IMPLIMENTATIONS OF MODERN TOOLS TO IMPROVE PROJECT MANAGEMENT AT THE PUBLIC WORKS DEPARTMENT (JKR)

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Draft Final Report

Projek Sarjana Muda II

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SUPERVISOR'S DECLARATION

I have checked this report and the report can now be submitted to JK-PSM to be delivered back to supervisor and to the second examiner.

Signature :……..

Name of Supervisor :…….

Date :…….

APPROVAL

I hereby declare that I have read this project report and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Design&Innovation).

Signature :. .....

Name of Supervisor : .....

Date : .....

DEDICATION

To my beloved mother and father

To my family and friends

ABSTRACT

Public Works Department (JKR) is well known in Malaysia to conduct the entire government project. However, there is some issue regarding the longer period to finish a construction. The factor that contributes in this problem is being studied. Thus, a research is conducted to help to reduce the problem facing by JKR Melaka. This project explained the process of recommendation Project Management and Technical Software to Public Works Department (JKR) at Melaka Tengah. The process involved in understanding of project flow and project communication. After the all the flow has been understood, the process of survey the best software and engineering method is used to identify the best software. The process to select the best software involves the engineering method such as data collection form the distribution of questionnaire which involve 10 respondents for each part. Then, the engineering method such as House of Quality (HOQ) and Weighted Rating Method is used to select the best software. . The selected software will be suggested to the engineer of JKR Melaka and their acceptance is the main result for this research. At the end of the project, a formal report is written to discuss the outcome of the project.

ABSTRAK

Jabatan Kerja Raya (JKR) terkenal di Malaysia bagi menjalankan keseluruhan projek kerajaan. Walau bagaimanapun, terdapat beberapa isu mengenai tempoh yang lebih lama untuk menyelesaikan sesuatu projek. Faktor yang menyumbang dalam masalah ini sedang dikaji. Oleh itu, satu penyelidikan telah dijalankan untuk membantu mengurangkan masalah yang dihadapi oleh JKR Melaka. Projek ini menjelaskan proses cadangan Pengurusan Projek dan perisian teknikal kepada Jabatan Kerja Raya (JKR) di Melaka Tengah. Proses yang terlibat dalam memahami aliran projek dan komunikasi projek. Setelah aliran yang telah difahami, proses kajian tinjauan dan teknik kejuruteraan yang terbaik digunakan untuk mengenal pasti perisian yang terbaik. Proses untuk memilih perisian yang terbaik melibatkan kaedah kejuruteraan seperti pengumpulan data membentuk pengedaran soal selidik yang melibatkan 10 responden untuk setiap bahagian. Kemudian, kaedah kejuruteraan seperti House of Quality (HOQ) dan *Weighted Rating Method* digunakan untuk memilih perisian yang terbaik. . Perisian yang dipilih telah dicadangkan kepada jurutera JKR Melaka dan penerimaan mereka adalah hasil utama dalam kajian ini. Pada akhir projek ini, satu laporan rasmi ditulis untuk membincangkan hasil projek.

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I feel grateful because had given a chance to work with the greatest minds in the field of Project Planning and Public Works Department (JKR) Melaka. Firstly, special thanks to my supervisor Dr. Shamsul Anuar Bin Shamsudin. Honestly, Dr Shamsul is like a father to me because he very understands from the early of project until I was able to finish the project. His guidance and advice is very useful to me. At first, I wasn't able to interview the JKR representative due to they won't able to giving time because of many project that must be handle. However, Dr Shamsul has giving an idea to interview the sub-contractor of JKR. This made me feel not to give up and try to deal with them for the second time. Thus, the second deal is successful. I would like to thank JKR representative, Puan Zuraikha bt Samsuddin because giving some time for me to interview her. Lastly, thank you to my family and friends for their motivation and support until I was able to finish writing the report.

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PMS	Project Management Software
JKR	Jabatan Kerja Raya
PWD	Public Work Department
DFA	Design for Assemble
FEA	Finite Element Analysis
FEM	Finite Element Modeling
FE	Finite Element
HOQ	House of Quality
SRS	Software Requirement Software
ME	Middle East
US	United States

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CHAPTER 1

INTRODUCTION

This chapter will explained the introduction of the project such as the background of Public Works Department (JKR), background of the study, researcher experience, problem statement, objective and scope of the project.

1.1 Background

The background will explained on the history of Public Works Department (PWD) from the beginning until now. Besides, the background of the study will be written on after the history of PWD. Moreover, the researcher experience that related to the topic will be explained later. The experience is important since it will help the researcher while doing this project.

1.1.1 History of PWD

The Malaysian Public Works Department abridged JKR, is the government office in Malaysia under Ministry of Works Malaysia (MOW) which is in charge of development and upkeep of open foundation in Malaya and Labuan. In Sabah and Sarawak, isolate element of Public Works Department exists under separate express government's locale. The early history of the creation of a Ministry actually starts to the establishment of small departments in the days of British rule, especially when the British began to intervene in the Malay States after the signing of the Pangkor Treaty on 17th - 20th January 1874. One of the oldest departments of government created by the 'Crown Colony' before the Pangkor

Treaty is' Public Works Department (PWD) or later known as the Public Works Department (PWD), which was established in 1872. Its establishment aims to provide the infrastructure for socio-economic development the British government and the political system in the Straits Settlements, comprising Singapore, Melaka, Perak (Wall), Seberang Perai and Penang. Major J. Mcnair FA, former Colonial Engineer Straits was the first person appointed to head the Department of Public Works (Jabatan Kerja Raya Perak,2015).

In 1954, the British Government has taken steps to separate the administration of Malaya (Malaya) from the administration, which is based in Singapore. This is the starting point of government departments in Malaya allowed to implement policies and programs respectively. In 1955, the first Federal Election Legislative Council level indicates when the transition of power among the local people of the British administration of Malaya before independence process was conducted. The Alliance, which combines the United Malays National Organisation (UMNO), the Pan-Malayan Chinese Association (MCA) and the Malayan Indian Congress (MIC) has won 51 seats and the Islamic Party of Malaya (PAS) obtained one seat. In 1956, the Chief Minister and several Ministers have been appointed to head the Government of the Federation of Malaya.

In the same year, several ministries were created, including the Ministry of Public Works with the original name of the Ministry of Works, Posts and Telecommunications. Honourable Mr. Sardon bin Haji Spokesman is the first minister who heads the Ministry. The functions and responsibilities of the Department of Public Works has been preserved and placed under the administration of the Ministry. Director of the Public Works Department is responsible to the Minister in relation to matters of policy Ministry. In 1975, the Ministry has been restructured and renamed the Ministry of Works and Transport.

The rapid development and socio-economic development of the country in the 1970s has led to the function and role of the Ministry is increasing. In according with the role, in 1978 again changed the name of the Ministry to the Ministry of Works and Public Utilities. However, in parallel with the specialization of responsibility, in the 1980s, the Government has decided to name the Ministry as the Ministry of Works Malaysia and the name has remained until now.

1.2 Background of the Study

A pre-contract Construction Projects in Malaysia, this includes Contractor and Employer. The delicate given to the temporary workers incorporates numerous authoritative archives.

i. Guideline to Tenderers
ii. States of agreement
iii. Reference sections to the states of agreement
iv. Bills of amount
v. Prelude to the Bill of amounts
vi. Strategy for estimation
vii. Timetable of Particulars
viii. Rundown of Drawings

The Tenderer should submit to the previously mentioned summation and needs to create a work program, aside from satisfying other formal prerequisites of the delicate. The work program contains data of how the Tenderer would complete his work if at all he were being granted the agreement. The work program likewise reflects, what exactly degree is the Tenderer fit for delivering a successful arrangement, which in application would prompt to the best sought result for the business. Once the agreement is chosen and after

the issuance of the Letter of Award, the temporary worker needs to create a Master work program which depicts in detail, what and how the timetable of functions be finished. Likewise month to month/week by week work programs with upgraded extend advance will be submitted to the customer to look at the real and arranged calendars furthermore to assess the venture status.

Nowadays, the majority of the Tenderers or the contractual workers take after a formal approach in building up their work program which is either in a wrote arrange or a spread sheet or programming program with some time related bars on a graph. These work programs does not give any definite data of how the Tenderer is expecting to deal with. In most of the cases the work program is neglected, as valuing of the Tender is the principle idea even the evaluating is not finished as for the work program. The accompanying are the conceivable disadvantages in this situation.

i. The customer may not get the correct substance as arranged by the Tenderer from his program of works.
ii. All the conceivable exercises of the venture may not be fused in the program
iii. Every one of the exercises is not efficient and related as booked.
iv. The connection amongst cost and advance is unexplained
v. The connection amongst advance and venture obliges is not highlighted
vi. The customer can't pass judgment on basic exercises in the venture
vii. Any postponement or disappointment of a movement, they boss may not get legitimate proof to arraign neither the contractual worker nor the temporary worker have adequate program to legitimize himself.
viii. For any progressions that happen in the venture, the program is not amendable
ix. The program is not clear as crystal

1.1.3 Researcher Experience

Based on the experience gain from two month internship on July until September 2016, the researcher might differentiate successful project and unsuccessful project based on communication in Project Management. Successful project in a company is a project that applied the concurrent engineering that is a strategy for planning and creating items, in which the distinctive stages run at the same time, instead of sequentially. It diminishes item advancement time furthermore an ideal opportunity to market, prompting to enhanced profitability and lessened expenses. In this process, engineer, supervisor, head department and quality control's person will sit together and discussed about the project. Usually, unsuccessful project is because of miscommunication among the members. Thus, by implement the experience and idea to JKR Project Management, the researcher feel that it might help to create better project in the future.

1.2 Problem Statement

Throughout 9th Malaysia Plan since year 2006 until 2010, PWD has been given with 6104 projects to develop. However, the project came out with many problems even though much solution has been implementing by them. Finding shows that the unsuccessful project influences the time taken, overall cost and quality produced by PWD.

i. Vast majority of the Construction extends the booked work program put together by the contractual worker to the customer are not efficient and are deficient. As a result, disarray and misconstruing happen. Therefore, correspondence disappointment will happen and making an undesirable venture arranging.

ii. Numerous contractual workers don't take genuine measures while displaying the work program. When the contractual worker gets the venture, he makes his

arrangement demonstrating the extend finish date and important points of reference as required by the customer. The work program does not have the vibe of the venture stream; it is basically accomplished for formal necessities and customer's fulfilment as it were.

iii. Moreover, for a customer having more than one principle contractual workers for a similar venture, the work program put together by the diverse temporary workers is not comparative in presentation. The customer discovers trouble in synchronizing work program of various temporary workers to acquire his coveted yield.

iv. There are no point by point details in the agreement reports that confine the temporary worker to take after a procedural organization while showing their calendar of works. In this circumstance the understand ability of the work program to a great extent relies on upon the customer see. Not in all cases the customer will have the capacity to comprehend what precisely the contractual worker has said in the work program of the venture and how effective is the function program, so that the program yield is in the support of the customer.

v. The insufficiency or vagueness in a Project Plan Presentation may prompt to communicational and legally binding mistakes.

Numerous legally binding issues that ascent in a development extend and additionally prompt to discretion needs to manage starting system put together by the agreement, likewise the variety in the venture cost needs to manage the concurred plan program. For instance the cost of steel and cement may differ every now and then; the agreement permits the expansion or exclusion to the agreement entirety with the variety in the cost of any materials utilized as a part of the extend. The variety figured will be accounted through work program concurred by the customer and the temporary worker.

Thus, the program of works must be done in an exceptionally exact way, with the best data installed in, likewise straightforward and clear in appearance.

The problem faced by PWD is in crucial condition because it might affect the 10th Malaysia Plan for development since year 2011. Thus, PWD should plan to ensure that time taken, cost and quality is under controlled. Completing project on time, cost and quality produced is the key for successful project. However, other problem that might happen during construction is must be predicted and prepare for worst by an organization. Debate may ascend for any foul play done, either to the contractual worker or to the customer for an insufficient arrangement presentation as the root. All in all there is a need of correspondence upgrade in the venture administration as far as venture arranging perhaps presentation.

1.2 Objectives

The objective of the research is the head of the project. Besides, it is the main idea of the plan of the project. Moreover, the objective must meet with the problem statement of the project.

i. To understand Project Planning Processes and Communication System in Project Management

   Firstly, it is critical to comprehend the significance of venture arranging in Project Management, the arrangement design and the arranging stages, how to arrange a extend and the different parts of an arrangement. Besides, the research will investigate about comprehend Planning in Construction Management. Understanding the significance of correspondence in a Project administration,

conveying arranges as work projects. Impacts of poor correspondence in extend administration.

ii. Understand Work Program, Current Plan Presentation Practices and software used for planning

Understanding the project work and presentation systems, utilities, components and, work program designs. In order to enhance the present routine of presentation, and an unmistakable comprehension, an investigation of it is required. This incorporates both venture arranging and application that happens for the duration of the life of a venture. It will be advantageous to look at the current method of plan presentation with the expected method of development venture arrange presentation took after by organizers. Numerous analysts and experts have supported that venture arranging alone does not suffice in effectively dealing with a complex development extend. Along these lines, it is critical to survey the present mode extend administration accept amid a development extend. A clearer comprehension of current practices will give a superior picture what prerequisites in the presentation will upgrade the correspondence in term of arranging between the different units of venture administration. The examination goal is additionally to concentrate the generally utilized programming as a part of Malaysia for arranging. The research will be cover on the investigation of current Project Management tool used by PWD.

iii. To analyse the best software for Project Management Software and Software to help in Mechanical Sector

The researcher will find and suggest software that suits with the current planning of JKR by considering the cost and usability of the software. Besides, the research

will investigate the software that helps the project that involve in Mechanical Sector in order to reduce failure in structure and building.

iv. To recommend the best Mechanical Software and Project Management Software

At the end of the research, a recommendation will be made to PWD in order to help them to create better quality of the project.

1.4 SCOPE OF PROJECT

This research will covers on the recommendation of modern tools suitable for construction project management PWD. Besides that, the research will cover on PWD Malacca area. Thus, other scope such as installation of suggested modern tools at PWD and recommendation at other area of PWD will not being covered in this research.

CHAPTER 2.0

LITERATURE REVIEW

2.1 Designs in Project Management

A venture to comprise of three parts: degree, spending plan and calendar (Harold Kerzner, 2000). It is critical that every one of the three of these segments to be characterized unmistakably also, connected together with one impacts the other, both separately and on the whole. Planning is essential since it unites to extend definitions, individuals, cost, asset, timing, and strategies for performing work to characterize the sensible succession of action for the venture. The calendar is the last result of degree definition, planning, furthermore, arranging and structures the base against which all movement is measured. Extend following and control can't be expert at a decent arrangement and calendar.

A venture can be thought to be any arrangement of exercises and errands that have a particular goal to achieve with in specific, characterized begins and end dates, subsidizing limits and devour asset such as cash, individuals, hardware. Project Management then again, includes extended arranging and venture checking and incorporates such things as project arranging. Project Arranging has three main components for an example knowing meaning of work necessities, value and amount to work and assets required. Besides, there is one more important thing in project work such

as project checking. The processes to check are following advancement, contrasting genuine result with anticipated result, investigating effect and making conformity.

All venture arrangements ought to indicate the key focuses the venture, deliverables at these focuses and dangers spoke to by postponement or potentially disappointment of deliverables. The extend plan ought to be a report which depicts how the venture function will be led, what is to be proficient, when particular fragments are performed, who is dependable and the amount it will cost. The arrangement ought to characterize duties and responsibility for all individuals required in the venture. Development temporary workers have the lead part in the development stage; however the customer and creator have an essential part also. A helpful domain of cooperation must be created so that all gatherings can cooperate as a unit to accomplish the venture.

2.1.1 Project Plan Architecture and Phases

Harold Kerzner (2000) recommended that the venture arrange engineering ought to constitute finish undertaking definitions, asset prerequisites definitions, real timetable points of reference, meaning of end-thing quality and dependability prerequisites and the reason for execution estimation. Furthermore, the arranging phase will involves exclusions, mistake of the work breakdown structure, confusion of data, utilization of wrong evaluating systems, inability to recognize and focus on real cost components, and inability to survey and accommodate dangers.

2.1.2 How to Plan a Project

Cohenca-Zall, D., Laufer, A., Shapira, An., and Howell, G.A. (1994) has built up the taking after to arrange a venture.

i. Decide the correct conditions for the venture to be finished or to be ended. Then, before it is totally clear what the destinations of the venture are, it looks bad to begin evaluating to what extent it will take and how much it will cost. Sadly, many venture directors neglect to take this to start with, urgent stride. Every venture ought to have a reasonable association with at least one genuine of association's business issues.

ii. Make a stock of all the work that should be finished with a gauge of the time it will take to finish by a solitary colleague. This should be possible in an arranging session with all the colleagues. Assignments that will assume control three weeks to finish should be separated further to get great granularity. To abstain from getting overwhelmed with points of interest, the errands at the most reduced level ought to take around 1 week. The outcome is a work breakdown structure. Ensure that having the venture's deliverables infused into the association or its surroundings will really bring about the normal advantages (extend goals) to appear.

iii. Recognize the assets expected to finish every terminal component of the WBS. Now you can more often than not gauge the cost to convey every terminal component and, thusly, the venture (base up approach). Once in a while a best down way to deal with evaluating expenses is additionally conceivable by method of utilizing coefficients.

iv. Settle on a choice whether this underlying arrangement bodes well whether the costs legitimize the advantages. Adjust the goals and the supporting work as important.

v. Characterize conditions among undertakings. A few assignments should be finished before different undertakings can start. By placing assignments into their relative fruition arrange, a venture chief builds a venture organize.

vi. Figure the base time the venture will take: it is the longest way through the venture arrange from the beginning of the venture until its end. This way is known as the basic way or basic chain, if asset conditions are considered. Different assignments should be possible in parallel to the basic way be that as it may, any deferral in the errands on the basic way will consequently bring about a delay in the general due date of the venture.

vii. Make a venture plan such as a Gantt graph.

viii. Get ready for hazard administration and change the venture arrange as needs be.

ix. Confer the association to beginning the venture usage.

x. Extend arranging is not something that is done just once toward the start of the venture. It ought to be a progressing errand of the venture administrator to keep an eye on the advance of his group and upgrade the venture arrange in like manner. Extend administration programming can be useful if utilized appropriately. There are a few venture administration principles that portray in detail how to arrange also, deal with a venture.

xi. Arranging how chance administration will be held in the specific venture. Arrange ought to incorporate hazard administration undertakings, obligations, exercises and financial plan.

xii. Compressing arranged and confronted dangers, adequacy of relief exercises what's more, exertion spends for the hazard administration.

