POLITEKNIK UNGKU OMAR

e-STC FOR SITE REQUISITION MACHINERY SPARE PART ORDER

NUR AZYYATI FARI'AH BINTI FARIZAL HARYADI

(01BCT20F3030)

CIVIL ENGINEERING DEPARTMENT

SESSION 2 2022/2023

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A project report/thesis submitted in partial fulfilment of the requirement for the award of the Bachelor's Degree of Civil Engineering Technology

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STATEMENT OF AUTHENTICITY AND PROPRIETARY RIGHTS

e-STC FOR SITE REQUISITION MACHINERY SPARE PART ORDER

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ABSTRACT

Procurement Department at Pembinaan Tetap Teguh Jentera (PTTJ) basically manage all machineries at the site and responsible for internal department request, dealing with suppliers, coordinating and monitoring purchases especially in documentation for purchase spare part machineries and equipment's order. The existing method used for machinery spare parts orders is not systematic and difficult to track between the Workshop Department and The Procurement Department, resulting in overlooking, double order, delay payment to suppliers, and blocked orders by suppliers. Therefore, the aim of the study is to develop the systematic tracking center(e-STC) for site requisition machinery spare part order using wix.com at PTTJ for more systematic and efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. There are three objectives to be studies, first is to identify the need of systematic tracking center for site requisition machinery spare part orders at PTTJ. Secondly is to develop the e-STC for site requisition machinery spare part orders at PTTJ using wix.com and finally is to test the effectiveness of systematic tracking center (e-STC) for site requisition machinery spare part orders at PTTJ. Objective 1 and 3, used quantitative method conducted by survey and objective 2 use wix.com. Data Analysis uses SPSS and Excel Solution Online. The results for objective 1 showed that the current method; av. mean is very low in every constraint elements; <1.5 average mean and was resulted for current method, easy to track order element. Result for objective 2 show that e-STC for site requisition machinery spare part orders at PTTJ using wix.com successful to developed. Meanwhile, result for objective 3 show that > 90% respondents agree the e-STC for site requisition machinery spare part order is systematic. Paired T Test showed that easy to track order element; pre-test, av. mean is 1.97 while post-test show av. mean is 4.31 resulted as 2.37 in differences av. mean; High in agree interpretation using e-STC. The conclusion; e-STC is a systematic and efficient medium for purchase Invoices and Delivery Orders (DO) and payments to suppliers and needs to be implemented for site requisition machinery spare part orders at PTTJ.

Keywords: Systematic Tracking Center, Invoices, Delivery Order (DO), Delay Payment, Block Order

ABSTRAK

Jabatan Perolehan di Pembinaan Tetap Teguh Jentera (PTTJ) pada asasnya menguruskan semua jentera di tapak dan bertanggungjawab terhadap permintaan dalaman jabatan, berurusan dengan pembekal, menyelaras dan memantau pembelian terutamanya dalam dokumentasi pembelian mesin alat ganti dan tempahan peralatan. Kaedah sedia ada yang digunakan untuk tempahan alat ganti jentera adalah tidak sistematik dan sukar untuk dikesan antara Jabatan Bengkel dan Jabatan Perolehan, mengakibatkan terlepas pandang, pesanan berganda, kelewatan pembayaran kepada pembekal, dan pesanan disekat oleh pembekal. Oleh itu, tujuan kajian adalah untuk membangunkan pusat pengesanan sistematik (e-STC) untuk tempahan alat ganti jentera permintaan tapak menggunakan wix.com di PTTJ untuk Invois pembelian dan Pesanan Penghantaran (DO) yang lebih sistematik dan cekap serta pembayaran kepada pembekal. Terdapat tiga objektif kajian, pertama adalah untuk mengenal pasti keperluan pusat pengesanan yang sistematik untuk tempahan alat ganti jentera permintaan tapak di PTTJ. Kedua adalah membangunkan e-STC untuk tempahan alat ganti jentera permintaan tapak di PTTJ menggunakan wix.com dan akhirnya adalah untuk menguji keberkesanan pusat pengesanan sistematik (e-STC) untuk tempahan alat ganti jentera permintaan tapak di PTTJ. Objektif 1 dan 3, menggunakan kaedah kuantitatif yang dijalankan secara tinjauan dan objektif 2 menggunakan wix.com. Analisis Data menggunakan SPSS dan Excel Solution Online. Keputusan untuk objektif 1 menunjukkan bahawa kaedah semasa; av. min adalah sangat rendah dalam setiap elemen kekangan; <1.5 purata min dan terhasil untuk kaedah semasa, mudah untuk menjejaki elemen pesanan. Keputusan untuk objektif 2 menunjukkan bahawa e-STC bagi tempahan alat ganti jentera permintaan tapak di PTTJ menggunakan wix.com berjaya dibangunkan. Manakala, keputusan bagi objektif 3 menunjukkan bahawa > 90% responden bersetuju bahawa e-STC bagi tempahan alat ganti jentera permintaan tapak adalah sistematik. Ujian T Berpasangan menunjukkan elemen pesanan yang mudah dikesan; ujian pra, av. min ialah 1.97 manakala ujian pasca menunjukkan av. min ialah 4.31 terhasil sebagai 2.37 dalam perbezaan av. bermakna; Responden sangat setuju menggunakan e-STC. Kesimpulannya; e-STC adalah medium yang sistematik dan cekap untuk pembelian Invois dan Pesanan Penghantaran (DO) dan pembayaran kepada

pembekal dan perlu dilaksanakan untuk tempahan alat ganti mesin permintaan tapak di PTTJ.

