranking of mean of strategies against delay in IT projects

Strategies		Mean of Sub-Variables	Rank	Mean of Key Variables	Rank
Technology-related					
i.	Use other tools	3.68	9	3.54	7
ii.	Use appropriate computing language	3.39			
Product-related					
i.	Define better customer specification	4.39	1	4.20	1
ii.	Reduce design complexity	3.94	5		
Managerial-related					
i.	Communication plan	3.64	10	3.79	4
ii.	Set a baseline preventing scope creep	3.94	5		
Organization-related					
i.	Improve the working environment	3.44	11	3.76	5
ii.	Improve the process	4.08	3		

Personnel-related					
i.	Hire good developers	4.11	2	3.88	3
ii.	Hire many staffs	3.64	10		
Time-related					
i.	Critical Path Method (CPM)	3.88	6	3.93	2
ii.	Statement of Work (SOW)	3.97	4		
Cost-related					
i.	Brainstorming	3.71	8	3.74	6
ii.	Earned Value Management (EVM)	3.77	7		

Table 4.6.8 shows the ranking of mean of strategies agaisnt delay in IT projects. The strategy that is ranked number 1 is product-related with the overall mean of 4.20. The sub-variables that contribute to the mean are defining better customer specification and reduce design complexity. The rank is followed by time-related strategy, personnel-related strategy, managerial-related strategy, organization-related strategy, cost-related strategy and technology-related strategy with the overall mean of 3.93, 3.88, 3.79, 3.76, 3.74 and 3.54 respectively.

4.7 EFFECTS OF DELAY IN IT PROJECTS

The effects of delay in IT projects are classified into four types, which are overtime, over cost, project abandonment and litigation. The mean of the effects of delay in IT projects were analyzed.

Table 4.7.1 : Mean of effects of delay in IT projects

Effects of Delay in IT Projects	Mean
Overtime	1.02
Over cost	1.18
Project Abandonment	1.61
Litigation	1.64

Table 4.7.1 shows the mean of effects of delay in IT projects. Each of the variables has no sub-variables. Mean of effect of overtime is 1.02, over cost is 1.18, whereas project abandonment is 1.61 and last but not least, litigation has the mean of 1.64.

Table 4.7.2 : Ranking of mean of effects of delay in IT projects

Strategies	Mean of Key Variables	Rank
Overtime	1.02	4
Over cost	1.18	3
Abandonment	1.61	2
Litigation	1.64	1

Table 4.7.2 shows the ranking of mean of effects of delay in IT projects. The effect that is ranked number 1 is litigation with the mean of 1.64. The rank is followed by abandonment effect, over cost effect and overtime effect with the mean of 1.61, 1.18 and 1.02 respectively.

4.8 CORRELATION BETWEEN CAUSES AND EFFECTS

The relationship between two variables can be determined by performing correlation analysis. In this study, Pearson's correlation coefficient is used to establish the relationships between all cause of delay in IT projects and all effects of project delay in IT projects. Pearson's correlation coefficient uses '*r*' for a sample statistic.

The rule of thumb that explains the size of a correlation coefficient is shown in table 4.8.

Table 4.8 : Rule of Thumb for Interpreting the Size of a Correlation Coefficient

Size of Correlation	Interpretation
.90 to 1.00 (-.90 to -1.00)	Very high positive (negative) correlation
.70 to .90 (-.70 to -.90)	High positive (negative) correlation
.50 to .70 (-.50 to -.70)	Moderate positive (negative) correlation
.30 to .50 (-.30 to -.50)	Low positive (negative) correlation
.00 to .30 (.00 to -.30)	Little if any correlation

Source : Hinkle, Wiersma, & Jurs (2003).

4.8.1 Relationship between All Causes of Delay in IT Projects and Overtime

The correlations between all causes of delay in IT projects and overtime are analyzed using Pearson Correlation. The relationship between technology-related cause and overtime, relationship between product-related cause and overtime, relationship between managerial-related cause and overtime, relationship between organization-related cause and overtime, relationship between personnel-related cause and overtime, relationship between time-related cause and overtime, and relationship between cost-related cause and overtime were analyzed.

4.8.1.1 Correlation between Technology-related Cause and Overtime

Table 4.8.1.1 : Correlation analysis between technology-related cause and overtime

Correlations

		Technology	Overtime
Technology	Pearson Correlation	1	.112
	Sig. (2-tailed)		.372
	N	66	66
Overtime	Pearson Correlation	.112	1
	Sig. (2-tailed)	.372	
	N	66	66

Table 4.8.1.1 shows the correlation between technology-related cause and overtime effect. The Pearson correlation coefficient, r is 0.112. This shows that there is little if any correlation between technology-related cause and overtime effect as the correlation coefficient is ranged from 0.0 to 0.3. There is no significant relationship between technology-related cause and overtime effect.

4.8.1.2 Correlation between Product-related Cause and Overtime

Table 4.8.1.2 : Correlation analysis between product-related cause and overtime

Correlations

		Product	Overtime
Product	Pearson Correlation	1	-.085
	Sig. (2-tailed)		.499
	N	66	66
Overtime	Pearson Correlation	-.085	1
	Sig. (2-tailed)	.499	
	N	66	66

Table 4.8.1.2 shows the correlation between product-related cause and overtime effect. The Pearson correlation coefficient, r is -0.085. This shows that there is little if any correlation between product-related cause and overtime effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between product-related cause and overtime effect.

4.8.1.3 Correlation between Managerial-related Cause and Overtime

Table 4.8.1.3 : Correlation analysis between managerial-related cause and overtime

Correlations

		Managerial	Overtime
Managerial	Pearson Correlation	1	-.007
	Sig. (2-tailed)		.957
	N	66	66
Overtime	Pearson Correlation	-.007	1
	Sig. (2-tailed)	.957	
	N	66	66

Table 4.8.1.3 shows the correlation between managerial-related cause and overtime effect. The Pearson correlation coefficient, r is -0.007. This shows that there is little if any correlation between managerial-related cause and overtime effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between managerial-related cause and overtime effect.

4.8.1.4 Correlation between Organization-related Cause and Overtime

Table 4.8.1.4 : Correlation analysis between organization-related cause and overtime

Correlations

		Organization	Overtime
Organization	Pearson Correlation	1	-.170
	Sig. (2-tailed)		.173
	N	66	66
Overtime	Pearson Correlation	-.170	1
	Sig. (2-tailed)	.173	
	N	66	66

Table 4.8.1.4 shows the correlation between organization-related cause and overtime effect. The Pearson correlation coefficient, r is -1.170. This shows that there is little if any correlation between organization-related cause and overtime effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between organization-related cause and overtime effect.

4.8.1.5 Correlation between Personnel-related cause and Overtime

Table 4.8.1.5 : Correlation analysis between personnel-related cause and overtime

Correlations

		Personnel	Overtime
Personnel	Pearson Correlation	1	-.078
	Sig. (2-tailed)		.535
	N	66	66
Overtime	Pearson Correlation	-.078	1
	Sig. (2-tailed)	.535	
	N	66	66

Table 4.8.1.5 shows the correlation between personnel-related cause and overtime effect. The Pearson correlation coefficient, r is -0.078. This shows that there is little if any correlation between personnel-related cause and overtime effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between personnel-related cause and overtime effect.

4.8.1.6 Correlation between Time-related Cause and Overtime

Table 4.8.1.6 : Correlation between time-related cause and overtime

Correlations

		Time	Overtime
Time	Pearson Correlation	1	-.013
	Sig. (2-tailed)		.915
	N	66	66
Overtime	Pearson Correlation	-.013	1
	Sig. (2-tailed)	.915	
	N	66	66

Table 4.8.1.6 shows the correlation between time-related cause and overtime effect. The Pearson correlation coefficient, r is -0.013. This shows that there is little if any correlation between time-related cause and overtime effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between time-related cause and overtime effect.