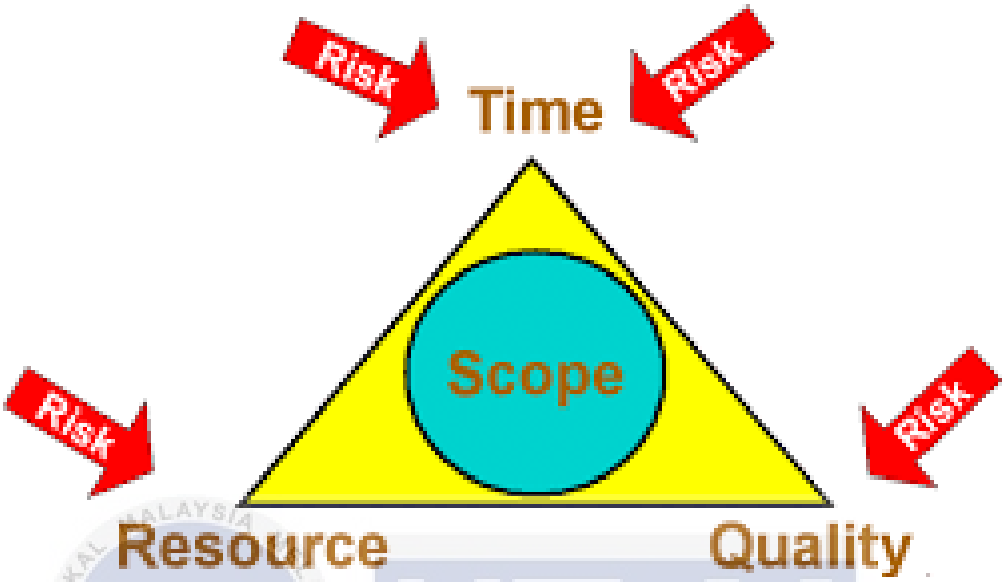

Figure 2.1: Consideration in a Project

(Source: BlueFletch, 2017)

2.1.3 Components of Project Planning

Parts of venture arranging and planning as specified in the report. Besides, the important word is described in the report. (Chaos, 1994)

i. Breakthroughs: significant checkpoints for advance audit on a characterized course of events

ii. Baseline: beginning stage at starting, finishing point for future changes

iii. Assumptions: Gives vision/comprehension of the tasks objectives and course

iv. Dangers, dependencies: Characterizes vulnerability

v. Contingencies: for known, high likelihood hazard

vi. Charts, graphics: Demonstrating errands and their arrangement

2.1.4 Principles of Planning and Scheduling

There must be an express operational arrangement to manage the whole venture. The arrangement must incorporate and the three parts of the venture: scope spending plan and calendar. As well frequently, arranging is centred on timetable without respect to the critical parts of extension and spending plan. Leicht, Michael (1999), to build up a coordinated aggregate arrangement, the venture must be separated into very much characterized units of work that can be measured and oversaw. This prepare begins with the work separate structure. When this is finished the venture colleagues who have the mastery to play out the work can be chosen. The group individuals can characterize the time and cost that will be required to create the work. With this data the total venture plan can be produced. The venture plan and timetable should obviously characterize singular obligations, plans, spending plans, also, expected issues.

The venture director ought to get ready formal concurrences with proper gatherings at whatever point there is an adjustment in the venture. There ought to be similarly concern given to calendar and spending plan, and the two must be connected. Arranging, planning and controlling start at initiation of the venture and are proceeds for the duration of the life of the venture until culmination. The accompanying are the key standards for arranging and planning.

i. Start arranging before the work, fairly then in the wake of beginning the work.
ii. Include individuals who really take every necessary step in arranging and booking process.
iii. Incorporate every one of the parts of the venture: scope, cost, timetable, and quality.

iv. Incorporated adaptability with the arrangement, incorporate stipend for changes and time for audits also, endorsements.

v. Keep in mind that timetable is the arrangement for taking every necessary step, and it will never be exactly right.

vi. Keep the arrangement straightforward, kill immaterial subtle elements that keep the arrangement from being discernible.

vii. Convey the arrangement to every one of the gatherings; any arrangement is useless unless it is known.

2.2 Construction Planning

Construction arranging as an essential what's more, testing movement in the administration and execution of development ventures. It includes the decision of innovation, the meaning of work errands, the estimation of the required assets and spans for individual undertakings, and the recognizable proof of any collaborations among the distinctive work assignments. A decent development plan is the reason for building up the financial plan and the calendar for work. Building up the development plan is a basic assignment in the administration of development, regardless of the possibility that the arrangement is not composed or generally formally recorded (Chris Hendrickson, 2001)

Figure 2.2: Mind map of construction planning

(Source: Conjecture Corporation, 2003-2017)

However, these specialized parts of development arranging, it might likewise be important to settle on authoritative choices about the connections between venture members and even which associations to incorporate into a project. For instance, the degree to which sub-temporary workers will be utilized on a venture is regularly decided amid development arranging. Like an investigator, an organizer starts with a result and should combine the means required to yield this outcome. Basic parts of development arranging incorporate the era of required exercises, investigations of the ramifications of these exercises, and decision among the different option method for performing exercises.

Rather than an investigator finding a solitary prepare of occasions, in any case, development organizers additionally confront the standardizing issue of picking the best among various option arranges. Additionally, a criminologist is confronted with a noticeable outcome, while an organizer must envision the last office as depicted in the arrangements and details. In building up a development arrange, it is normal to receive an

essential accentuation on either cost control or on timetable control. A few tasks are principally partitioned into cost classifications with related expenses. In these cases, development arranging is cost or cost situated.

Inside the classes of use, a qualification is made between expenses brought about straightforwardly in the execution of a movement furthermore, by implication for the achievement of the venture. For instance, acquiring costs for venture financing and overhead things are ordinarily regarded as backhanded expenses. For different tasks, planning of work exercises after some time is basic and is underlined in the arranging procedure. For this situation, the organizer safeguards that the best possible priorities among exercises are kept up and that productive planning of the accessible assets wins.

Conventional planning techniques underline the support of assignment priorities bringing about basic way planning techniques or effective utilization of assets after some time bringing about employment shop planning strategies. At last, most complex undertakings require thought of cost and planning after some time, so that arranging, observing and record keeping must consider both measurements. In these cases, the reconciliation of timetable and spending data is a noteworthy concern. Alternative Emphasis in Construction Planning Development arranging is not a movement which is limited to the period after the honour of an agreement for development. It ought to be a basic action amid the office outline. Additionally, if issues emerge amid development, re-arranging is required. As in the improvement of proper options for office outline, decisions of suitable innovation and strategies for development are regularly not well organized yet basic fixings in the accomplishment of the venture. For instance, a choice whether to pump or to transport concrete in basins will specifically influence the cost and span of undertakings included in building development.

A choice between these two choices ought to consider the relative costs, reliabilities, and accessibility of gear for the two transport techniques. Sadly, the correct ramifications of various strategies depend upon various contemplations for which data might be scrappy amid the arranging stage, for example, the experience and ability of specialists or the specific underground condition at a site. In selecting among option strategies and advancements, it might be vital to figure various developments arranges in view of option techniques or suspicions. Once the full arrangement is accessible, then the cost, time and dependability impacts of the option methodologies can be evaluated. This examination of a few choices is regularly made express in offering rivalries in which a few option plans may be proposed or esteem building for option development strategies might be allowed.

For this situation, potential constructors may wish to get ready arrangements for each elective outline utilizing the proposed development technique and also to get ready arrangements for option development techniques which would be proposed as a component of the esteem building process. In shaping a development plan, a helpful approach is to re-enact the development handle either in the creative ability of the organizer or with a formal PC based recreation system. By watching the outcome, examinations among various arrangements or issues with the current arrangement can be recognized. For instance, a choice to utilize a specific bit of hardware for an operation promptly prompts to the subject of regardless of whether there is adequate get to space for the hardware.

Also, issues in asset accessibility distinguished amid the re-enactment of the development procedure may be viably hindered by giving extra assets as a major aspect of the development arrange. There are a few elements that are critical with a specific end goal to accomplish an effective venture amid development. A natty gritty development plan that is created and utilized by the temporary worker who is performing the work, not the

proprietor or creator, the proprietor ought to just characterize the begin and end dates of the venture. Contractual workers know their capacities, assets, and how they arrange to facilitate the numerous exercises required to construct the venture in field. In this manner they are ideal met all requirements to build up a timetable to direct the various development ventures (Wixom et. al, 2001).

Planning abilities are useful for any undertaking; they are significant, be that as it may, for the effective administration of huge complex undertakings. The venture plan is the guide that characterizes how to get from the beginning to the last outcomes (Macomber et. al, 2003).

Program arranging is a progressing action at all the hierarchical levels. Be that as it may, the readiness of a venture outline arrange, preceding timetable begin, is the principle obligation. Successful venture arranging requires specific aptitudes a long ways past composing a record with timetables and spending plans. It requires correspondence and data preparing abilities to characterize the real asset prerequisites and managerial bolster essential. It requires the capacity to arrange the fundamental assets and duties from key work force in different support associations with almost no formal power, including the meaning of quantifiable points of reference. Viable arranging abilities required in the ranges of below.

i. Data handling
ii. Correspondence
iii. Asset arrangements
iv. Securing duties
v. Incremental and particular arranging
vi. Guaranteeing quantifiable points of reference

vii. Encouraging top administration contribution

Likewise the arrangement ought to remain a feasible record, changes in venture scope furthermore, profundity are inescapable. The arrangement ought to reflect essential changes through formal updates and ought to be the managing record for the duration of the life cycle of the venture. At long last the likelihood that the arranging can be overcompensated, if not controlled, arranging can turn into a conclusion to itself and a poor substitute for imaginative work. Subsequently the program ought to be adaptable (Hendrickson et. al,1984).

2.3 Project interchanges

As far as venture correspondences, the venture arrange itself is presumably the most important correspondence vehicle in the whole stockpile. By resolving to paper the deliverables, the capable gatherings, the booked conveyance dates, and the conditions, we take the general engagement which might be extensive and hard to picture and separate it into its segment parts, in this way making it much less demanding to grasp and examine at the level of detail vital. Individuals impart from various perspectives, frequently interchanges get sifted and fairly contorted. For some reasons, understandings in the venture environment must be composed. Extend administration puts stock in the reasoning that exclusive what is on paper is truly critical. Another essential feature of any extend administration framework is to give the general population in the association with procedural rules for how to lead extend arranged exercises and how to convey in such a multidimensional situation (Paulson, 1999).

2.4 Previous Research

There are several researches that have been made in order to identify the best project management tools. The research has done for many locations for many companies around the world including Malaysia. However, some of the research is abandoned and some already achieve their results.

2.4.1 The use of Project Management Software in Construction Industries

The journal is written by Mladen Vukomanović et. al in Journal of Technical 19, 2 (2012). The research is made for Construction Industries at Southern Europe. The researcher found that the most as often as possible utilized PMS (Project Management Software) as a part of the SEE (Southeast Europe) contrast from those in the US (United States). Besides, organizations in SEE had little involvement with PM forms other than looking after operations. This was because of over 50 years of focal arranging in vast State-possessed endeavours the previous Yugoslav development industry where the three nations of this review began from - was set apart by organizations with more than 15 000 workers that were accused of endorsed generation targets. This is the reason the PMS from created nations, for example, Primavera, which join present day PM procedures, are still not appropriate in transitional economies. Despite the fact that Primavera has gotten an abnormal state of fulfilment, its poor picture in SEE might be clarified by its high multifaceted nature, extend introduction and its nonconformist with the SEE business culture.

Since the SEE development area is still capacity situated where the contractual worker and supervision are the ones who are truly overseeing ventures, the venture introduction is Primavera biggest reception issue at the point when executed on transitional

economies. In this way, while Primavera gives extend administration reports, terms, procedures and venture association structure; the SEE development industry oversees extends under entirely lawfully controlled limits formats, reporting, partners, chain of command. Besides, since Primavera covers an extensive traverse of ventures, the device is not particular for the development forms alone, nor is it adjusted to the business culture of the SEE development industry. Along these lines, from the SEE perspective, Primavera is a mind boggling framework that can't effectively work without outside specialists.

On the off chance that Primavera needs to exceed expectations on the SEE showcase, it should adjust its components to the normal business direct in SEE, by joining the layouts, reporting and conforming to the pecking orders of the venture partners. Nonetheless, despite the fact that it begins from the US, the MS (Microsoft) Project's outcomes in SEE relate with the world discoveries. This is presumably because of its straightforwardness and the way that it for all intents and purposes comes as a major aspect of the MS Office. In spite of the fact that the device is exceptionally versatile, after a specific level of venture unpredictability, the MS Project gets to be distinctly deficient PMS for the development.

The apparatus is a basic PMS, however in the event that it needs to exceed expectations in SEE, a portfolio and an on location administration highlight ought to be included. It was extremely intriguing to locate a residential PMS such as occasion, surpassing Primavera in SEE. This is the situation since GALA is the main PMS that has coordinated Project Management rationality with an on location administration and the SEE controls, bringing about its abnormal state of ubiquity in SEE 7% of piece of the overall industry in five years, particularly among temporary workers. Occasion is additionally the main PMS those backings quality affirmation frameworks such as ISO 9001 in venture administration. Be that as it may, it needs assist change, particularly with

respect to portfolio administration. It was additionally intriguing to perceive how tantamount the outcomes are from the ME and the US. This is the situation in view of the expansive nearness of development firms from the US and the UK (United Kingdom) in the ME, which compares with past investigations of the substantial impact of the Western method for overseeing ventures on ME (Middle East).

At long last, Primavera got the most minimal rating, which underpins Roztocki and Weistroffer's thought of the low pertinence of the IT (Information Technology) instruments beginning in the created nations for the transitional economies. Just completely project oriented and develop organizations ought to consider executing Primavera, yet with a stipulation in regards to its multifaceted nature and the extra cost for the support. This is clearly not the situation in SEE. In any case, organizations that still attempt to execute Primavera in SEE will likewise require a PMS customized for transitional economies, such as occasion. In this way, these outcomes demonstrated the inapplicability of the IT arrangements beginning in created economies to transitional economies, which bolster the speculation.

2.4.2 An assessment of finite element software for application to the roll-forming process

Finite element analysis (FEA) is a modernized technique for anticipating how an item responds to true strengths, vibration, warm, liquid stream, and other physical impacts. Limited component examination demonstrates whether an item will break, destroy, or work the way it was planned. It is called investigation, however in the item improvement prepare, it is utilized to foresee what will happen when the item is utilized. EA (Element Analysis) works by separating a genuine question into an extensive number thousands to several thousands of limited components, for example, little 3D (Three Dimensional)

shapes. Scientific conditions anticipate the conduct of every component. A PC then includes all the individual practices to foresee the conduct of the genuine question.

The journal is written by M.A. Sheikh et. al in Journal of Materials Processing Technology 180 (2006) 221–232. The article explain on the roll shaping industry has numerous challenges in item advancement and process set-up. The outline and advancement of rolls and procedures are for the most part in light of experimentation and past encounters. Late modern patterns request items having high calibre and tight resistances. This requires more exact and savvy roll-shaping procedures than the ones utilized in the conventional item improvement techniques.

SHAPE is a dependable FE (Finite Element) based arrangement supplier, which covers an extensive variety of move framing and turning shaping re-enactments including ring rolling, tube turning, stream shaping, and string rolling. It additionally gives intense examination instruments to warmth exchange, move push and microstructure investigations. In this section the specialized ability of SHAPE for move framing is evaluated by concentrate a modern issue. The exactness and heartiness of the product is assessed utilizing machine shop comes about.

2.5 Software Requirement Specification (SRS)

A product prerequisites detail (SRS) is a portrayal of a product framework to be created. It lays out utilitarian and non-practical prerequisites, and may incorporate an arrangement of utilization cases that portray client associations that the product must give. Programming necessities detail builds up the reason for an understanding amongst clients and temporary workers or providers (in market-driven tasks, these parts might be played by the promoting and improvement divisions) on what the product item is to do and also what it is not anticipated that would do (Chambers, 2016).

Programming necessities determination allows a thorough evaluation of prerequisites before configuration can start and lessens later upgrade. It ought to likewise give a reasonable premise to assessing item costs, dangers, and schedules. Software prerequisites detail keeps programming ventures from failure. The product prerequisites detail archive enrols enough and vital necessities that are required for the venture development. To determine the necessities we need clear and intensive comprehension of the items to be created or being produced. This is accomplished and refined with Nitti gritty and persistent interchanges with the venture group and client till the fulfilment of the product. However, SRS is not chosen for the researcher to build software, but as a guide to choose the best software for PWD. There are several factors that should be considered in choosing software (TechTarget, 2006-2016).

2.5.1 Software Requirement Specification (SRS) for Project Management Software

Firstly, the software chosen must be friendly used. However a few devices are extremely convoluted and clients require a few days of preparing. The best item for user will be something that is discover by user clear to utilize and that will suit user group. Many instruments offer free trials so the user get the chance to see what it resembles working in the product before making the dedication to get it (Project Management Books,2016).