Kata kunci: Pusat Penjejakan Sistematik, Invois, Pesanan Penghantaran (DO), Pembayaran Kelewatan, Pesanan Sekat

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LIST OF ABBREVIATION

PTT	Pembinaan Tetap Teguh
PTTJ	Pembinaan Tetap Teguh Jentera
e-STC	electronic-Systematic Tracking Center for Site Requisition Machinery Spare Part Order
IoT	Internet of Things
TAM Model	Technology Acceptance Model

CHAPTER 1

INTRODUCTION

1.1 Introduction

Construction industry is one of the industries that play an important role in developing and enhancing economic sector and the development of one’s country. According to Mordor Intelligence blog, Malaysia's construction market is expected to grow at a Compound Annual Growth Rate (CAGR) of around 6% between 2022 and 2027 as show in Figure 1. Based on Figure 1, Some of the major players in Malaysia Construction Market are YTL Corporation Berhad, IJM Corporation Berhad, Gamuda Berhad, UEM Group Berhad and Malaysian Resources Corporation Berhad takes part in the study to indicates the market summary in another five years and expected register growth driven by investment in large-scale transport and energy projects. The construction industry in Malaysia, like everything else, was severely impacted by the COVID-19 pandemic. Except for critical or essential services, most construction work was halted during the Movement Control Order (MCO). Contractors have continued to face disruption even after the MCO was lifted, such as having to incorporate stringent standard operating procedures on health and safety measures ("SOPs") for construction sites. This happen because of the disruption, they have been unable to complete their work as originally and normally planned. The construction industry is expected to expand due to investment in large-scale transportation and energy projects. In September 2021, the government announced its plan to establish the Public Private Partnership (PPP) 3.0 model, a specialized mechanism to fund infrastructure projects in the 12th Malaysia (12MP) plan between 2021 and 2025. In December 2021, the Malaysian parliament passed the government's budget for 2022, approving an expenditure of MYR 332.1 billion (USD 81.8 billion). The budget includes an allocation of MYR 75.6 billion (USD 18.6 billion) for development expenditure, as well as several incentives to

improve employment rates and support businesses The government announced its intention to establish the in September 2021.

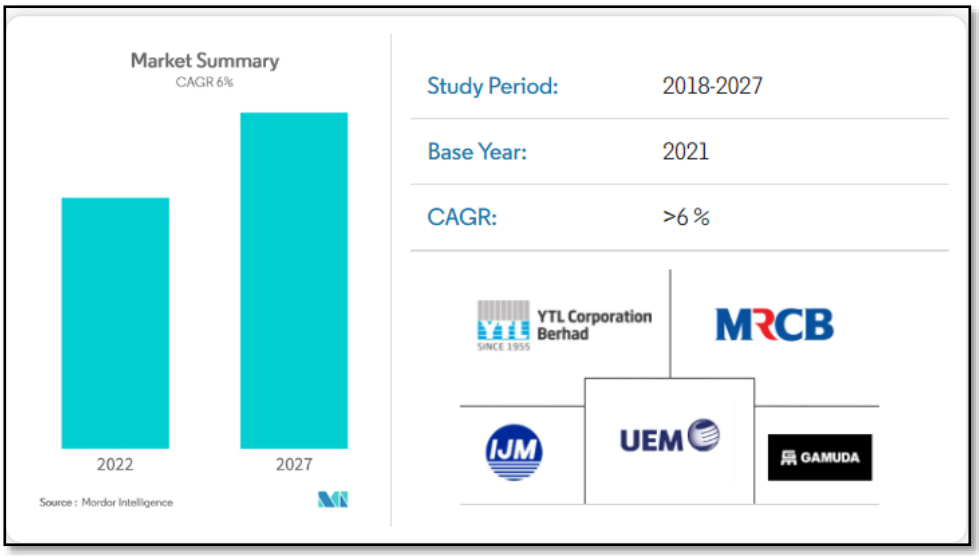


Figure 1.1: Market summary indicates CAGR 6%. (Source from Malaysia Construction Market – Market Summary; Mordor Intelligence)

The construction industry is one of the industries that plays an important role in the development and enhancement of economic sectors as well as the development of one's country. Although the construction industry contributes to development, it is not an environmentally friendly activity because many problems can arise if the industry's progress and development are not well planned for example, construction of building often results in the production of unnecessary waste which can be due to excessively ordered supplies or mishandling of materials by unskilled laborers. The solution that can be done is recycling and material recovery of C&DW varies greatly in the world, but the effort to strengthen the concept of sustainability in the construction industry can be pursued not only preparing recycled conglomerates suitable for low-cost operations such as backfilling and embankments, but also developing innovative concrete with recycled aggregate for structural applications. The Malaysian construction industry is divided into two categories which are general construction and specialty trade work. The first area is general construction, which includes building construction for example, both residential and commercial and civil engineering construction such as sewers, roads, highways, bridges,

and tunnels. The second area is special trade works, which includes metal works, electrical works, tiling, flooring, painting, glassworks, and others.