4.8.1.7 Correlation between Cost-related cause and Overtime

Table 4.8.1.7 : Correlation analysis between cost-related cause and overtime

Correlations

		Cost	Overtime
Cost	Pearson Correlation	1	-.048
	Sig. (2-tailed)		.704
	N	66	66
Overtime	Pearson Correlation	-.048	1
	Sig. (2-tailed)	.704	
	N	66	66

Table 4.8.1.7 shows the correlation between cost-related cause and overtime effect. The Pearson correlation coefficient, r is -0.048. This shows that there is little if any correlation between cost-related cause and overtime effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between cost-related cause and overtime effect.

4.8.2 Relationship between All Causes of Delay in IT Projects and Over Cost

The correlations between all causes of delay in IT projects and over cost are analyzed using Pearson Correlation. The relationship between technology-related cause and over cost, relationship between product-related cause and over cost, relationship between managerial-related cause and over cost, relationship between organization-related cause and over cost, relationship between personnel-related cause and over cost, relationship between time-related cause and over cost, and relationship between cost-related cause and over cost were analyzed.

4.8.2.1 Correlation between Technology-related Cause and Over Cost

Table 4.8.2.1 : Correlation analysis between technology-related cause and over cost

Correlations

		Technology	Over Cost
Technology	Pearson Correlation	1	-.312*
	Sig. (2-tailed)		.011
	N	66	66
Over Cost	Pearson Correlation	-.312*	1
	Sig. (2-tailed)	.011	
	N	66	66

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.8.2.1 shows the correlation between technology-related cause and over cost effect. The Pearson correlation coefficient, r is -0.312. This shows that there is low negative correlation between technology-related cause and over cost effect as the

correlation coefficient is ranged from -0.3 to -0.5. There is a significant relationship between technology-related cause and over cost effect at the 0.05 level.

4.8.2.2 Correlation between Product-related cause and Over Cost

Table 4.8.2.2 : Correlation analysis between product-related cause and over cost

Correlations

		Product	Over Cost
Product	Pearson Correlation	1	.153
	Sig. (2-tailed)		.219
	N	66	66
Over Cost	Pearson Correlation	.153	1
	Sig. (2-tailed)	.219	
	N	66	66

Table 4.8.2.2 shows the correlation between product-related cause and over cost effect. The Pearson correlation coefficient, r is 0.153. This shows that there is little if any correlation between product-related cause and over cost effect as the correlation coefficient is ranged from 0.0 to 0.3. There is no significant relationship between product-related cause and over cost effect.

4.8.2.3 Correlation between Managerial-related Cause and Over Cost

Table 4.8.2.3 : Correlation analysis of managerial-related cause and over cost

Correlations

		Managerial	Over Cost
Managerial	Pearson Correlation	1	-.370**
	Sig. (2-tailed)		.002
	N	66	66
Over Cost	Pearson Correlation	-.370**	1
	Sig. (2-tailed)	.002	
	N	66	66

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.8.2.3 shows the correlation between managerial-related cause and over cost effect. The Pearson correlation coefficient, r is -0.370. This shows that there is low negative correlation between managerial-related cause and over cost effect as the correlation coefficient is ranged from -0.3 to -0.5. There is a significant relationship between managerial-related cause and over cost effect at the 0.01 level.

4.8.2.4 Correlation between Organization-related Cause and Over Cost

Table 4.8.2.4 : Correlation analysis between organization-related cause and over cost

Correlations

		Organization	Over Cost
Organization	Pearson Correlation	1	-.399**
	Sig. (2-tailed)		.001
	N	66	66
Over Cost	Pearson Correlation	-.399**	1
	Sig. (2-tailed)	.001	
	N	66	66

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.8.2.4 shows the correlation between organization-related cause and over cost effect. The Pearson correlation coefficient, r is -0.399. This shows that there is low negative correlation between organization-related cause and over cost effect as the correlation coefficient is ranged from -0.3 to -0.5. There is a significant relationship between organization-related cause and over cost effect at the 0.01 level.

4.8.2.5 Correlation between Personnel-related Cause and Over Cost

Table 4.8.2.5 : Correlation analysis between personnel-related cause and over cost

Correlations

		Personnel	Over Cost
Personnel	Pearson Correlation	1	.213
	Sig. (2-tailed)		.086
	N	66	66
Over Cost	Pearson Correlation	.213	1
	Sig. (2-tailed)	.086	
	N	66	66

Table 4.8.2.5 shows the correlation between personnel-related cause and over cost effect. The Pearson correlation coefficient, r is 0.213. This shows that there is little if any correlation between personnel-related cause and over cost effect as the correlation coefficient is ranged from 0.0 to 0.3. There is no significant relationship between personnel-related cause and over cost effect.

4.8.2.6 Correlation between Time-related and Over Cost

Table 4.8.2.6 : Correlation between time-related cause and over cost

Correlations

		Time	Over Cost
Time	Pearson Correlation	1	.360**
	Sig. (2-tailed)		.003
	N	66	66
Over Cost	Pearson Correlation	.360**	1
	Sig. (2-tailed)	.003	
	N	66	66

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.8.2.6 shows the correlation between time-related cause and over cost effect. The Pearson correlation coefficient, r is 0.360. This shows that there is low positive correlation between time-related cause and over cost effect as the correlation coefficient is ranged from 0.3 to 0.5. There is a significant relationship between time-related cause and over cost effect at the 0.01 level.

4.8.2.7 Correlation between Cost-related Cause and Over Cost

Table 4.8.2.7 : Correlation analysis between cost-related cause and over cost

Correlations

		Cost	Over Cost
Cost	Pearson Correlation	1	.347**
	Sig. (2-tailed)		.004
	N	66	66
Over Cost	Pearson Correlation	.347**	1
	Sig. (2-tailed)	.004	
	N	66	66

**. Correlation is significant at the 0.01 level (2-tailed)

Table 4.8.2.7 shows the correlation between cost-related cause and over cost effect. The Pearson correlation coefficient, r is 0.347. This shows that there is low positive correlation between cost-related cause and over cost effect as the correlation coefficient is ranged from 0.3 to 0.5. There is a significant relationship between cost-related cause and over cost effect at the 0.01 level.

4.8.3 Relationship between All Causes of Delay in IT Projects and Abandonment

The correlations between all causes of delay in IT projects and abandonment are analyzed using Pearson Correlation. The relationship between technology-related cause and abandonment, relationship between product-related cause and abandonment, relationship between managerial-related cause and abandonment, relationship between organization-related cause and abandonment, relationship between personnel-related cause and abandonment, relationship between time-related cause and abandonment, and relationship between cost-related cause and abandonment were analyzed.

4.8.3.1 Correlation between Technology-related Cause and Abandonment

Table 4.8.3.1 : Correlation analysis between technology-related cause and abandonment

Correlations

		Technology	Project abandonment
Technology	Pearson Correlation	1	-.079
	Sig. (2-tailed)		.530
	N	66	66
Project abandonment	Pearson Correlation	-.079	1
	Sig. (2-tailed)	.530	
	N	66	66

Table 4.9.8.1 shows the correlation between technology-related cause and abandonment effect. The Pearson correlation coefficient, r is -0.079. This shows that

there is little if any correlation between technology-related cause and abandonment effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between technology-related cause and abandonment effect.

4.8.3.2 Correlation between Product-related Cause and Abandonment

Table 4.8.3.2 : Correlation analysis between product-related cause and abandonment

Correlations

		Product	Project abandonment
Product	Pearson Correlation	1	.449**
	Sig. (2-tailed)		.000
	N	66	66
Project abandonment	Pearson Correlation	.449**	1
	Sig. (2-tailed)	.000	
	N	66	66

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.8.3.2 shows the correlation between product-related cause and abandonment effect. The Pearson correlation coefficient, r is 0.449. This shows that there is a low positive correlation between product-related cause and abandonment effect as the correlation coefficient is ranged from 0.3 to 0.5. There is a significant relationship between product-related cause and abandonment effect at the 0.01 level.