Furthermore, features of software are the most important consideration that should be made in detail because it controls most of the impression to the system. The features must have four vital things such as booking tools, undertaking management, capacity to share and constant reporting.

i. Booking Tools

On the off chance that user need to have the capacity to deal with their tasks viably, the user require proficient review booking apparatuses like Gantt graph programming. Numerous fundamental items won't show their venture arranges in a Gantt outline organize and will essentially demonstrate to user a rundown of errands while that may be alright for little activities with a modest group.

ii. Undertaking Management

An undertaking rundown is the beginning of all Gantt diagrams, so user require errand administration includes as well. This ought to likewise incorporate the capacity to allocate assignments to others in the group with the goal that they realize what work they ought to concentrate on. The user ought to have the capacity to request undertakings in ways that sound good to them. That implies gathering them together and including target finishing dates. The capacity to convey email cautions to the individual in charge of finishing the work is another benefit.

iii. Capacity to Share Externally and Constant Reporting

Imparting user's arrangements and errands to colleagues in their organization is certain something. However, likewise search for the usefulness which makes extend information accessible to individuals outside users business. This is particularly valuable with regards to working with temporary workers and outsiders. It's likewise another motivation behind why cloud-based online programming is so famous and compelling. This will pull information from different diverse regions of the venture administration programming and utilize it to create reports that mirror the present status of the venture.

2.5.2 Software Requirement Specification (SRS) for Finite Element Analysis Software

Firstly, same with the Project Management software requirement, the software must be friendly used. Besides, the software must be applied to AutoCAD since PWD used it as drawing tools. Moreover, it must have features such as static analysis, can calculate natural frequency and thermal calculation. This is because the features will be used for every project in PWD. For instance, thermal calculation is to calculate ventilation and air-condition around building which is one of mechanical project in PWD. Besides, it also should have special characteristic such as security of the software, proficient and adaptable since people consider this while choosing a system (MCB UP, 1984).

i. Security

Usefulness is fine and dandy, yet in the event that user information isn't protected then the respectability of their venture isn't either. Thus, look at the security choices offered by user favoured programming supplier. In the event that they are facilitating user product on the web, ensure they have 128-piece encryption. Utilize a different committed facilitating stage to keep user client information sheltered and secure from everybody else's.

ii. Proficient Interface and Adaptable

There are such a large number of apparatuses out there. However, some look very out-dated. User essential criteria for picking a product item should be usefulness. Heaps of reports out of the crate highlight is incredible, however it's far superior to be able to alter user involvement with custom fares and fields. User ought to have the capacity to roll out little improvements to the look of the apparatus to give it a chance to mirror their own particular working inclinations. Besides, some will give

user a chance to transfer logos. The most critical regions for customization are reports and information sections. These give user adaptability by the way user need to show data to their partners. Thus, giving user learning about what should be overseen on the venture.

2.6 Project Management Software Concept

Project Management Software concept is the concept for software selected which has description, benefits, feature, cost, appliance and protection of the software. The project management software concept has different software with different features to compare.

2.6.1 Software 1 (RedMine)

Redmine.org is a free and open source extends composed utilizing the Ruby on Rails structure. Redmine is an electronic venture administration instrument that additionally tracks bugs and framework issues. Utilizing distinctive timetables and Gantt diagrams, it shows extend data, due dates, and errand assignments. It is a piece of the Bitnami application library and elements far reaching control and checking choices (Redmine, 2006-2014).

Besides, there are some benefits that is special features of this software. The Redmine software has five benefits that are, numerous project support, adaptable access controls, issue tracking and presentation, time tracking, better formatting, and vault browser and diff viewer.

i. Numerous Project Support and Adaptable Access Controls

All venture workload is introduced in one place to encourage examination and checking. All labourers can have distinctive parts out in the open and private ventures, both of which can be introduced in a redo way. Subprojects can likewise be included. Besides, Redmine gives chairmen a chance to characterize parts and restrain access to clients contingent upon their position in the chain of importance.

ii. Issue Tracking and Vault Browser

Managers can make custom statuses and characterize sorts of issues, composing conventions for every sort. Through realistic presentation representatives can better imagine their work process and have a precise perspective of the 10,000 foot view. Besides, Redmine can peruse through storehouse substance and hunt change sets. It bolsters SCM (Subversion, CVS, Mercurial, Darcs, Bazaars, and Git) and can see Diff and comment on.

iii. Time Tracking and Better Formatting

Managers can track how much time a worker or a group grasps to handle a ticket or finish a whole venture. Redmine presents the data in brief yet compact reports. Moreover, moderators can submit distinctive issue data date, related segment, content, Boolean, and so forth, with other custom fields accessible. They can additionally post messages, share documents or even make wikis for the venture to additionally illuminate things.

Furthermore, the software has their own page records the security vulnerabilities that were settled in Redmine discharges, beginning from 1.3.0. Besides, if the user has any complaint on the security, a report can be made through Redmine Security email. Moreover, Redmine is open source and free, it has no use arrangements or confinements on utilization. It can be downloaded from the site. The software is portable since it can support to mobile devices includes iPhone and android users. A part from that, Redmine also has many features that help users to do their task (Zapier, 2016).

a) Numerous undertakings bolster
b) Adaptable part based get to control
c) Adaptable issue following framework
d) Gantt diagram and date-book
e) News, reports and records administration
f) Sustains and email warnings
g) Task discussions
h) Time following
i) Custom fields for issues, time-passages, tasks and clients
j) Issue creation by means of email
k) Multilanguage bolster
l) Different databases bolster

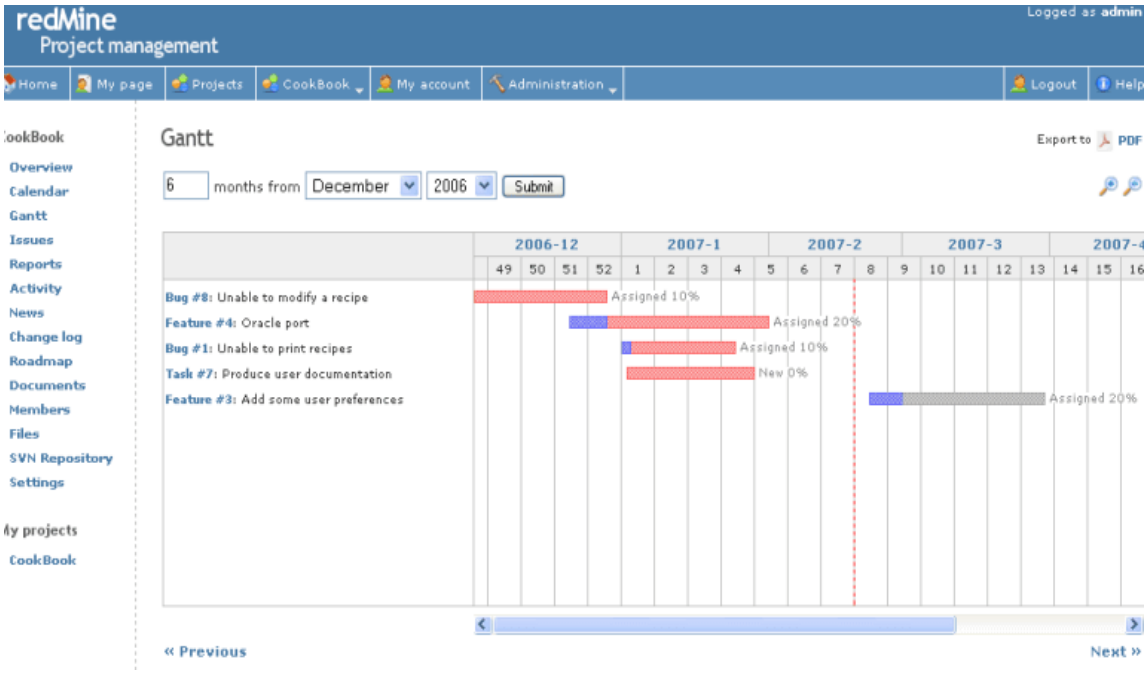

Figure 2.3: Project Management Operation of Software 1

(Source: Windowsshareware.com, 2009-2017)

2.6.2 Software 2 (Microsoft Office Project)

Microsoft Project empowers organizations to begin, oversee extend portfolio speculations, and convey effectively with the proposed business esteem. Microsoft Project Professional gives organizations a capable, outwardly upgraded approach to proficiently deal with an extensive variety of their undertakings and projects. From meeting imperative due dates, to picking the correct assets and engaging your office groups, Project Professional conveys new and additionally instinctive encounters to arrange, oversee, and work together with different people, groups, and the undertaking (G2 Crowd, 2016).

Microsoft Project also has many benefits such as it is an adaptable device for venture portfolio administration (PPM) and every day work, conveyed through Office 365. The primary spot in this classification of items is held by Wrike which has an aggregate

score of 9.8/10 and is the champ of Best Project Management Software Award for 2015. Apparently one of the best among the as of now accessible venture administration devices, Microsoft Project is the instrument for any organization that is sick of attempting to support efficiency with whiteboard scribbling, post-it notes, and in addition pieces of paper. The device manages many-sided quality in an exceptionally straightforward way. While the device has an amazingly colossal scope of abilities, it is generally simple for any client to motivate it to do precisely what he or she needs. Microsoft Project is planned by individuals who have overseen genuine activities and realize that a few things and procedures are continually evolving. Consequently with this instrument, including new undertakings or modifying the association of a venture halfway through will be a simple thing to do. It is to a great degree natural and offers extraordinary adjust of convenience and unpredictability. Venture is utilized as a part of different businesses including fabricating, pharmaceuticals, development, retail, budgetary administrations, government, and medicinal services (IDG UK, 2016).

Moreover, access to Microsoft Project Central data requires a client account. Microsoft Project Central incorporates both confirmation and part based security to guarantee that lone approved clients are permitted get to and that once they are signed in, clients can just observe the data and play out the activities for which they have consents. The accompanying segments talk about the formation of client records, validation techniques, and task of parts to particular clients. Thus, the software is very secure. Besides, the software is portable since it can support to mobile devices includes iPhone and android users. However, Microsoft Project has the Pricing Plans those categories in two that are supervisor plan, colleagues plan and PMO Executive. The customer can choose their package based on their needs. Although the software is closed source, it has many

features that suits with the pricing. Therefore, the pricing plan is acceptable. The features is listed below.

i. Extend Portfolio Management
ii. Improve IT administration
iii. Give powerful presentations
iv. Envision change
v. Work consistently crosswise over devices
vi. Impart progressively
vii. Remain composed
viii. Convey extends effectively
ix. Enhance ordinary coordinated effort
x. Access from basically anyplace
xi. Select ideal portfolios
xii. Convey extends effectively
xiii. Find and share data

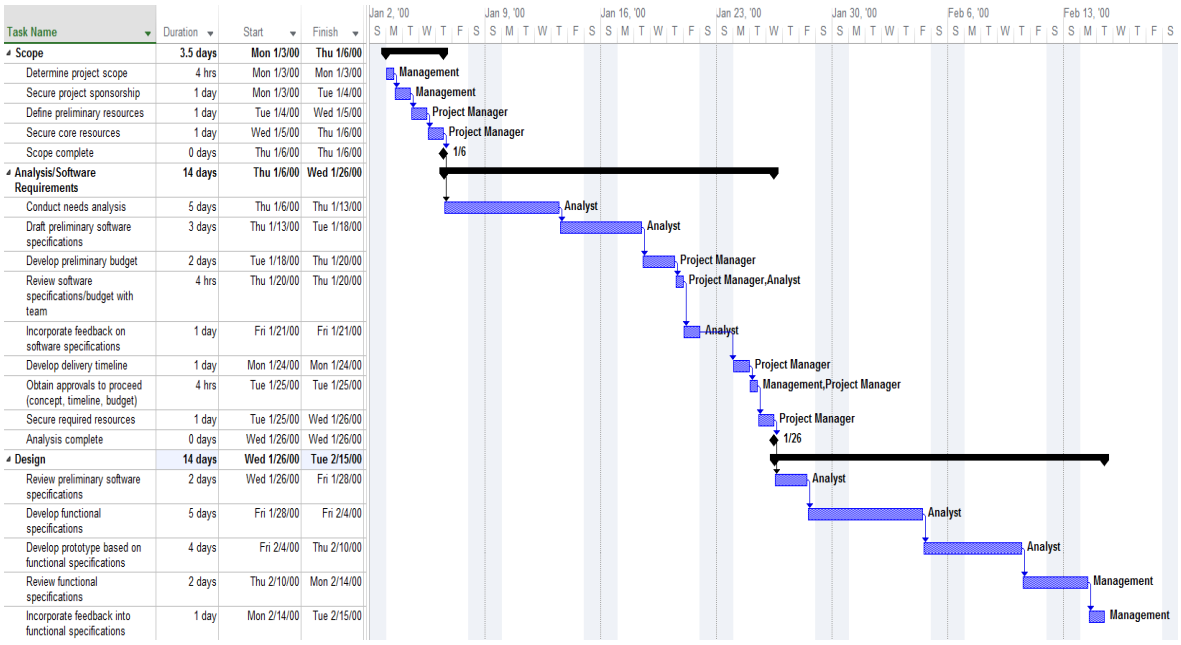

Figure 2.4: Project Management Operation of Software 2

(Source: AddictiveTips, 2017)

2.6.3 Software 3 (MyCollab)

MyCollab is a free, open source cooperation stage administration. It gives the complete set components of Project Management, CRM, and Document Management. MyCollab is utilized extremely well as a part of both customary venture administration and agile strategies. It is the online application keeps running on Java stage and MySQL database. Its establishment procedure is basic, and you don't have to alter arrangement records physically the same number of other Java programs. MyCollab is the last decision of numerous associations to locate the best programming for their utilizations. It covers all territories of venture administration; it's worth to attempt (Slashdot,2016).

MyCollab people group is authorized with Affero GPL v3. Besides, if there is something problem regarding the software, user also may contact their authorized person since have their own community support. Besides, the software is portable since it can

support to mobile devices includes iPhone and android users. Moreover, the software has excellent features. The features of MyCollab are listed below.

i. Client Management
ii. Extend Management
iii. Record Management
iv. Issue Tracking
v. Undertaking Management
vi. Client Management
vii. Reporting
viii. Online Editor
ix. Coordinated Project Management
x. Gantt diagram
xi. Date-book
xii. Versatile web application

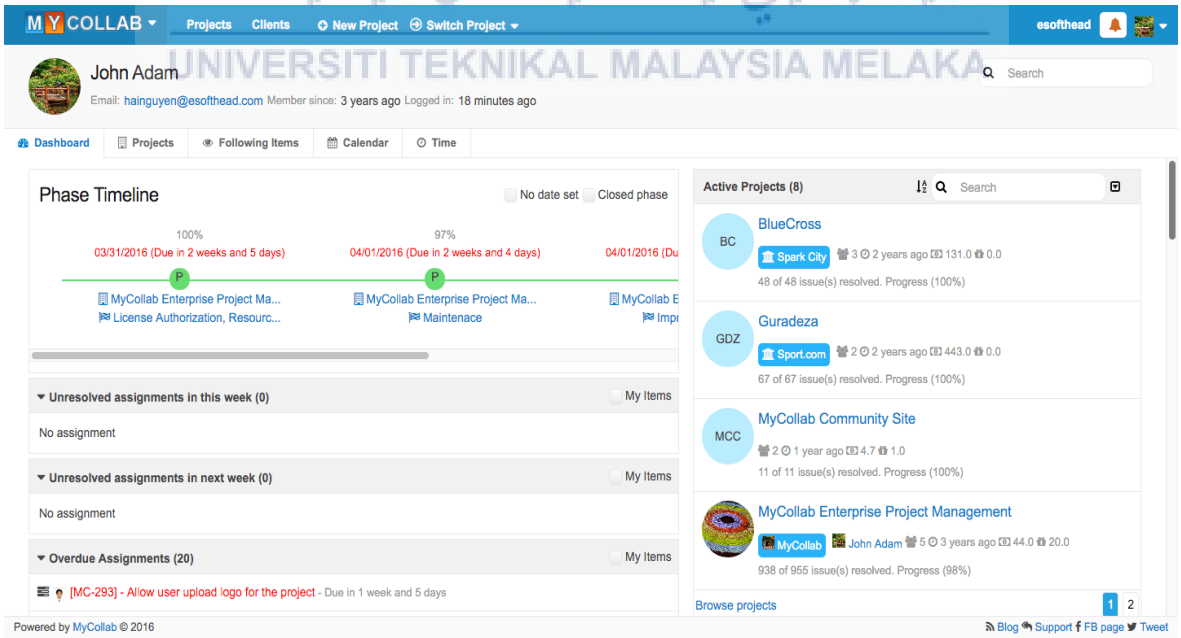

Figure 2.5: Project Management Operation of Software 3

(Source: Free and open source project management software, 2017)

2.7 Finite Element Analysis Software Concept

Finite Element Analysis Software Concept is the concept for software selected which has description, benefits, feature, cost, appliance and protection of the software. Moreover, every concept has three main functions that are thermal calculation, natural frequencies calculation and static analysis. The Finite Element Analysis Software concept has different software with different features to compare.

2.7.1 Software 1 (ANSYS)

The ANSYS basic investigation programming suite empowers you to take care of complex basic building issues and improve, speedier outline choices. With limited component examination (FEA) devices, you can alter and computerize your recreations, and parameterize them to break down numerous outline situations. ANSYS Structural Mechanics programming effortlessly associates with different material science investigation instruments, giving much more prominent authenticity in foreseeing the conduct and execution of complex items. ANSYS FEA programming is utilized all through industry to empower specialists to upgrade their item plans (Glassdoor, 2008-2016).

Moreover, the software has their own protection to protect user data. Distributed computing arrangements give esteem through business dexterity, capacity to concentrate on centre ability and improved joint effort. Be that as it may, associations might be worried about information stockpiling in an open cloud framework outside of an organization's system. At the point when outlined effectively cloud innovations can possibly be more secure than the on-premises foundation of generally organizations. This application brief portrays the security design in ANSYS Enterprise Cloud and the Amazon Web Services-construct foundation with respect to which it works (Indeed,2016).