4.8.3.3 Correlation between Managerial-related Cause and Abandonment

Table 4.8.3.3 : Correlation analysis between managerial-related cause and abandonment

Correlations

		Managerial	Project abandonment
Managerial	Pearson Correlation	1	-.135
	Sig. (2-tailed)		.279
	N	66	66
Project abandonment	Pearson Correlation	-.135	1
	Sig. (2-tailed)	.279	
	N	66	66

Table 4.8.3.3 shows the correlation between managerial-related cause and abandonment effect. The Pearson correlation coefficient, r is -0.135. This shows that there is little if any correlation between managerial-related cause and abandonment effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between managerial-related cause and abandonment effect.

4.8.3.4 Correlation between Organization-related Cause and Abandonment

Table 4.8.3.4 : Correlation analysis between organization-related cause and abandonment

Correlations

		Organization	Project abandonment
Organization	Pearson Correlation	1	-.283*
	Sig. (2-tailed)		.021
	N	66	66
Project abandonment	Pearson Correlation	-.283*	1
	Sig. (2-tailed)	.021	
	N	66	66

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.8.3.4 shows the correlation between organization-related cause and abandonment effect. The Pearson correlation coefficient, r is -0.283. This shows that there is little if any correlation between organization-related cause and abandonment effect as the correlation coefficient is ranged from 0.0 to -0.3. There is a significant relationship between organization-related cause and abandonment effect at the 0.05 level.

4.8.3.5 Correlation between Personnel-related Cause and Abandonment

Table 4.8.3.5 : Correlation analysis between personnel-related cause and abandonment

Correlations

		Personnel	Project abandonment
Personnel	Pearson Correlation	1	.233
	Sig. (2-tailed)		.060
	N	66	66
Project abandonment	Pearson Correlation	.233	1
	Sig. (2-tailed)	.060	
	N	66	66

Table 4.8.3.5 shows the correlation between personnel-related cause and abandonment effect. The Pearson correlation coefficient, r is 0.233. This shows that there is little if any correlation between personnel-related cause and abandonment effect as the correlation coefficient is ranged from 0.0 to 0.3. There is no significant relationship between personnel-related cause and abandonment effect.

4.8.3.6 Correlation between Time-related Cause and Abandonment

Table 4.8.3.6 : Correlation analysis between time-related cause and abandonment

Correlations

		Time	Project abandonment
Time	Pearson Correlation	1	.235
	Sig. (2-tailed)		.058
	N	66	66
Project abandonment	Pearson Correlation	.235	1
	Sig. (2-tailed)	.058	
	N	66	66

Table 4.8.3.6 shows the correlation between time-related cause and abandonment effect. The Pearson correlation coefficient, r is 0.235. This shows that there is little if any correlation between time-related cause and abandonment effect as the correlation coefficient is ranged from 0.0 to 0.3. There is no significant relationship between time-related cause and abandonment effect.

4.8.3.7 Correlation between Cost-related Cause and Abandonment

Table 4.8.3.7 : Correlation analysis between cost-related cause and abandonment

Correlations

		Cost	Project abandonment
Cost	Pearson Correlation	1	-.176
	Sig. (2-tailed)		.157
	N	66	66
Project abandonment	Pearson Correlation	-.176	1
	Sig. (2-tailed)	.157	
	N	66	66

Table 4.8.3.7 shows the correlation between cost-related cause and abandonment effect. The Pearson correlation coefficient, r is -0.176. This shows that there is little if any correlation between cost-related cause and abandonment effect as the correlation coefficient is ranged from 0.0 to -0.3. There is no significant relationship between cost-related cause and abandonment effect.

4.8.4 Relationship between All Causes of Delay in IT Projects and Litigation

The correlations between all causes of delay in IT projects and litigation are analyzed using Pearson Correlation. The relationship between technology-related cause and litigation, relationship between product-related cause and litigation, relationship between managerial-related cause and litigation, relationship between organization-related cause and litigation, relationship between personnel-related cause and litigation,

relationship between time-related cause and litigation, and relationship between cost-related cause and litigation were analyzed.

4.8.4.1 Correlation between Technology-related Cause and Litigation

Table 4.8.4.1 : Correlation analysis between technology-related cause and litigation

Correlations

		Technology	Company litigated
Technology	Pearson Correlation	1	.155
	Sig. (2-tailed)		.214
	N	66	66
Company litigated	Pearson Correlation	.155	1
	Sig. (2-tailed)	.214	
	N	66	66

Table 4.8.4.1 shows the correlation between technology-related cause and litigation effect. The Pearson correlation coefficient, r is 0.155. This shows that there is little if any correlation between technology-related cause and litigation effect as the correlation coefficient is ranged from 0.0 to 0.3. There is no significant relationship between technology-related cause and litigation effect.

4.8.4.2 Correlation between Product-related Cause and Litigation

Table 4.8.4.2 : Correlation analysis between product-related cause and litigation

Correlations

		Product	Company litigated
Product	Pearson Correlation	1	-.003
	Sig. (2-tailed)		.980
	N	66	66
Company litigated	Pearson Correlation	-.003	1
	Sig. (2-tailed)	.980	
	N	66	66

Table 4.8.4.2 shows the correlation between product-related cause and litigation effect. The Pearson correlation coefficient, r is -0.003. This shows that there is little if any correlation between product-related cause and litigation effect as the correlation coefficient is ranged from 0.0 to -0.3. There is a significant relationship between product-related cause and abandonment effect.

4.8.4.3 Correlation between Managerial-related Cause and Litigation

Table 4.8.4.3 : Correlation analysis between managerial-related cause and litigation

Correlations

		Managerial	Company litigated
Managerial	Pearson Correlation	1	-.279*
	Sig. (2-tailed)		.023
	N	66	66
Company litigated	Pearson Correlation	-.279*	1
	Sig. (2-tailed)	.023	
	N	66	66

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.8.4.3 shows the correlation between managerial-related cause and litigation effect. The Pearson correlation coefficient, r is -0.279. This shows that there is little if any correlation between managerial-related cause and litigation effect as the correlation coefficient is ranged from 0.0 to -0.3. There is a significant relationship between managerial-related cause and litigation effect.

4.8.4.4 Correlation between Organization-related Cause and Litigation

Table 4.8.4.4 : Correlation analysis between organization-related cause and litigation

Correlations

		Organization	Company litigated
Organization	Pearson Correlation	1	-.557**
	Sig. (2-tailed)		.000
	N	66	66
Company litigated	Pearson Correlation	-.557**	1
	Sig. (2-tailed)	.000	
	N	66	66

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.8.4.4 shows the correlation between organization-related cause and litigation effect. The Pearson correlation coefficient, r is -0.557. This shows that there is moderate negative correlation between organization-related cause and litigation effect as the correlation coefficient is ranged from -0.5 to -0.7. There is a significant relationship between organization-related cause and litigation effect at the 0.01 level.

4.8.4.5 Correlation between Personnel-related Cause and Litigation

Table 4.8.4.5 : Correlation analysis between personnel-related cause and litigation

Correlations

		Personnel	Company litigated
Personnel	Pearson Correlation	1	.224
	Sig. (2-tailed)		.071
	N	66	66
Company litigated	Pearson Correlation	.224	1
	Sig. (2-tailed)	.071	
	N	66	66

Table 4.8.4.5 shows the correlation between personnel-related cause and litigation effect. The Pearson correlation coefficient, r is 0.224. This shows that there is little if any correlation between personnel-related cause and litigation effect as the correlation coefficient is ranged from 0.0 to 0.3. There is no significant relationship between personnel-related cause and litigation effect.