The notable CIA group of three of secrecy, honesty and accessibility is the system used to give a comprehensive perspective of security. Furthermore, ANSYS Software is acceptable for computer and laptop since it can support the software. However, the software cannot be downloading to mobile device due to great space memory needed to support them and ANSYS is closed source and payable, it has use arrangements or confinements on utilization. Although it is closed source but the features is very satisfying and recommended by user since it is established more than 10 years. The features of ANSYS FEA are listed below.

i. Progressed Numerical Methods for Nonlinear Problems
ii. Advanced Numerical Methods for Nonlinear Problems
iii. Propelled Post-Processing Advanced Post-Processing
iv. Auto Contact Detection for Assemblies Auto Contact Detection for Assemblies
v. Coupling Physics Coupling Physics
vi. Exhaustive Element Technology Comprehensive Element Technology
vii. Broad Library of Material Models Extensive Library of Material Models
viii. Capable Solver Capabilities Powerful Solver Capabilities
ix. Reporting
x. Prevalent CAD Interface and Robust Meshing

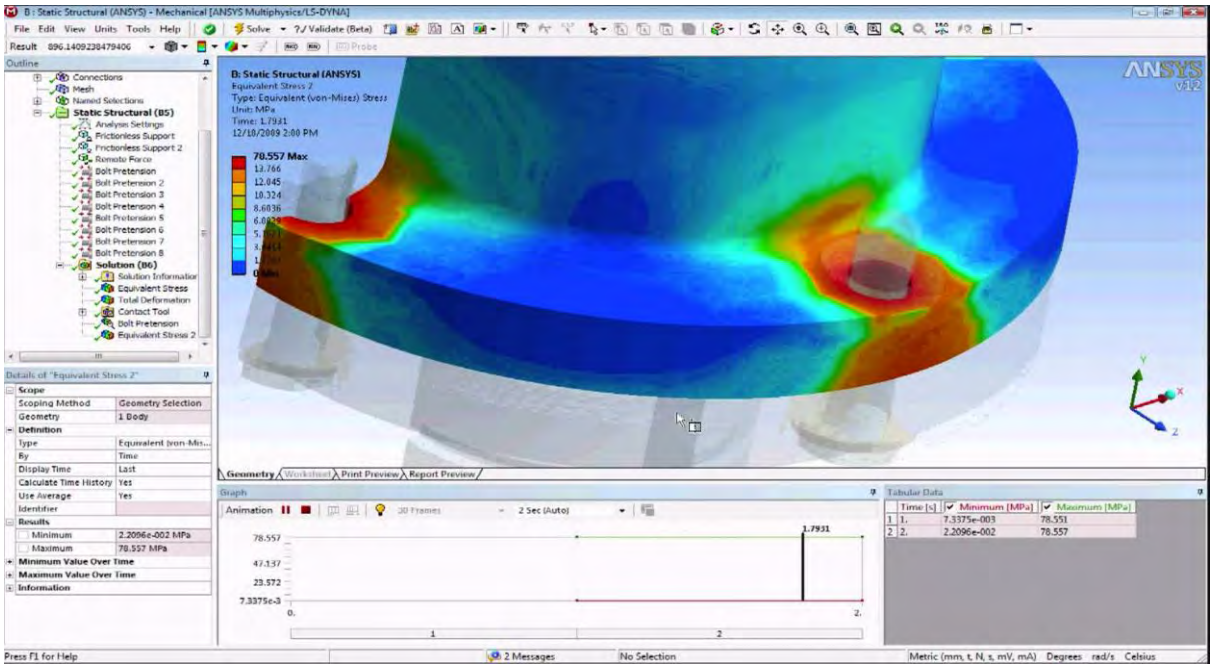

Figure 2.6: Finite Element Analysis Operation of Software 1

(Source: Linkedin,2017)

2.7.2 Software 2 (AutoFEM Analysis Lite)

AutoFEM Analysis Lite is from AutoFEM Software is a system of finite-element analysis. The main feature of the system is its deep integration with AutoCAD 2007-2010. AutoFEM Analysis Lite offers an easy-to-use first step analysis tool for every AutoCAD user. It is available for every user of AutoCAD at no cost. AutoFEM Analysis Lite uses the same finite element technology that a commercial version of AutoFEM Analysis. AutoFEM Lite Software is acceptable for computer and laptop since it can support the software. However, the software cannot be downloading to mobile device due to great space memory needed to support them. Besides, it combines with AutoCAD to operate (Autodesk, 2011-2016).

AutoFEM Lite is open source and free, it has no use arrangements or confinements on utilization. It can be downloaded from the site. The software doesn't have any protection since it is free to download. The security license is only for the purchased product. However, the software is secure to download and recommended from other users. AutoFEM Analysis Lite is used to perform all kind of finite element analysis. The features are listed below.

i. Static analysis

ii. Frequency analysis

iii. Buckling analysis

iv. Thermal analysis

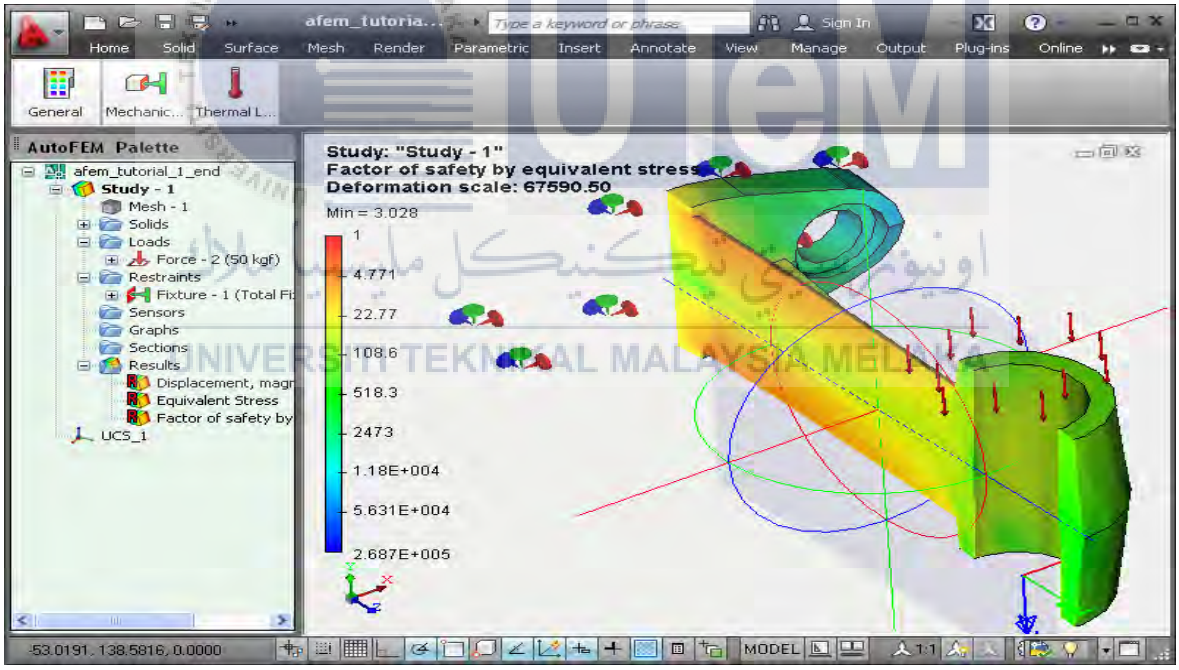

Figure 2.7: Finite Element Analysis Operation of Software 2

(Source: Autodesk, 2011-2016)

2.7.3 Software 3 (Elmer)

Elmer is an open source metaphysical re-enactment programming for the most part created by CSC IT Centre for Science (CSC). Elmer advancement was begun 1995 in a joint effort with Finnish Universities, look into foundations and industry. After it's open source distribution in 2005, the utilization and advancement of Elmer has turned out to be global. Elmer incorporates physical models of liquid flow, basic mechanics, electromagnetics, warm exchange and acoustics, for instance. These are depicted by halfway differential conditions which Elmer understands by the Finite Element Method (Slashdot, 2016).

Furthermore, Elmer is open source and free, it has no use arrangements or confinements on utilization. It can be downloaded from the site. The software doesn't have any protection since it is open source software. However, the software is secure to download and recommended from other users. Moreover, Elmer Software is acceptable for computer and laptop since it can support the software. Besides, it has many different FEA features that are very usable. The features of ANSYS FEA are listed below.

i. Metaphysical limited component programming
ii. Advanced UI in light of Qt
iii. Parallelization with MPI
iv. Dynamic client group
v. Broad support of various component sorts

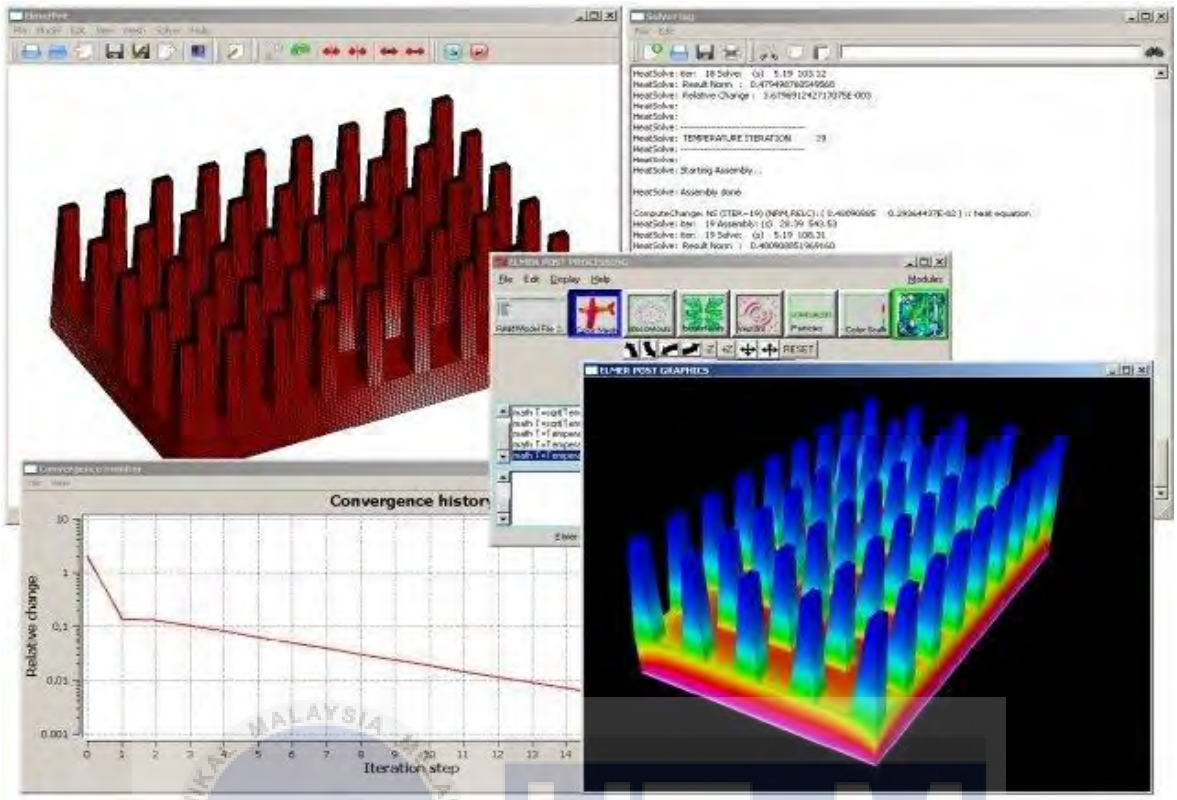

Figure 2.8: Finite Element Analysis Operation of Software 3

(Source: Slashdot Media, 2017)

CHAPTER 3

METHODOLOGY

This chapter will cover on the methodology of this project. Methodology is an action that needs to be taken in order to achieve the objective of the project. A process planning is most important and had to be charted out. This would determine the efficiency of the project to be done. The project management software is the task of the research while finite element analysis software is chosen to improve mechanical sector in PWD. The actions that need to be carried out to achieve the objectives in this research are listed below.

i. Identification need and define the problem

   Firstly, the research is made by identify the problem faced by PWD and understand the need and produce idea that might relate to the problem.

ii. Gather Information

   The literature review will be taken from journals, articles, or any materials regarding the previous studies and researches that related to the factor contributed the project failure, project management control, strategies to achieve successful project will be reviewed. Besides, the information must relate to how to implement successful project management, PMS (Project Management Software and Mechanical Software.

iii. Collecting data

   The information of project management at PWD (Public Works Department) will be taken from PWD staff, trainee and worker from construction site. Information

from website and newspaper also will be carried out to take information and comment of Ministry and client about project effectiveness conduct by PWD. Moreover, the data collection involves in two that are primary data and secondary data. Primary Data example is questionnaire for current Project Management at PWD and Mechanical Project Problem. From literature review and data collected, the information will be transform into survey questionnaire. The questionnaire will be distributed at PWD Malacca for staff and worker while some of them to the client. Moreover, others company also will be distributed questionnaire to get their opinion and observation about their company's project management that can be applied to PWD. Then, the secondary data was taken from website such as recommendation and software rating by user around the world.

iv. Analysis and Interpreting Data

The data collected will be analysed while score of each question will be calculate to get the highest and lowest ranked by respondent. After that, simple data analysis will be interpreted using statistic method. The simplest method will be chosen such as pie chart and bar graph to indicate the rank given by respondent. The methods to analysis are house of quality and weighted ranking method. This method is using to choose best software for project management and finite element analysis.

v. Interview

The interview will involve the PWD Management to obtain their opinion on the selected project management software and finite element analysis software. If the opinion is positive then the process will go further while the response is negative, the process will reverse to data collection.

vi. Recommendation

After interview, the suitable modern tools will be implement using data taken from every source. The recommendation will be proposed to PWD Malacca while final report writing will be elaborate details on the research.

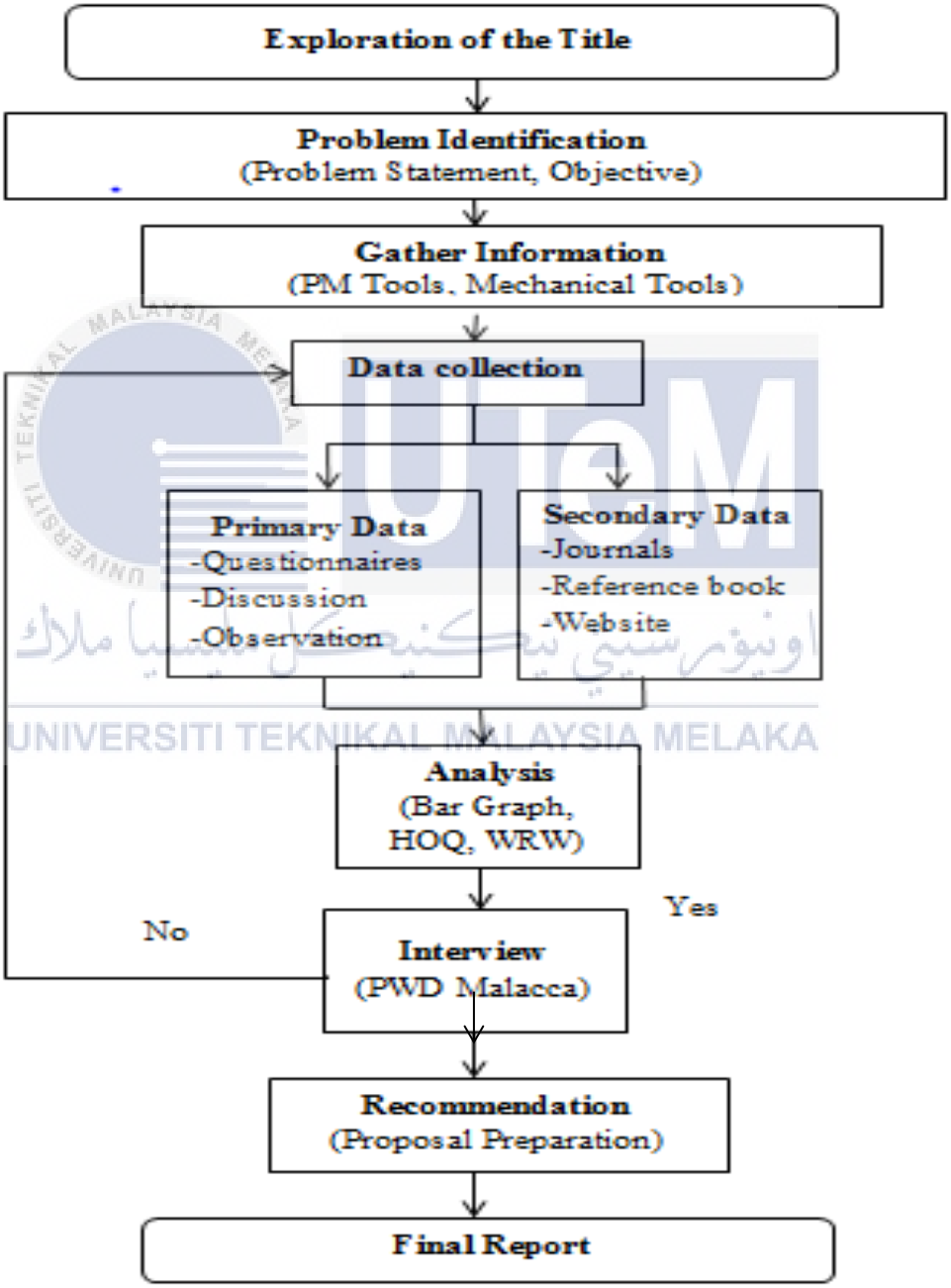

Figure 3.1: Flow Chart summary for the research

3.1 Basis of Questionnaire Construction

The questionnaires consist of two different question papers with different respondents. First question paper is about project management problem and software specification while second paper is about finite element analysis software specification and mechanical project's problem. Each paper has different respondents since the question will be distribute to the respondent that has expertise in the sector. The data of the questionnaires will be interpretation into software function.