4.8.4.6 Correlation between Time-related Cause and Litigation

Table 4.8.4.6 : Correlation analysis time-related cause and litigation

Correlations

		Time	Company litigated
Time	Pearson Correlation	1	.262*
	Sig. (2-tailed)		.034
	N	66	66
Company litigated	Pearson Correlation	.262*	1
	Sig. (2-tailed)	.034	
	N	66	66

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.8.4.6 shows the correlation between time-related cause and litigation effect. The Pearson correlation coefficient, r is 0.262. This shows that there is little if any correlation between time-related cause and litigation effect as the correlation coefficient is ranged from 0.0 to 0.3. There is a significant relationship between time-related cause and litigation effect at the 0.05 level.

4.8.4.7 Correlation between Cost-related Cause and Litigation

Table 4.8.4.7 : Correlation analysis between cost-related cause and litigation

Correlations

		Cost	Company litigated
Cost	Pearson Correlation	1	.244*
	Sig. (2-tailed)		.049
	N	66	66
Company litigated	Pearson Correlation	.244*	1
	Sig. (2-tailed)	.049	
	N	66	66

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.8.4.7 shows the correlation between cost-related cause and litigation effect. The Pearson correlation coefficient, r is 0.244. This shows that there is little if any correlation between cost-related cause and litigation effect as the correlation coefficient is ranged from 0.0 to 0.3. There is a significant relationship between cost-related cause and litigation effect at the 0.05 level.

4.9 FISHBONE DIAGRAM

Fishbone diagram is developed for the review of relationship between causes and effects of this study. According to Watson (2004), Fishbone diagram is used for data analysis, which is very systematic that translates the causes, which affect the effects of the problem. By developing Fishbone diagram, the highest originator of the problem can be defined, making it easier to identify the what can be done to the problem aroused (Ilie and Ciocoiu, 2010). Therefore, to determine which types of causes affect the problem of overtime, over cost, abandonment and litigation, Fishbone diagram is developed to identify which causes need special attention.

Figure 4.9.1, 4.9.2, 4.9.3 and 4.9.4 show the Fishbone diagram which shows the causes and effects of delay in IT projects in this study.

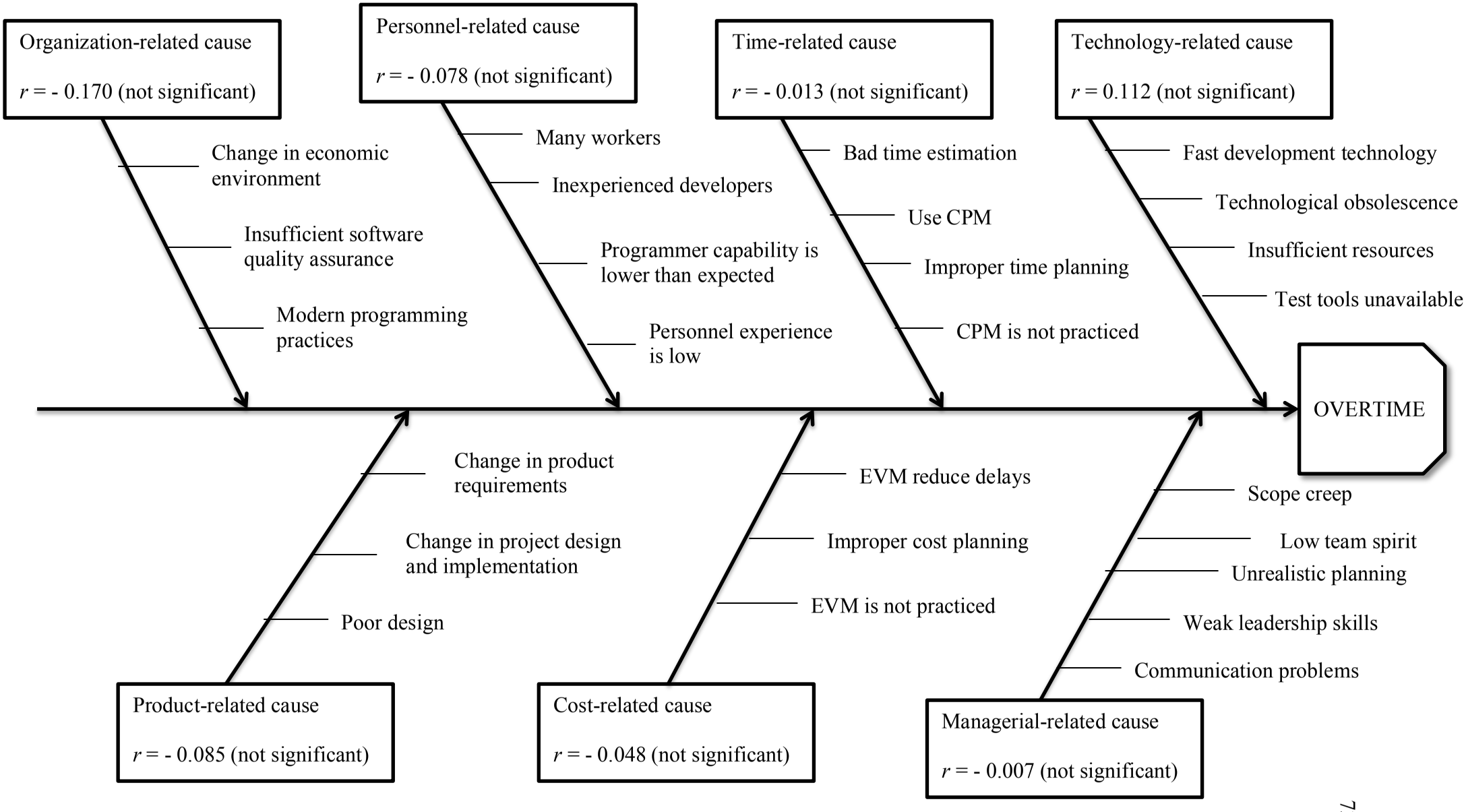

Figure 4.9.1 : Fishbone diagram of overtime effect

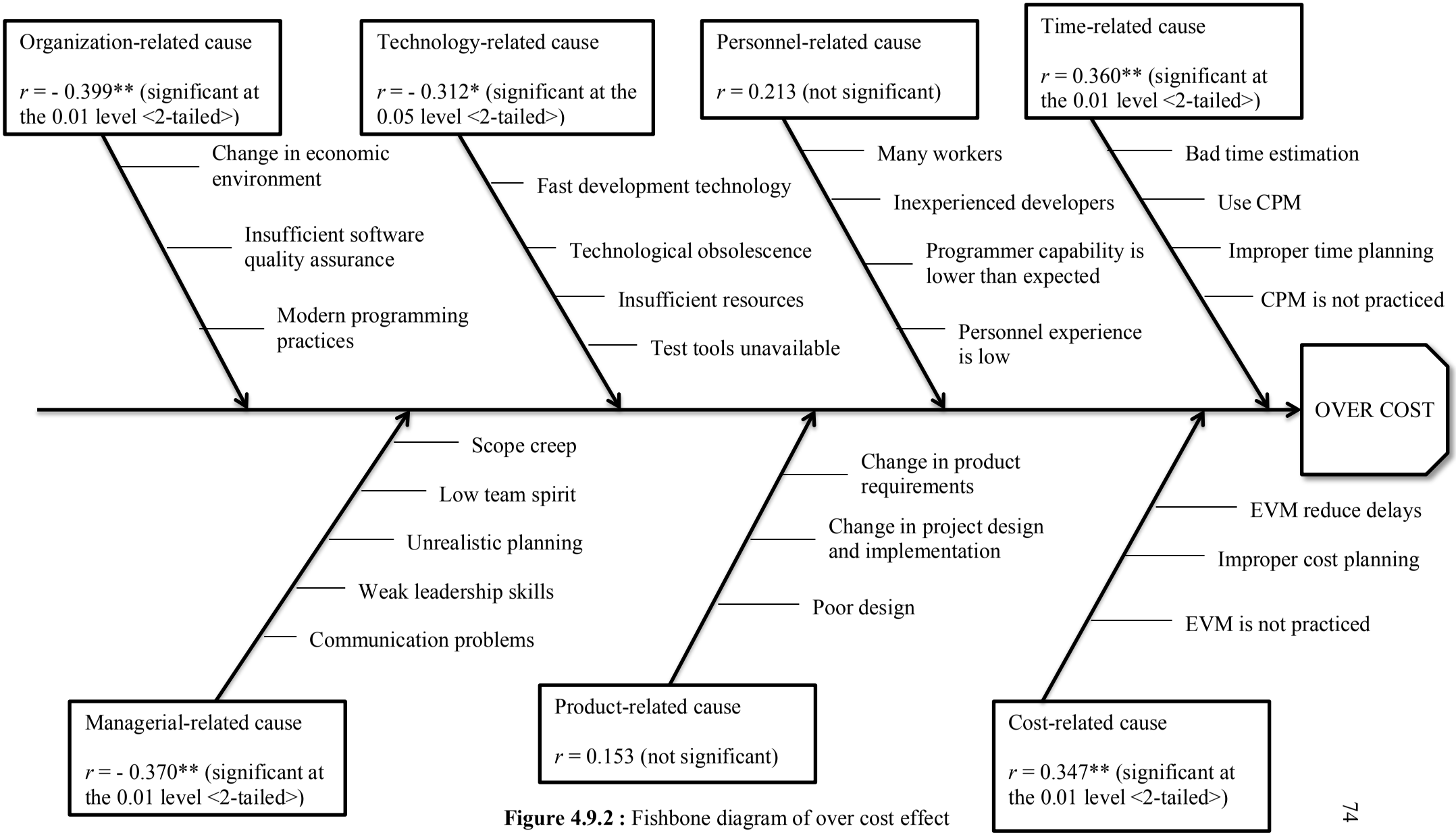

Figure 4.9.2 : Fishbone diagram of over cost effect

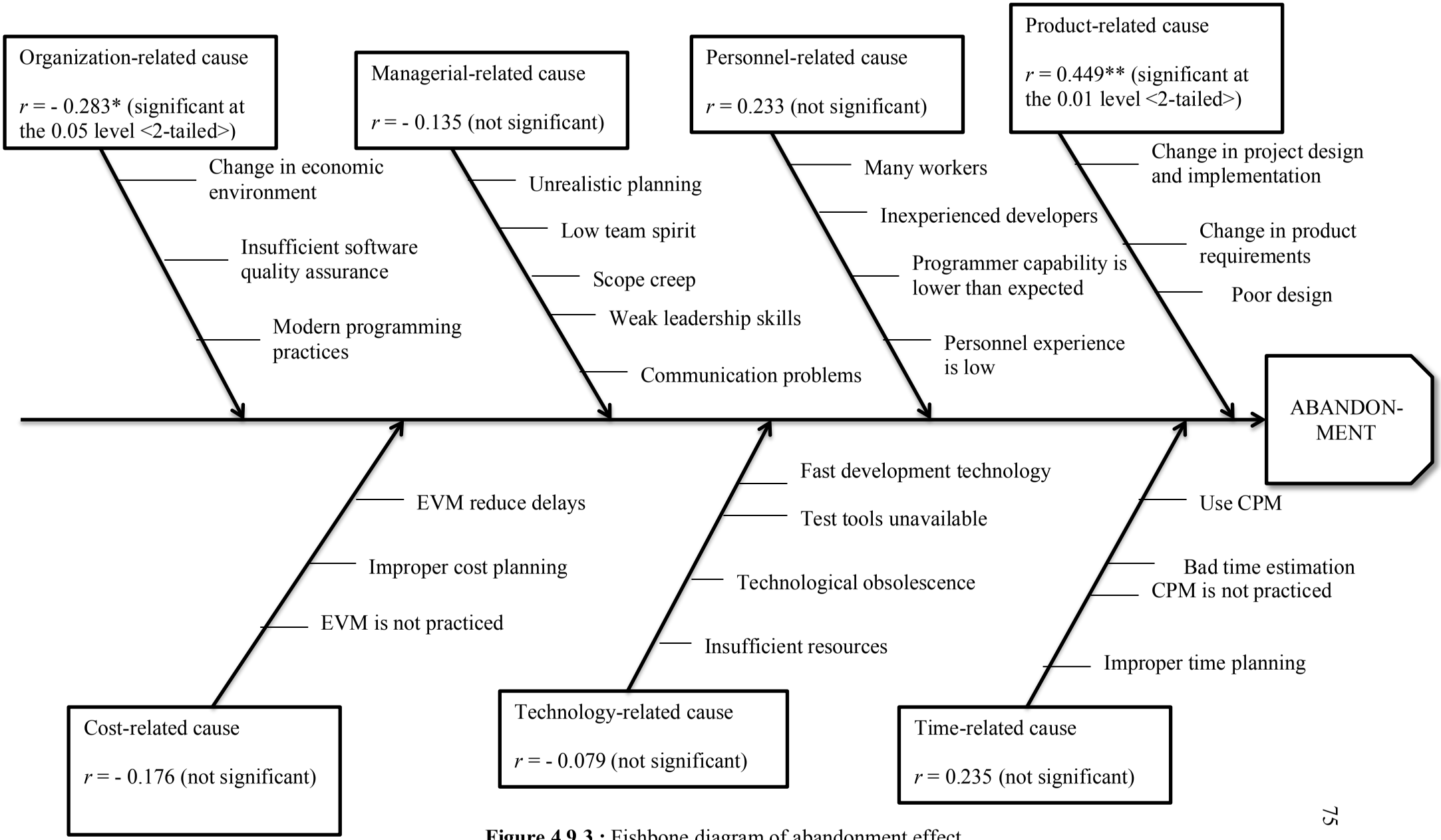

Figure 4.9.3 : Fishbone diagram of abandonment effect

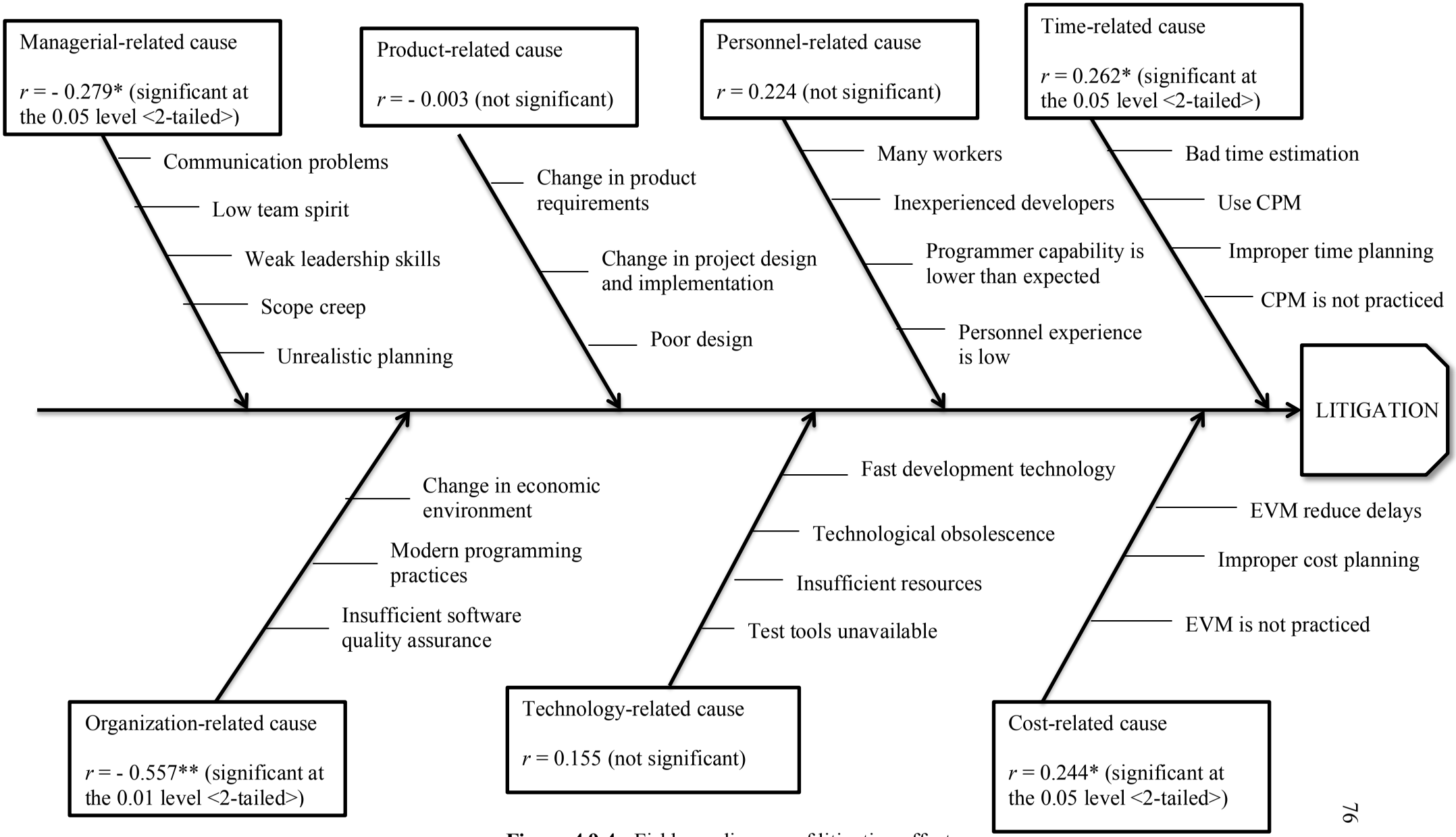

Figure 4.9.4 : Fishbone diagram of litigation effect

Figure 4.9.1 shows the fishbone diagram of overtime effect. There are seven types of causes, which affect the overtime effects, which are technology-related cause, product-related cause, managerial-related cause, organization-related cause, personnel-related cause, time-related cause, and last but not least, the cost-related cause. The type of cause that is near to the overtime effect has the highest influence to the effect. The nearer the cause, the higher the effect. Therefore, in figure 4.9.1, the technology-related cause shows that it has a highest influence to the overtime effect, although there is no significant relationship between the technology-related cause and overtime effect. The sub-variables of technology-related cause are test tools unavailable, technological obsolescence, fast development technology and insufficient resources contribute to the effect. The Pearson correlation coefficient, *r* of the cause is 0.112, this is followed by managerial-related cause with the Pearson correlation coefficient, *r* of -0.007, time-related cause with the Pearson correlation coefficient, *r* of -0.013, cost-related cause with the Pearson correlation coefficient, *r* of -0.048, personnel-related cause with the Pearson correlation coefficient, *r* of -0.078, product-related cause with the Pearson correlation coefficient, *r* of -0.085 and lastly is organization-related cause with the Pearson correlation coefficient, *r* of -0.170. Thus, technology-related cause should be taken into consideration in order to reduce overtime to workers when project is delayed. On the other hand, organization-related cause that has the sub-variables of change in economic environment, insufficient software quality assurance and modern programming practices can be disregarded.

Figure 4.9.2 shows the fishbone diagram of over cost effect. There are seven types of causes, which affect the over cost effects, which are technology-related cause, product-related cause, managerial-related cause, organization-related cause, personnel-related cause, time-related cause, and last but not least, the cost-related cause. The type of cause that is near to the overtime effect has the highest influence to the effect. The nearer the cause, the higher it affects the problem. Thus, in figure 4.9.2, the time-related cause shows that it has a highest influence to the over cost effect, plus it has a significant relationship between the time-related cause and over cost effect at the 0.01 level. Cost-related cause, managerial-related cause and organization-related cause also have a significant relationship between the over cost effect at the 0.01 level, while technology-related cause has a significant relationship at the 0.05 level. The sub-

variables of time-related cause are bad time estimation, Critical Path Method (CPM) is not practiced, improper planning, and the use of CPM contribute to the effect. The Pearson correlation coefficient, *r* of the time-related cause is 0.360, this is followed by cost-related cause with the Pearson correlation coefficient, *r* of 0.347, personnel-related cause with the Pearson correlation coefficient, *r* of 0.213, product-related cause with the Pearson correlation coefficient, *r* of 0.153, technology-related cause with the Pearson correlation coefficient, *r* of -0.312, managerial-related cause with the Pearson correlation coefficient, *r* of -0.370 and lastly is organization-related cause with the Pearson correlation coefficient, *r* of -0.399. Consequently, time-related cause should be taken into consideration in order to reduce over cost when project is delayed. On the other hand, organization-related cause that has the sub-variables of change in economic environment, insufficient software quality assurance and modern programming practices can remain disregarded.