3.1.1 Project Management's Questionnaires

The questionnaires will be distributed among 10 selected respondents. The respondents consist of businessman, project manager and business student which have been expert using project management software. The questions are about six segments which related to problem of project and project management software requirement.

i. Management issues

Management issues is the problem occurs due to management. The problem occurs such as unclear objective and lack of business focus of a team is due to lack of management strategy. Besides, no quality control of a product is one example of poor management.

ii. Content issues

Content issues are related to the content of project. For instance, shifting requirements of a project and technical complexity are contribute to project problem. Moreover, over cost is one of the content issues so that the project stopped due to costs getting out of hands.

iii. Communication issues

This issue is the crucial since it is control everything in the project. The communication issues ids the giving information and discussion in a team. Unaligned team is the effect of communication issues. Moreover, mismanagement of progress also is categories in communication issues because project manager is miscommunication between their workers.

iv. Execution issues

An execution issue is the issues that related to the quality of the project. Bad quality of project is due to unrealistic schedule and reactive planning. A requirements that need the project to finish at very short period time will contribute to execution issues because the quality of project is ignored due to chasing due date of project. Besides, lack of resources and activities between members also will produce execution issues.

v. Other issues

Issues such as vendor issues and skill issues are categorised into other issues. The vendor issues is issues related to vendor such as supplier people not consistent, supplier skills overstretched and supplier under resourced. Furthermore, skill issues are the skill of the worker and professional team that lead to project became slower.

vi. Software Requirement

The question is rating question on the project management features will be rank into their impotency. The requirement will be involve factor such as ease of use, portability and costs of the system.

3.1.2 Technical Tool Questionnaires

The questionnaires will be distributed among 10 selected respondents. The respondents consist of engineer, drafter and worker. Besides, students also will be involved on answering this questionnaire. BMCS's student from Faculty Mechanical Engineering in UTeM will be answering since they are familiar with FEA Software. Moreover, five question categories that consist of open ended and closed ended question will be asked.

i. Respondent Experience

The respondents experience is about their experience finite element analysis software. The question is open ended question. Besides, the name of the software will be filled by them.

ii. Fare issues

This issue related to the budget given for mechanical sector in buying their tools such as software. Besides, problem occurs such as need to hire specified person to do analysis while searching problem for maintenance.

iii. Skill issues

Skill issues are involving the skill while doing calculation. For instance, weak formulation due to human error while doing calculation will affect to maintenance of the project regularly. Besides, the quality of the project will be lower since long time taken for calculation.

iv. Other issues

Other issues such as lack of tools and vendor issues will be stated in this part. The vendor issues such as vendor not punctual while sending maintenance part.

v. Software Requirements

The question is rating question on the project management features will be rank into their impotency. The requirement will be involve factor such as ease of use, applicable to AutoCAD and security of the system.

3.2 Method of Analysis

Method of analysis is a procedure of reviewing, purifying, changing, and demonstrating information with the objective of finding helpful data, proposing conclusions, and supporting basic leadership. Information investigation has various aspects and methodologies, enveloping assorted procedures under an assortment of names, in various business, science, and sociology areas. This area will be involve with another three method which is data collection and interpretation, House of Quality (HOQ), and Weight Rating Method.

3.2.1 Data Collection and Interpretation

Data Collection and Interpretation is a piece of day by day life for a great many people. Understanding is the way toward comprehending numerical information that has been gathered, dissected, and exhibited. Individuals translate information when they turn on the TV and hear the newscaster on a survey, when they read promotions asserting that one item is superior to anything another, or when they pick market things that claim they are more powerful than other driving brands. A typical strategy for evaluating numerical information is known as measurable examination, and the action of investigating and translating information keeping in mind the end goal to make forecasts is known as inferential insights. Educated shoppers perceive the significance of judging the sensibility of information translations and forecasts by considering wellsprings of predisposition, for example, testing strategies or deluding questions, room for give and take, certainty interims, and fragmented elucidations. This part is a process step by step before taking step into HOQ.

i. Questionnaire Collection

After distributing questionnaire and get all the response from respondent, the questionnaire is being collected. The questionnaires total number of 20 which is 10 papers is distribute for every part is calculated. The score for each number is calculated and recorded.

ii. Interpretation of Data

Interpretation of data is the process where the question is categories then translate to software function. The data has direct question and indirect question where only the indirect question has to interpretative. Besides, only project management questionnaire will be involve in this step since technical question is direct question.

Table 3.1: Example of data interpretation of project management questionnaire

No.	Answers	Category	Software Functions
1	Bad communication between relevant parties	Communication issues	Group Meeting
2	Lack of planning, scheduling, resources and activities	Execution issues	Planning Appliance
3	No quality control	Management issues	Project Admiration
4	Unaligned team	Communication issues	Group Meeting
5	Costs getting out of hands	Content issues	Planning Appliance
6	Mismanagement of progress	Management and Communication issues	Project Admiration and Group Meeting
7	Overall poor management	Management issues	Project Admiration
8	Supplier skills overstretched	Other issues	Group Meeting
9	Supplier under resourced	Other issues	Group Meeting
10	Supplier people not consistent	Other issues	Group Meeting

iii. Survey Collection

Survey Collection is where the survey is done on internet. The reason of the survey is to count on the website suggestion, user rating and recommendation. Besides, the survey is the opinion of user around the world. Moreover, the survey involving the process of reading forum which citizen comment and discuss about software that is good and poor. Then after taking count all the opinion, the result will be combine and presented using statistic method.

iv. Combining Information

This step is about combining information from questionnaire and survey. The process is summation from both results. Then the software function is rank into their importunacy using statistical method.

v. Data Presentation

Data Presentation is the strategy by which individuals condense, arrange and impart data utilizing an assortment of devices, for example, outlines, appropriation diagrams, histograms and charts. The techniques used to display scientific information differ generally. Basic presentation modes including coding information, information examination, drawing outlines boxplots, tables, pie diagrams and histograms. The method is used to make the rating process in HOQ become easy by using customer need. Thus, all the result obtained will be presented using pie chart.

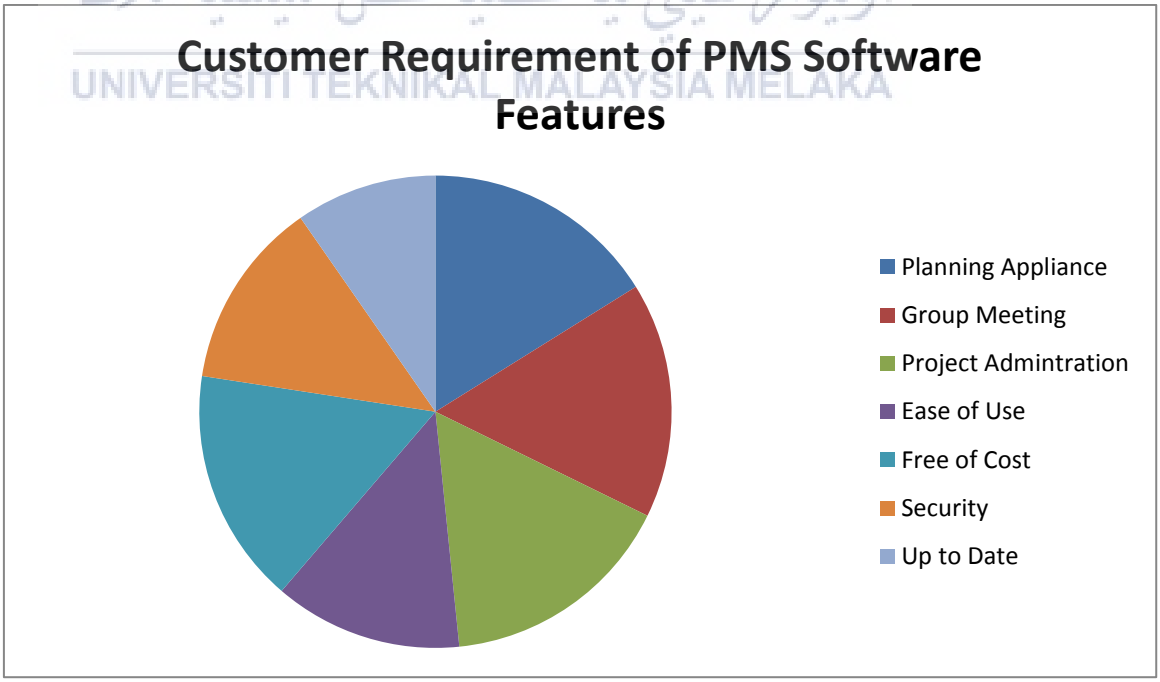

Figure 3.2: Example of data presentation for Project Management Software

3.2.2 House of Quality

House of Quality is a method used to choose the best software to apply at PWD. Besides that, from much software selected, HOQ will be used to select the top 3 software. Using the requirement from HOQ the software will be analysed and rate based on the features and performance.

3.2.3 Weighted Rating Method (WRM)

Weighted Rating Method is the method to choose the best software among 3 software's. All features are rank from 1 until 5 based on their impotency and the selected software is given rank. At the end, the score of software is calculated then the best score is chosen as the best software.

3.3 Method of Interview

This method is used to obtain the result of the selected software for Project Management and Finite Element Analysis Software. The respondents are from PWD which has expertise on their sector. Besides, if the respondent accepts the software, it will be implement to PWD Malacca by using proposal. The question will be asked on the interview are the usability, function, performance and respondent acceptability.

i. Usability

This question is to obtain the opinion of the respondent of the ease of use the software. Besides, their opinion on how the others will understand to use the software.

ii. Function

Furthermore, the respondents will be asked how the function of the software will help their project and how the software is meaningful for achieving their target.

iii. Respondent Acceptability

This question will control everything in this project. Besides, this question is to know whether the software is rejected or accept. Proposal to PWD will be made if the software is accepted.

CHAPTER 4

RESULT AND DISCUSSION

This chapter discusses about the findings on the implementations of modern tools at public works (JKR). These findings were archived by questionnaires and secondary sources.

4.1 Project Management Software Questionnaires

Project management software questionnaire is a method of survey to collect opinion of respondent about Project Management Software.

4.1.1 Respondent's background

Table represents the number of 10 respondents that has expertise in project management according to gender, occupation and age. The table represented 6 male and 4 female respondents. The respondents are categorized in their occupation such as businessman, project manager, lecturer and students. Besides, they are categorized in equal number which is two in every category. Lastly, there are 4 respondents that has been used project management software while 6 of the respondent using manual monitoring of works.

Table 4.1: Respondent's background

Occupation	Using Software	Gender	
		Male	Female
Businessman	0	2	0
Project Manager	0	1	1
Lecturer	2	1	1
Student	2	1	1
TOTAL	4	6	4
SUBTOTAL		10	

4.1.2 Factors of Project Failure

Figure 4.1 shows the average score on factors of project failure that has been ranked by respondents. The maximum score of each factor is 5 that is indicates strongly agree while 1 is very disagree. The first factor and second factor which are low skill of worker and supplier does not comply with the time with average rank of 3. Besides, the third factor is costs getting out of hand are ranked as 4 out of 5. Moreover, forth factor is has the highest rank which is 5 out 5. Those factors are mismanagement of progress, lack on planning schedule, no quality control of product and bad communication among relevant parties. Thus, the results show that management and communication are the most affluence factor to a project.

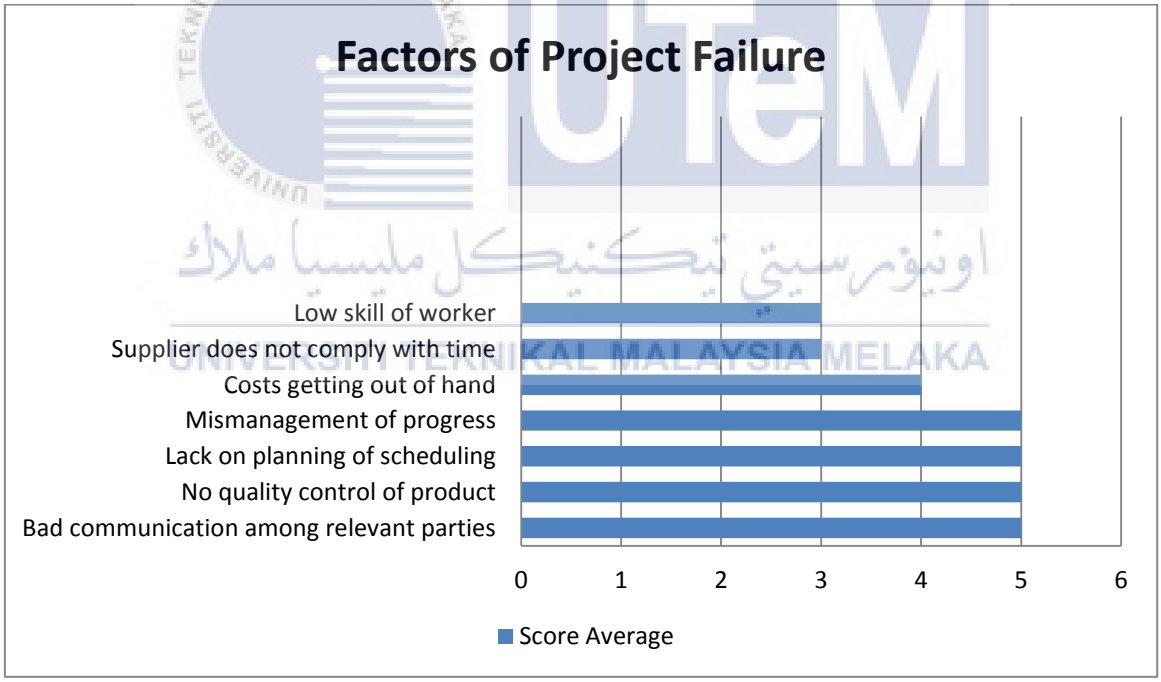

Figure 4.1: Factors of Project Failure

4.1.3 Opinion on Project Management Software

Figure 4.2 shows there were 90% of respondent think that project management software will help to successful project while 10% of respondent think that project management software will not help for them. This is because the respondent feels that software is complicated to use while manual method is easier.

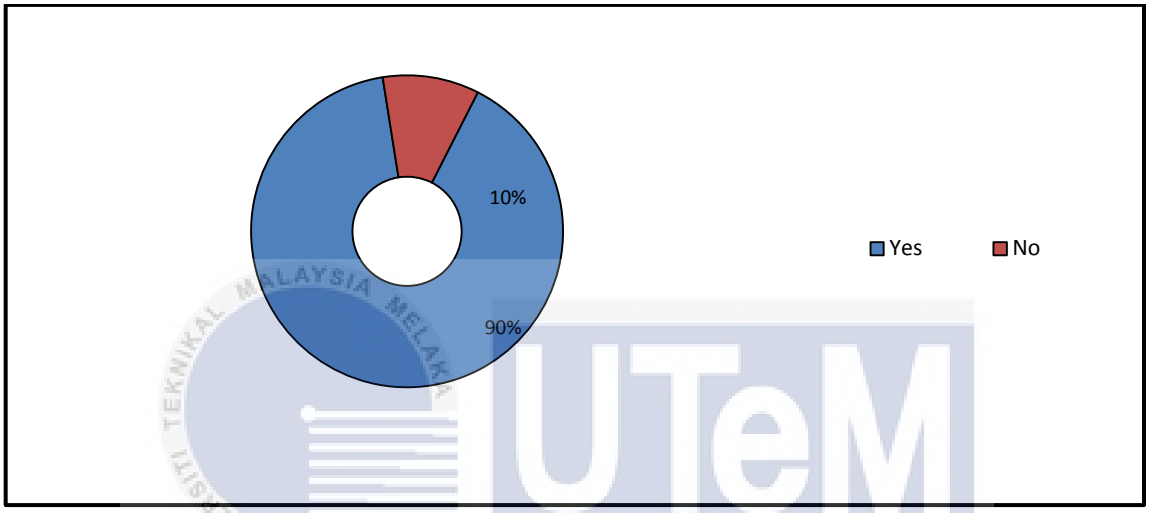

Figure 4.2: Opinion on Project Management Software to help successful project

4.1.4 Suggestion on Project Management Software

Figure 4.4 shows the suggestion of project management software by respondent. This suggestion is made based on their experience and knowledge. The result shown that Microsoft Project is the highest ranked of suggestion with 5 suggestions. This follows up with Microsoft Excel with 3 suggestions and 2 of them suggest for Milestone. Thus, it shows that most of the respondent knows about project management software that available in the market.

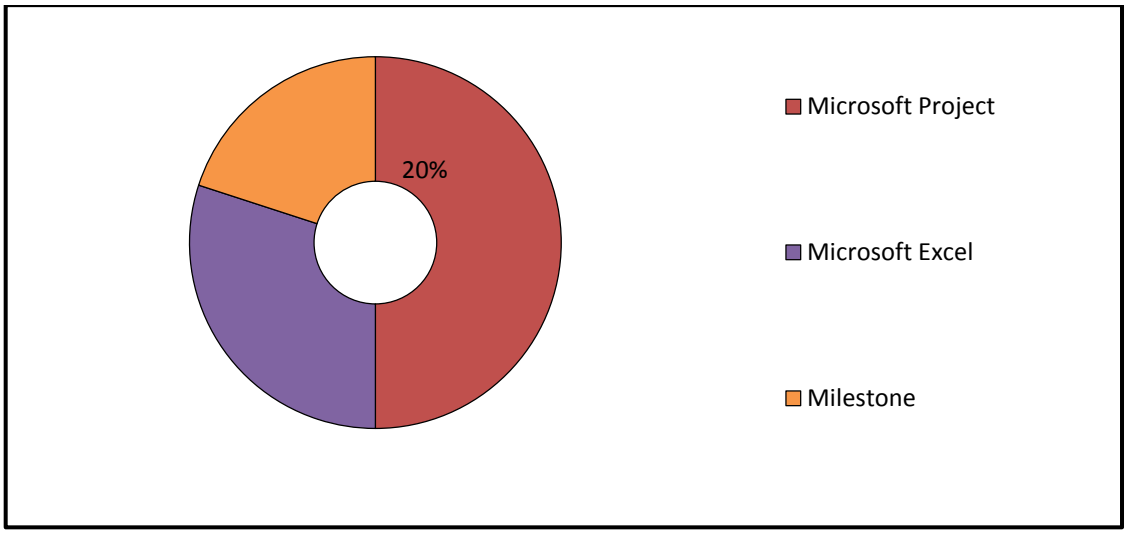

Figure 4.3: Suggestion on Project Management Software

4.1.5 Important Features in Project Management

Figure 4.4 shows the average score on important features in project management ranked by respondents. Firstly, the highest ranked of features with 5 out of 5 are budget management and Gantt chart. Second ranked with the rank 4out of 5 which is important features are reporting tools, chat tools and time tracking and reminder. Lastly, the lowest ranked are requirement managements and others feature with 3 out of 5 rank.

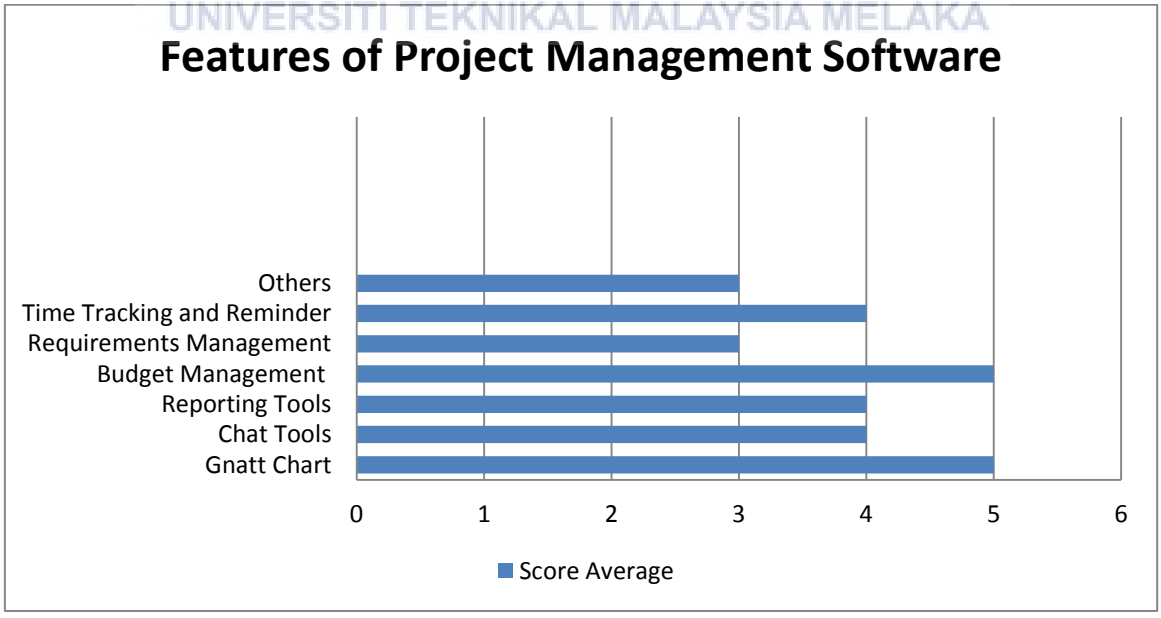

Figure 4.4: Features of Project Management Software Ranked by Respondent

4.2 Internet Articles about Project Management Software (PMS)

Internet article is another survey that has been made to get opinion from Project Management Software around the world. Mostly, the article will rank the best software to the lowest in the rank and it will describe the advantage and disadvantage of the software. Besides, other country that has highest technology is more exposed to several of software compare to this country.

4.2.1 Performance of Project Management Software

The first survey on internet article is the performance of Project Management Software. This is because the internet article is the opinion of the respondent or the user of Project Management Software. The maximum ranking given to the software is 5 which are the best while the lowest is 1.The result is shown in graphical method. The graph 4.5 shows that the best performance of Project Management Software is RedMine with the rank of 4.5 followed by Micrsoft Project and OrangeScrum with the vote of 4 over 5. Finally, the lowest vote is 3 out of 5 are MyCollab and Milestone. The vote is based on the updates of the software and the features of software.

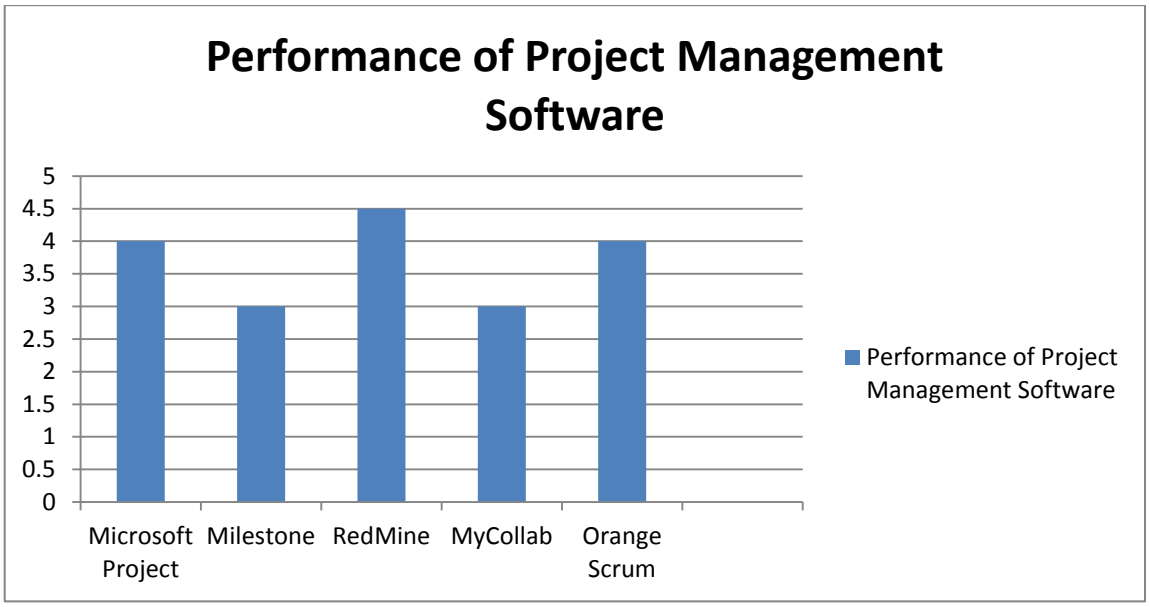

Figure 4.5: Performance rank of Project Management Software

4.2.2 Important features of Project Management Software

Figure 4.5 shows the important features of Project Management Software that are voted by respondents in internet. The result has a little difference on the questionnaire respondents. Firstly, the best features with vote of 5 over 5 are time tracking, budget management and Gantt chart. It is followed by reporting tools and chat tools with vote of 4. Lastly, the less important features is requirement management features.

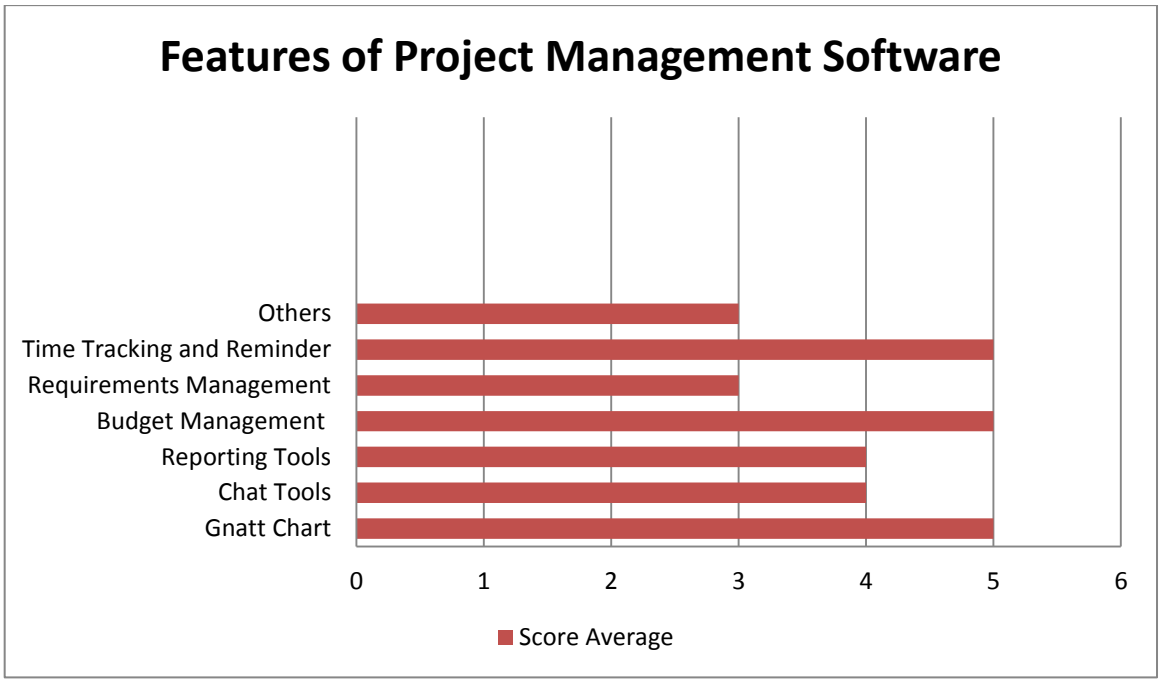

Figure 4.6: Important features of Project Management Software

4.3 Technical Software Questionnaires

Technical software questionnaire is a method of survey to collect opinion of respondent about Technical Software. This is because the software is a method of improving the Mechanical Department's system at JKR Melaka.

4.3.1 Respondent's background

Table 4.2 represents the number of 10 respondents that has involved in mechanical project and mechanical software according to gender, occupation and age. The table represented 8 male and 2 female respondents. The respondents are categorized in their occupation such as drafter, engineer, quality control person and students. Each occupation is in equal number of respondents which is 2. Students and drafter has an equal number of genders which is 1 in each while engineer and quality control only have male respondents.

Table 4.2: Respondent's background

Occupation	Gender	
	Male	Female
Drafter	1	1
Engineer	2	0
Quality Control	2	0
Student	1	1
TOTAL	8	2
SUBTOTAL	10	

4.3.2 Factors of Project Failure

Figure 4.6 shows the average score on factor of project failure in mechanical sector. The maximum score of each factor is 5 that is indicates strongly agree while 1 is very disagree. Firstly, the highest factor of failure with the vote of 5 that indicates strongly agree is no quality control. Then, it follows with low skill of worker with average number of 4. Besides, the factor of lack on planning schedule has average score of 3. Furthermore, the average number of 2 has two factors which are mismanagement of progress and supplier does not comply with the time. Lastly, the last factor with average number of 1 that indicates strongly disagree are and bad communication among relevant parties and costs getting out of hand.

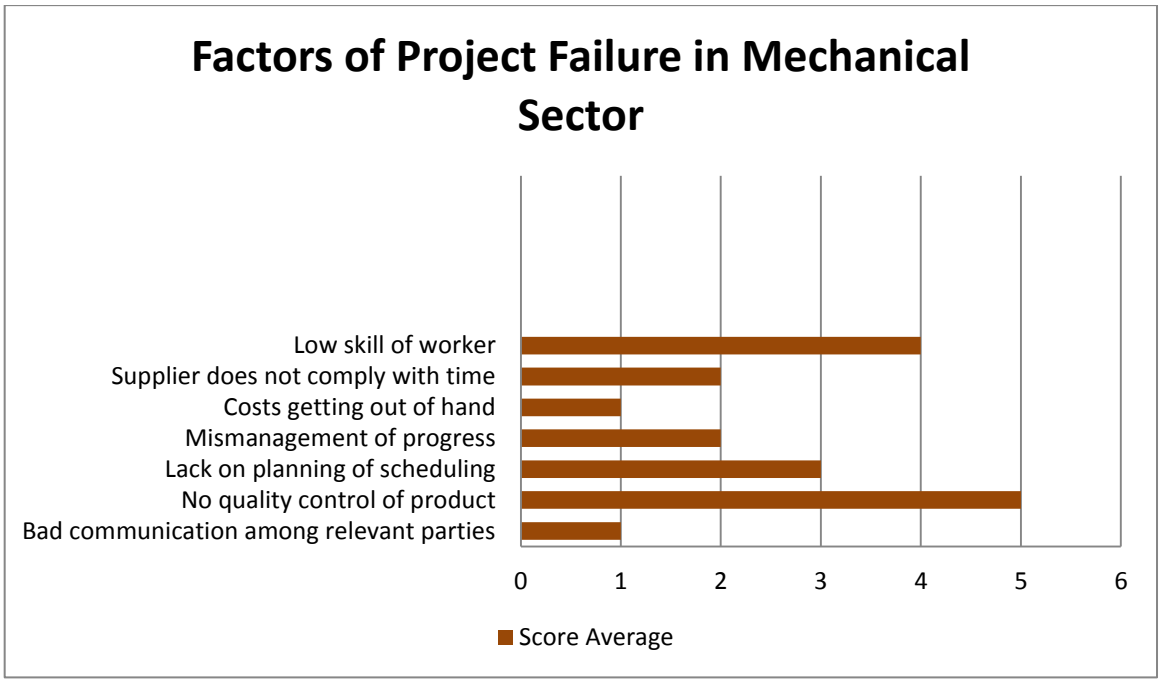

Figure 4.7: Factors of Project Failure in Mechanical Sector

4.3.3 Usage of Product Analysis Software at Work Place

Figure 4.7 shows the usage of product analysis software at respondent's work place. Majority of the respondent with 60% percentage of respondents is not having product analysis software at their workplace while the other 40% has product analysis software at their workplace.

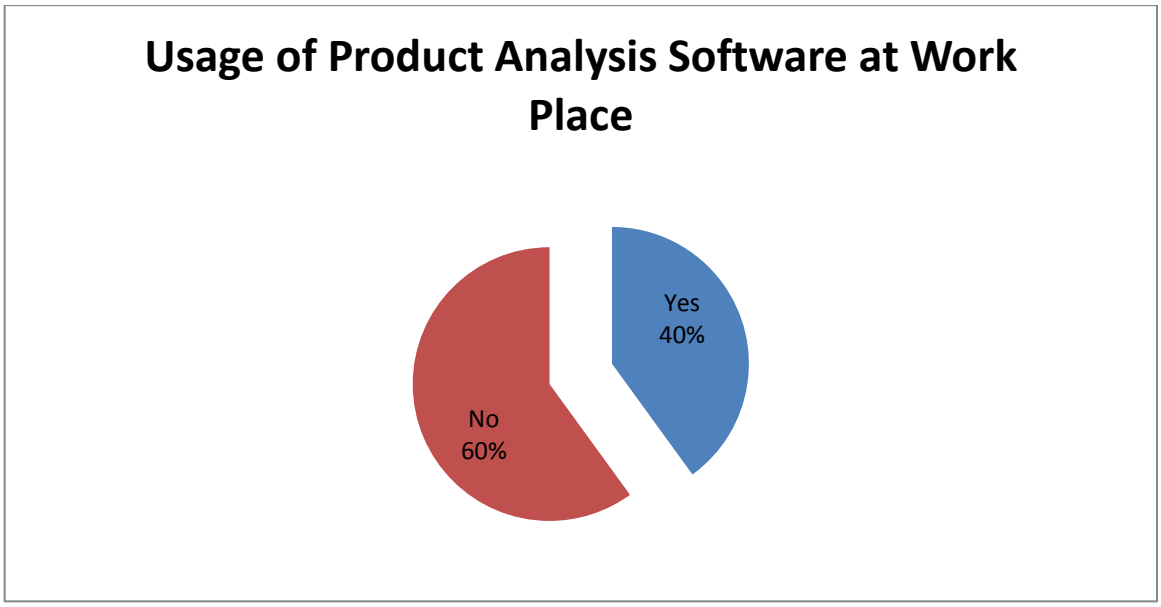

Figure 4.8: Usage of Product Analysis Software at Work Place

4.3.4 Drawing Software used at Work Place

Figure 4.8 shows that drawing software that has been used at respondent's work place. The highest number of software used is AutoCAD with 60% of respondents. Then, it is followed by SolidWork with 30% and CATIA 10%. This is because AutoCAD is well known among contractor and company. Besides, it is easy to use rather than new software.

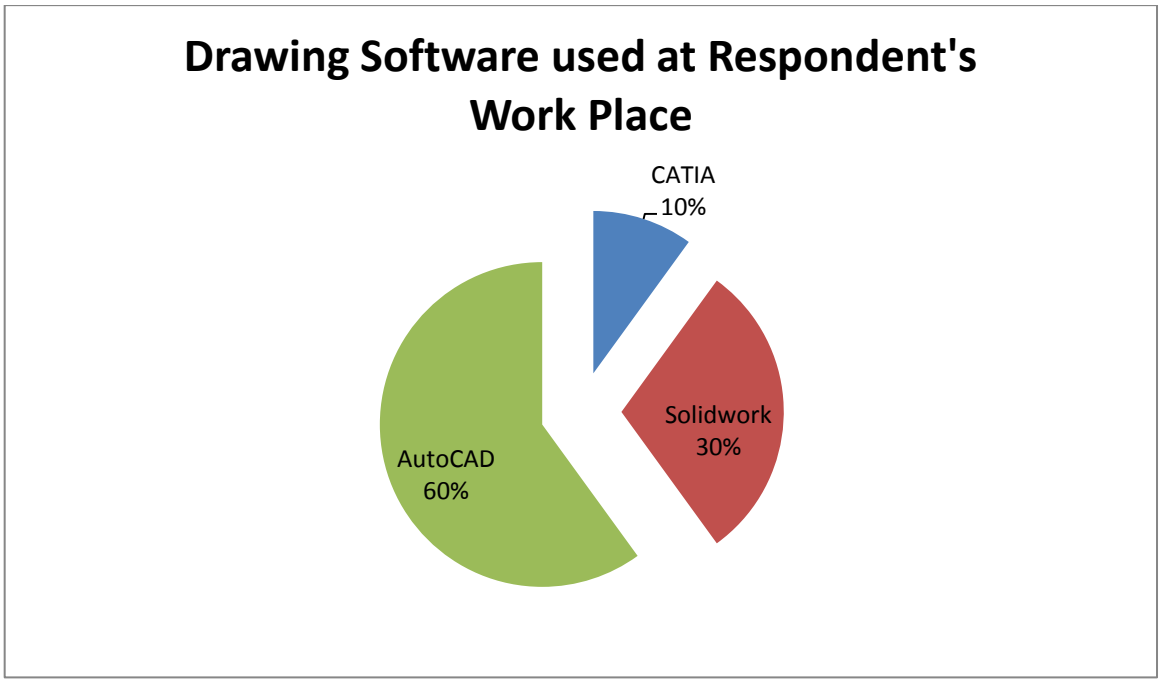

Figure 4.9: Drawing Software used at Respondent's Work Place

4.3.5 Important Features in Product Analysis Software

Figure 4.9 shows the average score on important features in Product Analysis Software ranked by respondents. Firstly, the highest ranked of features with 5 out of 5 are static analysis, natural frequency calculator and thermal calculation. Second ranked with the rank 4 out of 5 which is important features are applicable to drawing software and open source. Lastly, the lowest ranked are ease of use and others feature with 3 out of 5 rank.