Figure 4.9.3 shows the fishbone diagram of abandonment effect. There are seven types of causes, which affect the abandonment effects, which are technology-related cause, product-related cause, managerial-related cause, organization-related cause, personnel-related cause, time-related cause, and last but not least, the cost-related cause. The type of cause that is near to the abandonment effect has the highest influence to the effect. The nearer the cause, the higher the effect affects abandonment. Therefore, in figure 4.9.3, the product-related cause shows that it has a highest influence to the abandonment effect with a significant relationship between the abandonment effect at the 0.01 level. Meanwhile, organization-related cause has a significant relationship between the abandonment effect at the 0.05 level. The sub-variables of product-related cause are change in project requirements, change in project design and implementation, and poor design contribute to the abandonment effect. The Pearson correlation coefficient, *r* of the cause is 0.449, this is followed by time-related cause with the Pearson correlation coefficient, *r* of 0.235, personnel-related cause with the Pearson correlation coefficient, *r* of 0.233, technology-related cause with the Pearson correlation coefficient, *r* of -0.079, managerial-related cause with the Pearson correlation coefficient, *r* of -0.135, cost-related cause with the Pearson correlation coefficient, *r* of -0.176 and lastly is organization-related cause with the Pearson correlation coefficient, *r* of -0.283. So, product-related cause should be observed in order to reduce abandonment

to projects whenever project is delayed. On the other hand, organization-related cause that has the sub-variables of change in economic environment, insufficient software quality assurance and modern programming practices can be ignored.

Figure 4.9.4 shows the fishbone diagram of litigation effect. There are seven types of causes, which affect the litigation effects, which are technology-related cause, product-related cause, managerial-related cause, organization-related cause, personnel-related cause, time-related cause, and last but not least, the cost-related cause. The type of cause that is near to the litigation effect has the highest influence to the effect. The nearer the cause to the effect, the higher the influence to the effect. Therefore, in figure 4.9.4, the time-related cause shows that it has a highest influence to the litigation effect with a significant relationship with litigation effect at 0.05 level. Managerial-related cause also has a significant relationship with litigation effect at 0.05 level, while organization-related has a significant relationship with litigation effect at 0.01 level. The sub-variables of time-related cause are bad time estimation, Critical Path Method (CPM) is not practiced, improper planning, and the use of CPM contribute to the effect. The Pearson correlation coefficient, *r* of the cause is 0.262, this is followed by cost-related cause with the Pearson correlation coefficient, *r* of 0.244, personnel-related cause with the Pearson correlation coefficient, *r* of 0.224, technology-related cause with the Pearson correlation coefficient, *r* of 0.155, product-related cause with the Pearson correlation coefficient, *r* of -0.003, organization-related cause with the Pearson correlation coefficient, *r* of -0.557 and lastly is managerial-related cause with the Pearson correlation coefficient, *r* of -0.279. Hence, time-related cause should be taken into consideration in order to reduce litigation to the company when project is delayed. On the other hand, managerial-related cause that has the sub-variables of inexperienced developers, programmer capability is lower than expected, personnel experience is low and many workers can be disregarded.

4.10 CONCLUSION

This chapter highlighted the data analyses for respondents' profile, reliability analysis, mean of causes of delay in it projects, strategies against delay in it projects and effects of delay in it projects, and also correlation between causes and effects.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The aim of this chapter is to give conclusion and recommendations from the study. This chapter will provide conclusions based on the results gained concerning the research objectives, as well as providing recommendations and suggestions for future studies.

5.2 CONCLUSION

Based on this study, there are seven identified causes of delay in IT projects, which are technology-related, product-related, managerial-related, organization related, personnel-related, time-related and cost-related. Questionnaires have been distributed to different companies and the results were analyzed in Chapter 4. According to the analyzed results, mean of each causes were ranked, and it has came to terms by the respondents of the study that the main cause of delay in IT projects is product related cause since it was ranked the first compared to the other causes. Product-related cause was divided into three other sub-variables that are change in project requirements, change in project design and implementation and poor design. It showed that changing project design and implementation ranked the highest. Changing project design and implementation causes the project team to put more effort and thus lengthen the time of the project, causing delay to IT projects. This can be concluded that the first objective is reached.

Mean of each strategy against delay in IT projects were also ranked, and it has found out that product-related strategy were also ranked the highest, followed by time-related, personnel-related, managerial-related, organization-related, cost-related and technology-technology. The sub-variables that fall under product-related strategy were; define better customer specification and reduce design complexity. Based on the ranking, defining better customer specification was identified as the best strategy against delay in IT projects. Detailed instructions and need by the customers should be specified before starting the project to reduce and may be to avoid delay. This concludes that the second objective of this study is also reached.

In addition, mean of each effects of delay in IT projects were also ranked in order to find out which effects are the highest whenever delay occurs in IT projects. Based on the ranking, litigation shows that highest rank for the effects of delay in IT projects, while abandonment was ranked number 2, over cost was ranked number 3 and overtime was ranked the last. This shows that whenever delay occurs, litigation will occur to the company. So in order to prevent litigation from occurring, which will effect the company's reputation, delay in IT projects should be taken care of. This can be concluded that the third objective of this study is reached.

The hypothesis of finding the correlation between causes and effects were analyzed using Fishbone diagram since the study wants to obtain which cause has the most significant relationship with the effects of delay in IT projects. Based on the Fishbone diagram, the hypothesis is not accepted for the first effect (overtime), since it has no significant relationship with all the causes of delay in IT projects. This is because overtime is normal for all IT project teams. However, there is a significant relationship between the second effect (over cost) with time-related cause. Furthermore, it has the highest correlation with over cost. Beside that, cost-related cause, technology-related cause, managerial-related cause and organization-related cause also have a significant relationship with over cost effect. Hence the hypothesis is accepted for the second effect. This shows that whenever the planning of time is not properly done, more cost are needed for the project to be on time. Product-related cause has the most significant relationship with the third effect (abandonment), also has the highest correlation with the effect. Moreover, organization-related cause also has a significant relationship with

abandonment. Thus, hypothesis is accepted for the third effect. This is because, when the product is often changing, and the design does not meet its requirements, the project is often goes to abandonment. Time-related cause has the most significant relationship with the fourth effect (litigation), also has the highest correlation with the effect. Cost-related cause, organization-related cause and managerial-related cause also have a significant relationship with litigation effect. Hence concluded that the hypothesis is accepted for the fourth effect. This is because, when time is not properly planned, the company will be litigated if the project does not done on time.

5.3 LIMITATIONS OF THE STUDY AND RECOMMENDATIONS

There are a few limitations that were discovered and observed during the completion of this study. First limitation was during the distribution of questionnaires. Since there a half of the questionnaires are distributed by mail, the questionnaires that have been filled need to be sent back by mail. This causes restrictions for the respondents for the reason that they have to go to the post office to send back the questionnaires. This will cause low number of feedback from the respondents. Besides, the number of pages of the questionnaire also affects the response rate of the respondents. According to Deutskens et al. (2004), the elements that should be taken care of in a set of questionnaire is the length and the presentation.

Furthermore, the Information Technology (IT) project team is not very responsive to answer surveys. The rate of response in IT project researches are usually 10% to 35% rate of response only (Falconer & Hodgett, 1999).

Similar studies should be done to root out more causes that induce delay in IT project, since causes of delay varies in different environments and backgrounds. This can come to the aid of the IT projects, which suffers from project delay. They can make use of the study to diminish and restrain delays in IT projects.

REFERENCES

Abd Aziz, S. and Mahmood, R. 2011. The Relationship Between Business Model And Performance Of Manufacturing Small And Medium Enterprises In Malaysia. *African Journal of Business Management*. **Vol. 5**(22), pp. 8918-8932.

Abedi, M., Fathi, M. S. & Mohammad, M. F. (2011). Effects of Construction Delays on Construction Project.

Al-Ahmad, W. et al., *A Taxonomy of an IT Project Failure: Root Causes,*International Management Review, **vol. 5**, pp. 93-106, 2009.

Ambler, S. W., The "Broken Iron Triangle" Software Development Anti-Pattern. Retrieved May 9, 2013, from http://www.ambysoft.com/essays/brokenTriangle.html#Impact

Andresen, J. et al. 2000. , A Framework for Measuring IT Innovation Benefits. ITcon, **Vol. 5**, pp. 57-72.

Apolot, et al. 2011. An investigation into the causes of Delay and Cost Overruns in Uganda's Public Sector Construction Projects.

Archer, S. 2008. Stochastic Resource Constrained Project Scheduling With Stochastic Task Insertions Problems.

Cataldo, M. and Herbsleb, J. D. 2008. Communication networks in geographically distributed software development. *Proceedings of the ACM 2008 conference on Computer supported cooperative work,* 579–588.

Collofello, J. S. et al. 2002. Improving Software On-Time Delivery: An Investigation of Project Delays.

Desikan, S. and Ramesh, G. 2006. *Software Testing: Principles and Practices.* India, Pearson Education.

Deutskens, E., et al. 2004. Response Rate and Response Quality of Internet-Based Surveys: An Experimental Study. **15**(1): 21–36.

Devedzic, V. 2002. *Software Project Management*. Handbook of Software Engineering and Knowledge Engineering .Vol.2 – Emerging Technologies. Singapore, World Scientific Publishing Co.

Epstein, M. A and Politano, F. L. 2008. *Drafting License Agreements*. **Vol 1**. Aspen Publishers.

Falconer, D.J and Hodgett, R. A. 1999. Why Executives Don't Respond To Your Survey.

Farshchi, M., et al. 2012. Impact of Personnel Factors on the Recovery of Delayed Software Projects: A System Dynamics Approach.

Ferrucci, F. et al. 2010. Not going to take this anymore: Multi-Objective Overtime Planning for Software Engineering Projects. *ICSE 2013*.

Firesmith, D. 2004. Prioritizing Requirements. *Journal of Object Technology*. **Vol. 3.**

Fong N.K., Wong L.Y and Wong L.T. 2006. *Fire services installation related contributors of construction delays*. Building and Environment.

Forselius, P. and Kakola, T. 2009. An Information Systems Design Product Theory for Software Project Estimation and Measurement Systems. *HISS*. 1-10.

Forselius P. 2005. Discipline to Software Development – Learn to Distinguish Project Management from Other Management Levels. *IPMA World Congress 2005*.