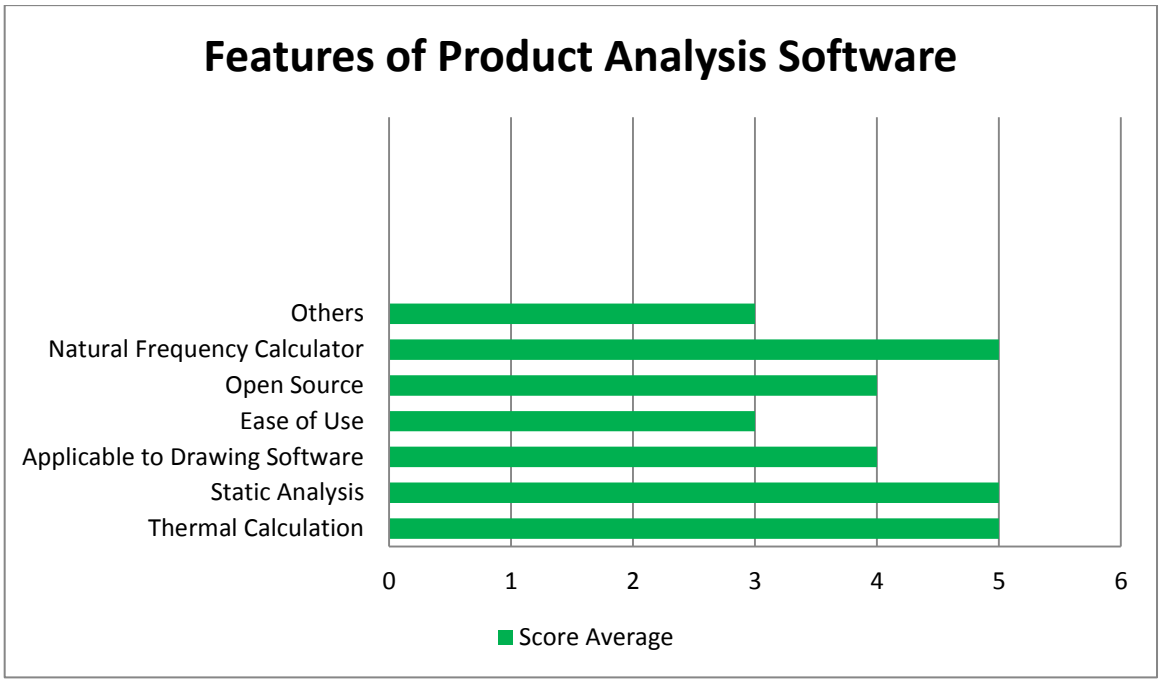

Figure 4.10: Features of Product Analysis Software Ranked by Respondent

4.4 Internet articles of Technical Software

Internet article is the survey that has been made to seek the world wide opinion. Based on forum and articles, the user will be comment about pros and cons of software and all the tips on handling technical software. The details result is shown below.

4.4.1 Technical Software that should be downloaded

Figure 4.10 shows the technical software that should be downloaded based on internet article. Firstly, the most voted software is finite element analysis with 40% respondent. It followed with thermal analysis with 30% and Fluid Analysis 20%. However, the is 10% of internet respondents that state others software.

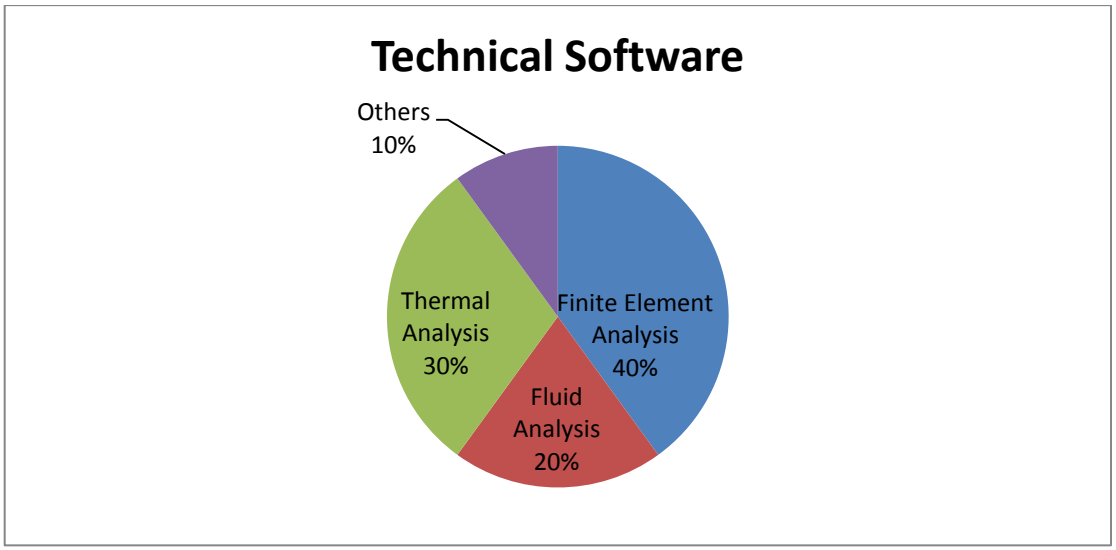

Figure 4.11: Technical Software that should be downloaded

4.4.2 The best performance of Finite Element Analysis

Figure 4.11 shows that the most voted software is AutoLite with 40%and ASNSYS 40%. The others such as VisualFEA and others is 10%. The reason is both of the software are open source and easy to use. Besides, AutoLite software can be used for AutoCAD.

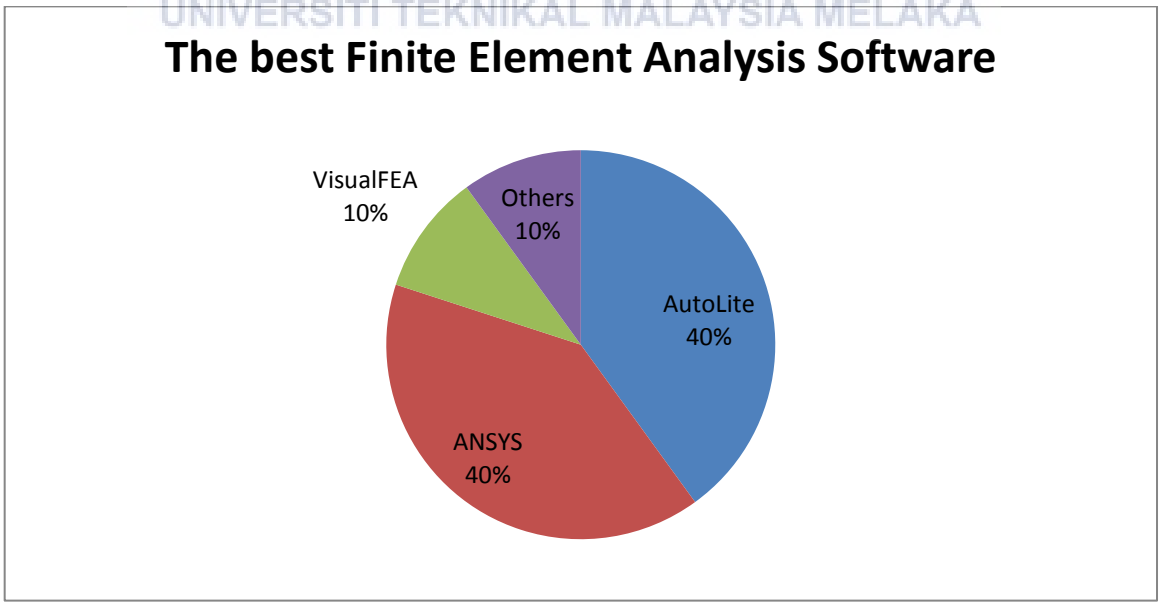

Figure 4.12: The best performance finite element analysis software

4.5 House of quality (HOQ)

The HOQ built for the Project Management Software selection can also serve as the basis for the overall interpretation of the HOQ. The Project Management Software HOQ of table shows that the most important Engineering Characteristics to the selection of Project Management Software such as functions, reliability, efficiency, maintainability and portability.

4.5.1 House of Quality for Project Management Software

Table 4.3 shows the House of Quality (HOQ) FOR Project Management Software. The HOQ was built to ensure the requirement of software meets the needs of problem. From the table 4.3, it is shown that the most engineering characteristic is functionally, reliability, usability, efficiency, maintainability and portability of software. The score is calculating based on the importance weight factor times with the engineering characteristic score. The importance weight is rank from 1 to 5 based on their importance and times with engineering characteristic score form 1 until 10. The sum of each raw is calculated and called as raw score and is divide with the overall raw score times with 100% to get relative weight. The highest score is functionality of software with raw score of 162 and 28.17% relative weight.

Then, it followed with reliability with raw score of 142 and relative weight 24.7% which make it in the 2nd rank. The 3rd rank is usability with the raw score of 86 and relative weight 14.6% and the 4th rank is maintainability with the raw score of 85 and relative weight 14.78% . Besides that, the 5th rank was portability with the raw score of 81 and relative weight 14.09% and the last rank was efficiency with the raw score of 19 and relative weight 3.3% Therefore, the chosen of software is based on the functionality of that software followed with reliability, usability, maintainability, portability and last is efficiency of the software.

Table 4.3: House of Quality for Project Management Software

		ENGINEERING CHARACTERISTICS					
Improvement Direction		↑	↑	↑	n/a	↓	↓
CUSTOMER REQUIREMENTS	Importance Weight Factor	Functionality	Reliability	Usability	Efficiency	Maintainability	Portability
Easy to Use	5	3		9			
Has Planning Appliance	5	9	3		1		
Has Project Admiration	5	9	3		1		
Free to Download	5			1		9	
Able to Send Notification	4	3	9		1		
Has Control Panel and Chart	5	9			1		
Has Protection	3	1				9	
Up to Date	3		9			5	
Can be Custom	4			9			
Can Communicate with Members	5	1	9				
Applicable to Mobile Device	4		1				9
Raw Score		162	142	86	19	85	81
Relative Weight %		28.17	24.70	14.96	3.3	14.78	14.09
Rank Order		1	2	3	6	4	5

4.5.2 House of Quality for Finite Element Software

Same method is applied to HOQ for Finite Element ANALYSIS. However, the result shown is almost same with the requirement for Project Management Software. The HOQ was built to ensure the requirement of software meets the needs of problem. From the table 4.4, it is shown that the most engineering characteristic used is functionally, reliability, usability, efficiency, maintainability and portability of software. The score is calculating based on the importance weight factor times with the engineering characteristic score. The importance weight is rank from 1 to 5 based on their importance and times with engineering characteristic score form 1 until 10. The sum of each raw is calculated and called as raw score and is divide with the overall raw score times with 100% to get relative weight. The highest score is functionality of software with raw score of 150 and 32.7% relative weight.

Then, it followed with reliability with raw score of 100 and relative weight 21.65% which make it in the 2nd rank. The 3rd rank is maintainability with the raw score of 84 and relative weight 18.8% and the 4th rank is usability with the raw score of 58 and relative weight 12.55%. Besides that, the 5th rank was efficiency with the raw score of 45 and relative weight 9.74% and the last rank was portability with the raw score of 25 and relative weight 5.41% Therefore, the chosen of software is based on the functionality of that software followed with reliability, maintainability, usability , efficiency, and last is portability of the software.

The possible reason that function ability is function of software is the main part that should be look before it has been used. The reliability and quality of software is important but not crucial for drawing analysis software. Same goes to other engineering characteristic; it is important but is not crucial that should be pay attention to it.

Table 4.4: House of Quality Finite Element Software

		ENGINEERING CHARACTERISTICS					
Improvement Direction		↑	↑	↓	↓	↑	n/a
CUSTOMER REQUIREMENTS	Importance Weight Factor	Functionality	Reliability	Usability	Efficiency	Maintainability	Portability
Easy to Use	5	3		9			
Free to Download	5			1		9	
High Performance	5				9		
Has Static Analysis	5	9	1				
Can Calculate Natural Frequency	5	9	1				
Has Thermal Calculation	5	9	1				
Applicable to AutoCAD	5		9	1			5
Up to Date	3		9			1	
Has Protection	4		1			9	
Can Send Notification	3		3	1			
Raw Score		150	100	58	45	84	25
Relative Weight %		32.47	21.65	12.55	9.74	18.18	5.41
Rank Order		1	2	4	5	3	6

4.6 Weighted Rating Method

Weighted Rating Method is a method for putting a similarity of objectivity into a subjective procedure. Utilizing a predictable rundown of criteria, weighted by significance or need of the criteria to the association, an examination of comparable "arrangements" can be finished. On the off chance that numerical qualities are appointed to the criteria needs and the capacity of the item to meet a particular basis, a "weighted" esteem can be inferred. By summing the weighted qualities, the item most nearly meeting the criteria can be resolved. The weighted rating method is used to compare between three selected software for both Project Management Software and Finite Element Analysis Software. Besides, this method will help to choose the best software between software selected.

4.6.1 Weighted Rating Method for Project Management Software

The criteria will be rank based on their importunacy. Then it is calculated until get the best software. According the table 3.4, the initial step is to distinguish the ease of use criteria by which the ideas will be assessed. The product detail prerequisite is a prime wellspring of this data. The plan criteria are distinguished as ease of use, performance, functions, low cost, and protection and applicable to other device. The following stride is to decide the weighting variable for each of the product criteria. The weights of the individual classifications at every level of the tree must add to 100. The weights of the criteria are 20, 20, 10, 20, 15 and 20 individually. The weighted rating for every idea at every plan criteria is gotten by duplicating the score by the rating element. Accordingly, for the criteria of convenience for programming 1, the rating is (20/100) x 4 = 0.8. The general rating for every idea configuration is the whole of these appraisals. The weighted

rating technique demonstrates that the best general programming idea for venture administration programming would Software 3 which is scored 5.0.

Table 4.5: Weighted Rating Method for Project Management Software

		CONCEPT ALTERNATIVES					
		SOFTWARE 1		SOFTWARE 2		SOFTWARE 3	
Criteria	Important Weight (%)	Rating	Weighted Rating	Rating	Weighted Rating	Rating	Weighted Rating
Easy to Use	20	4	0.8	3	0.6	5	1.0
Cost	20	5	1.0	1	0.2	5	1.0
Applicable to Other Device	10	4	0.8	4	0.8	4	0.8
Functions	20	4	0.8	2	0.4	4	0.8
Protection	10	3	0.6	4	0.8	3	0.6
Performance	20	4	0.8	3	0.6	4	0.8
	100	NA	4.8	NA	3.4	NA	5.0

4.6.2 Weighted Rating Method for Finite Element Software

Same concept with project management software, the process is to determine the best software for finite element analysis software. After that, the score is calculated to see the best score among three. As indicated by the table 3.5, the initial step is to recognize the ease of use criteria by which the ideas will be assessed. The product particular necessity is a prime wellspring of this data. The outline criteria are distinguished as ease of use, performance, functions, low cost, and protection and applicable to AutoCAD. The following stride is to decide the weighting element for each of the product criteria. The weights of the individual classifications at every level of the tree must add to 100. The

weights of the criteria are 20, 20, 20, 15, 10 and 15 separately. The weighted rating for every idea at every outline criteria is gotten by increasing the score by the rating variable. In this manner, for the criteria of usability for programming 1, the rating is (20/100) x 5 = 1.0. The general rating for every idea configuration is the whole of these appraisals. The weighted rating strategy demonstrates that the best general programming idea for venture administration programming would be Software 2 which is scored 5.4.