Hughes, R. and Cotterell, M. 2009. *Software project management*. 5th Edition. Maidenhead, McGraw-Hill.

Ichu, E. and Nemani, R. 2011. The Role of Quality Assurance in Software Development Projects: Project Failures and Business Performance. *International Journal of Computer Technology and Applications*. **2** (04): 716-725.

Ilie G. and. Ciocoiu C.N. 2010. Application Of Fishbone Diagram To Determine The Risk Of An Event With Multiple Causes Management Research And Practice **2** (1): 1-20.

Imamoglu, O. and Gozlu, S. 2008. The sources of success and failure of information technology projects: Project managers' perspective. *Portland International Conference on Management of Engineering & Technology*. 1430-1435.

Knapp, B. W. et al. 2010. A Project Manager's Guide to Passing the Project Management (Pmp) Exam.

Kumar, S. 2008. Reengineering: A focus on enterprise integration. **30** (5): 54-72.

Marciniak, J. J. 2001. *Process Models in Software Engineering.* Encyclopedia of Software Engineering, 2nd Edition, New York, John Wiley and Sons Inc.

McDonald, D.F. and Zack, J.G. 2004. Estimating Lost Labor Productivity in Construction Claims. AACE International Recommended Practice No. 25R-03. Retrieved from http://www.aacei.org/technical/rps/25r-03.pdf

Mensah, K. E. 1997. Critical Issues In Abandoned Information Systems Development Projects. *Communications of the ACM*.

Ming, F. S. and Ming, L. 2011. Scheduling simulation-based techniques for earned value management on resource-constrained schedules under delayed scenarios. *WSC '11 Proceedings of the Winter Simulation Conference*.

Sambasivan M. and Soon Y.W. 2007. Causes and effects of delays in Malaysian construction industry. *International Journal of project management.* 25, 517-526.

Saunders, M., Lewis, P. and Thornhill, A. 2007. *Research methods for business students.* 4th ed. London: Prentice Hall.

Schwalbe, K. 2010. *Information Technology Project Management*. 6th Edition. Cengage Learning.

Sekaran, U. 2003. *Research methods for business.* 4th ed. Hoboken, John Wiley & Sons.

Sekaran, U. and Bougie, R. 2010. *Research methods for business: a skill building approach.* New York, NY, Wiley.

Shore, B. 2005. Failure rates in global IS projects and the leadership challenge. *Journal of Global Information Technology Management*. **8**(3): 1-5.

Streiner, L. D., & Norman, G. R. 2008. *Health Measurement Scales: A Practical Guide to Their Development and Use.* 4th Edition. New York, Oxford University Press.

Stelth, P. and Le Roy, G. 2009. Projects' Analysis through CPM (Critical Path Method). *Europian Union Journal*. No.1.

Trump, K. S. 2009. Communicating Safety. *American School Board Journal.*

Olson, B. and Swenson, D. 2011.Overtime effects on project team effectiveness. *Midwest Instruction and Computing Symposium.*

Vanhoucke, M. 2009. Performance Analysis of Earned Value Management in the Construction Industry.

Vinod, V. et al. 2009. Software Team Skills on Software Product Quality. *Asian Journal of Information Technology.* **8** (1): 8-13.

Wankel, C. and DeFillippi, B. 2005. *Educating Managers through Real World Projects (Hc)*. U.S.A., Crashing Rocks Books.

Watson, G. 2004. The Legacy Of Ishikawa. Quality Progress **37**(4): 54-47.

APPENDIX A

PROJECT WORK SCHEDULE

TASKS		MONTHS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Briefing with Coordinator	■													
2	Discussion on Project Title & Objective	■	■												
3	Approval of Project Title		■												
4	Collect information from resources (journal, books, etc)		■	■	■										
5	Preparation of Chapter 1: Introduction		■												
6	Preparation of Chapter 2: Literature Review			■	■										
7	Preparation of Chapter 3: Research Methodology				■										
8	Develop Questionnaire					■									
9	Finalization & Submission of FYP 1					■									
10	Preparation and FYP 1 Oral Presentation					■									
11	Data Collection						■	■	■						
12	Preparation of Chapter 4: Data Analysis									■	■	■			
13	Preparation of Chapter 5: Conclusion											■	■		
14	Finalization & Submission of FYP 2												■	■	■
15	Preparation and FYP 2 Oral Presentation												■		

APPENDIX B

SAMPLE OF QUESTIONNAIRE

Section A: Biographical details

The purpose of this section is to establish the general profile of the enterprise and the respondent.

Name (optional)	
Gender	
Age (optional)	
Position	
Department	
No. of projects involved	
Experience in IT project	
Highest education level	
IT projects in what industry	

Section B: Causes of delay in IT projects

Answer question 1 to 7 by ranking the different options on a Likert scale of 1 – 5, where:

(1) = Strongly disagree
(2) = Disagree
(3) = Neutral
(4) = Agree
(5) = Strongly agree

1. Which of the following technology-related causes project delay?	**1**	**2**	**3**	**4**	**5**
a) Test tools unavailable					
b) Technological obsolescence					
c) Fast development technology					
2. Which of the following product-related causes project delay?					
a) Change in project requirements					
b) Change in project design and implementation					
c) Poor design					
3. Which of the following managerial-related causes project delay?					
a) Unrealistic planning					
b) Weak leadership skills					
c) Low team spirit					
d) Communication problems					
e) Scope creep					
4. Which of the following organization-related causes project delay?					
a) Change in economic environment					
b) Insufficient software quality assurance					
c) Modern programming practices					
5. Which of the following personnel-related causes project delay?					
a) Inexperienced developers					
b) Programmer capability is lower than expected					
c) Personnel experience is low					
6. Which of the following time-related project delay?					
a) Bad time estimation					
b) Improper planning of timing					
c) Critical Path Method is not practiced					

7. Which of the following cost-related causes project delay?					
a) Improper planning of costing					
b) Earned Value Management (EVM) is not practiced					

Answer the following questions by marking an X in the correct block.

8. Does your company uses Critical Path Method to do scheduling?	**Yes**	**No**
9. Earned Value Management reduces the delays in IT Projects.		
10. Does your company have many workers to perform a project?		
11. Is the number of resources often insufficient for a project?		

Section C: Strategies against delay in IT projects

Answer the following questions by ranking the different options on a Likert scale of 1 – 5, where:

(1) = Strongly disagree
(2) = Disagree
(3) = Neutral
(4) = Agree
(5) = Strongly agree

12. Which of the following technology-related strategies prevent delay from occurring in a project?	**1**	**2**	**3**	**4**	**5**
a) Use other tools					
b) Use appropriate computing language					
13. Which of the following product-related strategies					
a) Define better customer specification					
b) Reduce design complexity					
14. Which of the following managerial-related strategies prevent delay from occurring in a project?					
a) Communication plan					
b) Set a baseline preventing scope creep					
15. Which of the following organization-related strategies prevent delay from occurring in a project?					
a) Improve the working environment					
b) Improve the process					
16. Which of the following personnel-related strategies prevent delay from occurring in a project?					
a) Hire good developers					
b) Hire many staffs					
17. Which of the following time-related strategies prevent delay from occurring in a project?					
a) Critical Path Method (CPM)					
b) Statement of Work (SOW)					
18. Which of the following cost-related strategies prevent delay from occurring in a project?					
a) Brainstorming					
b) Earned Value Management (EVM)					

Section D: Effects of delays in IT Projects

Answer the following questions by making an X in the correct block.

19. Have you ever experienced overtime when a project is delayed?	**Yes**	**No**
20. Have your organization ever experienced over cost when a project is delayed?		
21. Is a project goes through abandonment when a project is delayed?		
22. Have your company ever been litigated when a project is delayed?		

THANK YOU FOR YOUR COOPERATION