Table 4.6: Weighted Rating Method for Finite Element Analysis Software

		CONCEPT ALTERNATIVES					
		SOFTWARE 1		**SOFTWARE 2**		**SOFTWARE 3**	
Criteria	Important Weight (%)	Rating	Weighted Rating	Rating	Weighted Rating	Rating	Weighted Rating
Easy to Use	20	5	1.0	5	1.0	3	0.6
Cost	20	3	0.6	5	1.0	5	1.0
Applicable to AutoCAD	20	5	1.0	5	1.0	1	0.2
Functions	15	5	1.0	5	1.0	3	0.6
Protection	10	4	0.8	3	0.6	1	0.2
Performance	15	4	0.8	4	0.8	3	0.6
	100	NA	5.2	NA	5.4	NA	3.2

4.7 Interview Result

The interview session is between the researcher and representative from Public Works Department Melaka was Puan Zuraikha bt Samsuddin which is the engineer of road section. Both questions are being asked to Puan Zuraikha since she has been handling mechanical construction before being assigned to road section. The interview session was doing well on the 5th April 2017. The general question about PWD Melaka and their system is being asked on the first session while end of session, she has been ask on her opinion about Project Management and Finite Element Analysis Software,.

i. Problem faced during handling project

There are many problems that are faced during project but the obvious is contractor that has insufficient fund that makes the project delayed. Other minor problem such as communication and changing in specification is the minor problem. However, JKR has taken an initiative ways to avoid the problem. The way is addition in system which it put a requirement to be JKR contractor instead of quality of work. The system needs the bank statement of the company before they accept the company.

ii. Current system used at JKR

Currently, JKR has provided a system called OSC. The system can be access by relevant parties to update about the project. Besides, it has owned communication part. However, the engineer refuses to use the system since it makes the works become complicated instead of using Whatsaap Apps.

iii. Working flow at JKR

The flow of working at JKR is differing from other company. The main department of JKR at Kuala Lumpur will send the drawing and analysis to the other department such as Melaka. At JKR Melaka, after getting all the drawing and analysis, we need

to monitor the work from start to end. All the drawing and analysis is not done at JKR Melaka.

iv. Usability of Suggested Software

The software is simple and easy to use. It is something new to JKR which is mostly the working is done using manual method. Both of the software is easy to use and easily to be understood.

v. Function

The best part of the software it has many function such as Gantt chart, time tracking and reminder. Every day it will send notification to remind the work to do on that day. The function is very suitable to use at construction site because it is easier to update and communicate. Moreover, the FEA software is also suitable for road project in order to analyse the strength of the beam for the bridge and calculate the natural frequency of the bridge. Thus, the FEA software suggested can be used for road project.

vi. Respondent Acceptability and Suggestion

The software and suggestion is good. The idea of the software is acceptable. However, for road section, to send picture as evidence is not enough since the drawing need to scale using ruler. Thus, the manual part is still using for this department.

4.8 Comparison between Suggested System and Current System

There are several advantages of using suggested system compared to current system that has been used at JKR. For instance, the strength of the suggested software is the function of the software. The software will help to solve the miscommunicating between the relevant parties in the project. Besides that, the software has time tracking and reminder so that it will help the engineer to monitor the work by reminding them. The communication between contractor and project manager will be better since the software has the chatting room and the software is applicable to device which it make easier to use.

Moreover, the limited number of engineer makes the working time and attention to the project is lesser. Most of time the engineer spending time to attend meeting about a project but using software, they will cut time taken by using chatting space in the software. All the problem will be discuss with project manager and contractor in the chatting room. However, the software has limitation such as the software need to update and using internet access to operate which it need some cost to pay the internet bills. The summary table below shows the summary of comparison between suggested system and current system of JKR.

Table 4.7: Summary of comparison between current system (JKR) and suggested system

Current system JKR (OSC)	Suggested System
System is general to all JKR Department.	System is specific to all members involved in the project.
The system of communication between contractor and engineer is manual system such as call and meeting.	There is chatting room for members that involved in the project and "wall" for status updating to show the progress of report.
Can be access on computer and phone by using chrome.	Can be access by using gadget and "apps".
The reminder and time tracking is based on "self-reminder".	System will remind each task need to complete from day-to-day.
System needs cost for maintenance.	System is open source.
System is lack of planning tools and management tools.	System has many tools for project management such as Gantt chart, time tracking and reminder.

To be concluded, the current software of JKR is excellent. The system has very strong security and their own update space for the community. The upper position such as project manager will give command and comment about the project. However, the software has some weakness since the software also used internet access and the system is slower to use because the system is accessible to many person. The system is used for the whole JKR which it makes over looked of some project. Thus, the system need to separate and addition on community chatting to discuss the entire problem. The system can be access on the phone but using the chrome. Thus, it takes a longer time and make in difficult to use.

4.9 Addition System Suggestion according to Problem

The interviewed person, Puan Zuraikha has stated her department problem which the software cannot help her much since she is on road department. The road department which control the entire road under JKR Melaka need the usage of road plan. The road plan is used as guidance at construction site and it is needed for scaling. The recommendation has been made which is finding software can view the plan with the detail scaling in the next research. Thus, there are some systems that can be suggested according to this problem such as AutoCAD for drawing view and editor, CAD Touch and PadCAD Lite. The software is applicable so that the engineer may bring only one gadget to view their road plan.

i. AutoCAD (drawing editor and viewer)

   AutoCAD drawing and editor is the drawing tools apps that can be used for gadget. It is easy to use and has drawing tools that can be view, edit and share using device. Thus, the scale of drawing can be view using these apps. The drawing also can be opened through email. This app is suits for construction project especially for engineers.

ii. CAD Touch

   CAD Touch is professional drawing editor that are ideal for on-site drawing and professional field such as architecture, engineering and home design. It has very fast multi-touch and easy to use. Besides it has the drafting tools like others drawing software that is being used on the computer.

iii. PadCAD Lite

PadCAD Lite is drawing software that is applicable to gadget and devices. It is suits for medium project size which is upheave to use. The drawing can be export as PDF Format or DXF Files. Besides, it is easy to use and ideal for contractors, architecture and real-estate professionals.

The reason of the software re suggested is to solve the problem that has been explained by Puan Zuraikha. All the software is ease of use and has almost the same advantages. However, it seems like AutoCAD drawing viewer and editor is perfect to use at JKR since they are using AutoCAD as their drawing tools.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

As a conclusion the objective of this research were achieved. Firstly, the researcher understood the project planning process and communication system in Project Management. Planning and communication is the important factor that is influence the success and failure of a project. Besides that, the researcher learns to know technique and current presentation practise at PWD Melaka. The part is important to see the cause of problem in PWD project. Moreover, the researcher already know the current software used at PWD Melaka which is OSC system software. At last of the project, the researcher has recommended the best software that she found for Project Management and Technical Software which is Finite Element Analysis. The researcher has interviewed representative of JKR Melaka which is Puan Zuraikha an engineer at road department. Puan Zuraikha has accepted the idea and gives her comment about the software.

Future recommendation for this project is to continue the research for road department at JKR Melaka which has been told by Puan Zuraikha. The research is about recommend software that can help road department without bring their drawing to the site. Besides that, for JKR, they should provide research department for student to do their research and recommendation for them. This is because JKR is too busy on their works and make it difficult for student to do their research. Moreover, the faculty should provide more tasks

for student to involve in dealing with corporate so that they will know the real problem facing by engineer as a preparation for them before involve in industry.

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APPENDICES A1
Project Management Software's Questionnaire

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Project Management Survey

I am a final year student of Universiti Teknikal Malaysia Melaka (UTeM) which is assigned to gather information about Project Management Software in order to fulfil my Final Year Project. Your responses are much appreciated. Thank you.

Section A – Respondent profile

1. Gender
   - Male
   - Female

2. Age
   - Below 20 years old
   - 20-30 years old
   - Above 30 years old

3. Occupation

4. Using Project Management Software
   - Yes
   - No

Section B

1. Using a scale of 0=Very Disagree to 5=Very Agree about the cause of project failure. Please rate the following.

	0	1	2	3	4	5
Bad communication among relevant parties	o	o	o	o	o	o
No quality control of product	o	o	o	o	o	o

Lack on planning of scheduling

o o o o o o

Mismanagement of progress

o o o o o o

Costs getting out of hand

o o o o o o

Supplier does not comply with time

o o o o o o

Low skill of worker

o o o o o o

2. Do you think that Project Management Software with various functions will lead to successful project?

- o Yes
- o No

3. Suggest one of the best Project Management Software that you ever know.

4. Are you willing to spend for Project Management Software that includes the features you need?

- o Yes
- o No

5. Using a scale of 0=Not Important to 5=Very Important about the features of Project Management Software that you need. Please rate the following.

	0	1	2	3	4	5
Chat Tools	o	o	o	o	o	o
Reporting tools	o	o	o	o	o	o
Budget management	o	o	o	o	o	o
Requirements management	o	o	o	o	o	o
Gantt chart	o	o	o	o	o	o
Budget management	o	o	o	o	o	o
Time Tracking and Reminder	o	o	o	o	o	o
Others	o	o	o	o	o	o

Please state:_____

End of question. Thank you for your cooperation.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Technical Software Survey

I am a final year student of Universiti Teknikal Malaysia Melaka (UTeM) which is assigned to gather information about Technical Analysis Software in order to fulfil my Final Year Project. Your responses are much appreciated. Thank you.

Section A – Respondent profile

1. Gender
   - o Male
   - o Female

2. Age
   - o Below 20 years old
   - o 20-30 years old
   - o Above 30 years old

3. Occupation

4. Using any Technical Analysis Software
   - o Yes
   - o No

Section B

1. Using a scale of 0=Very Disagree to 5=Very Agree about the cause of project failure. Please rate the following.

	0	1	2	3	4	5
Bad communication among relevant parties	o	o	o	o	o	o
No quality control of product	o	o	o	o	o	o
Lack on planning of scheduling	o	o	o	o	o	o
Mismanagement of progress	o	o	o	o	o	o
Costs getting out of hand	o	o	o	o	o	o
Supplier does not comply with time	o	o	o	o	o	o
Low skill of worker	o	o	o	o	o	o

2. Do your place provide technical analysis software to analyse drawing ?
   - o Yes
   - o No

3. What is the Drawing Software that has been used at your workplace?
   - o CATIA
   - o AutoCAD
   - o SolidWork

4. Are you willing to spend for Technical Analysis Software that includes the features you need?
   - o Yes
   - o No

5. Using a scale of 0=Not Important to 5=Very Important about the factor of usage Technical Analysis Software. Please rate the following.

	0	1	2	3	4	5
Natural frequencies calculator	o	o	o	o	o	o
Open Source Software	o	o	o	o	o	o
Ease of Use	o	o	o	o	o	o
Applicable to Drawing Software	o	o	o	o	o	o
Static Analysis	o	o	o	o	o	o
Thermal Calculation	o	o	o	o	o	o
Others	o	o	o	o	o	o

Please state: _____

End of question. Thank you for your cooperation.

APPENDICES A3
Letter of Interview Validation

JABATAN KERJA RAYA
CAWANGAN KEJUTERAAN MEKANIKAL
JALAN TAMING SARI,
75400 MELAKA.

Fakulti Kejuteraan Mekanikal,
Universiti Teknikal Malaysia Melaka,
Jalan TU 62, Taman Tasik Utama,
75450 Ayer Keroh, Melaka, Malaysia.

5 April 2017

Tuan,

PENGESAHAN TEMU BUAL PELAJAR

Perkara di atas adalah dirujuk. Dengan ini, pihak kami mengesahkan bahawa mahasiswi Universiti Teknikal Malaysia Melaka yang dinyatakan di bawah ini telah menjalankan penyelidikan di Jabatan Kerja Raya(JKR) cawangan Melaka sebagai memenuhi keperluan Projek Sarjana Muda.

2. Berikut merupakan maklumat peribadi berkenaan mahasiswi tersebut;

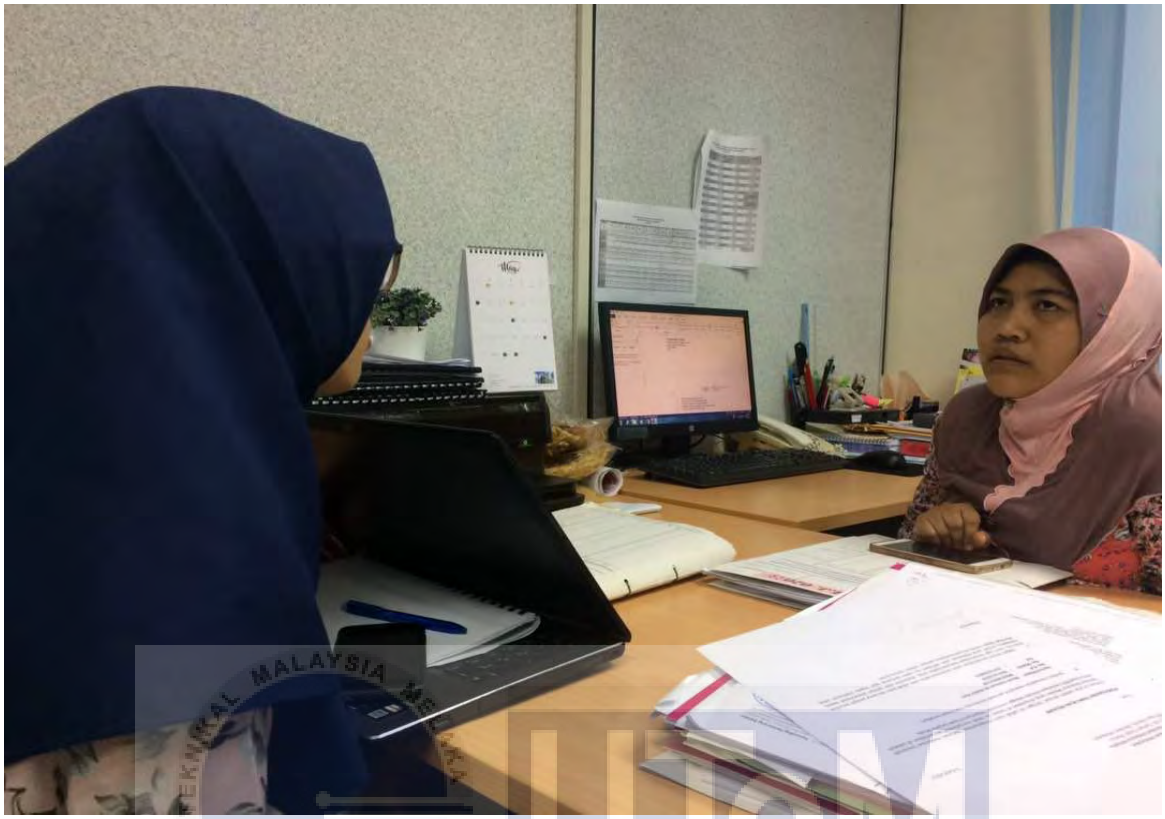
Nama Pelajar: Nurul Hidayah bt Abdul Aziz
No. K.P. :
No. Matrik :
Tel :

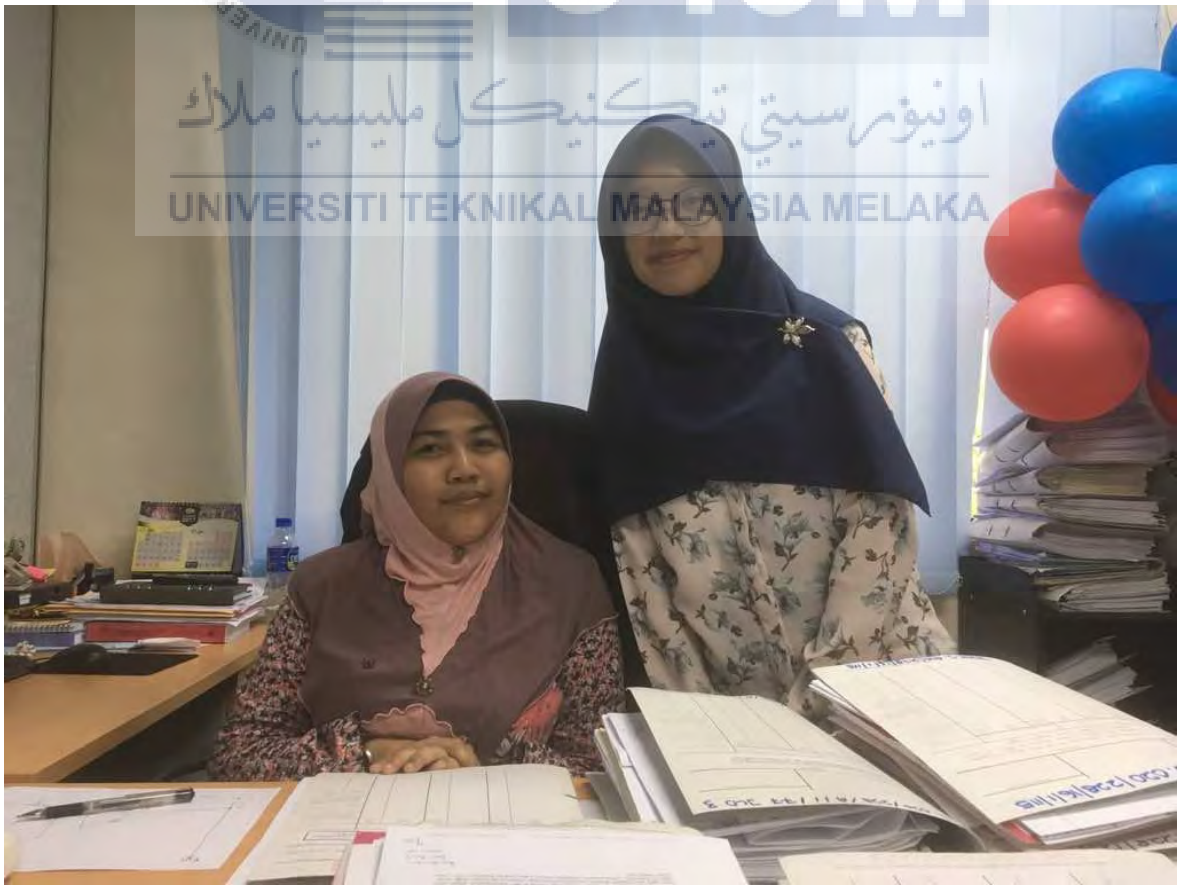
3. Segala proses penyelidikan telah disempurnakan oleh pihak kami bersama pelajar tersebut. Selain itu, kami juga berpendapat bahawa kajian yang dijalankan oleh pelajar (dapat/tidak dapat) membantu projek yang dijalankan oleh JKR.Oleh itu, kami berharap agar segala maklumat yang diberikan dapat membantu pembelajaran pelajar. Sekian, terima kasih.

Yang benar,

(ZURAIKHA BT. SAMSUDDIN)
JURUTERA AWAM (J44)
Bahagian Jalan, Ibu Pejabat
JKR Melaka

APPENDICES A4
Picture during Interview Session





APPENDICES A5
Picture during Visiting Session