The variety of machinery used in the construction industry is critical. Despite the fact that the construction industry is more labor-intensive, modern times demand that construction be completed as quickly as possible. The construction industry, as the "Mother Industry" of all other industries, is responsible for building the basic infrastructure for other industries. Infrastructure is created through the construction of roads, water supply schemes, electrical substations, and residential colonies. Other industries' financial viability is dependent on the completion of construction projects as soon as possible. As a result, a variety of machines are required to handle the required speed, massive quantities of items, precision, and efficiency.

Pembinaan Tetap Teguh (PTT) is one of the Malaysia's leading construction company, specialized in Earthworks and Infrastructure works. At the construction site under PTT (Pembinaan Tetap Teguh), Earthwork shall consist of all necessary site clearing and grubbing, excavation and backfill for structures and trenches, site grading, grassing and restoration, as well as related work as shown on the plans and as specified. Different types of earth-moving machines are capable of accomplishing different types of tasks and owing to technological advancements in the industry. For example, excavators are used for both small and large construction sites and the applications include excavation, demolition, heavy lifting, grading, landscaping, mining, dredging and more.

Basically, all machineries at site under PTT (Pembinaan Tetap Teguh) is manage by PTTJ (Pembinaan Tetap Teguh Jentera) which is a subsidiary company under PTT. Primarily, the procurement dept. under PTTJ is responsible for sourcing direct and indirect materials requested by the internal departments, dealing with suppliers to negotiate the best price and payment terms. Procurement Department are also required to liaise with suppliers for timely delivery, coordinating and monitoring all purchases to avoid any shortages, overcharges, and breakage. Procurement Department will also be responsible to manage

supply chain related tasks, analyze the cost reduction activities and alternative part replacements.

Pembinaan Tetap Teguh Sdn. Bhd as main contractor for project at Elmina West (Phase 1B/2) and project at Bandar Bukit Raja 2 Phase 3(I8). PTT is a construction company specializing in earthworks and civil engineering. Sime Darby Property (SDP), a client for project at Elmina West (Phase 1B/2) and project at Bandar Bukit Raja 2 Phase 3(I8, has collaborated with the Tropical Rainforest Conservation and Research Centre (TRCRC) to establish the ERKC - a hub for forestry research, conservation, education, and recreation. SDP was also a pioneer in the development of sustainable townships and communities. Ranhill Consulting Sdn. Bhd. as the consultant for project at Elmina West (Phase 1B/2) meanwhile Jurutera Perunding Zaaba Sdn. Bhd as the consultant for project at Bandar Bukit Raja 2 Phase 3(I8). Sime Darby Property also engaged Shah Alam City Council (MBSA) and communities in Elmina and Bukit Subang to set up edible community gardens for residents to plant and grow their own produce. This has enabled communities not just to forge strong bonds with one another but also to generate income from selling their own produce.

The common issue that arises in the process of PTTJ in maintaining and servicing PTT's machinery is the lack of administrator works to complete the necessary paperwork required on time to make payment towards suppliers in a consistent manner. Furthermore, the insufficiency to track orders properly made by site and office, without proper order tracking the common problem that would emerge is double order. In addition, no proper process in being implemented to show the exact condition of a specific machine. In other words, the checklist to check the condition of the machineries is not properly showed and documented. In short, all this problem would soon accumulate and have a drastic affect toward the progression of work at site.

1.2 Problem Statement

The procurement department administration works in PTTJ such as issuing out material request order (MRO), Purchase Order (PO) to order spare parts from supplier. Compiling Invoices, Delivery Order (DO) for matching purposes to make payment to suppliers. On top of that, completing internals back charges, tracking machinery locations between projects and keeping track of stock in store. The challenges that arise for procurement is lack of administrator workers to compile the necessary document needed to complete matching of invoices in a consistent basis. Currently, there are only three people in the procurement department that are handling admins work related to machinery. To handle paperwork's related for roughly 400 machineries between 10 different projects could be an overload for the admins. Thus, the insufficiency to track orders occur due to the overload of tasks being completed by the admins. Without tracking the order made by office and site it will lead to some order not being made because lack of communication or order being made by both parties resulting in double order. Moreover, site does not have a proper check list form to inspect the machine condition. The existing method is only verbal inspection or "WhatsApp" to Workshop Manager.

Administrative personnel are a professional who supports more senior employees in an organization. They help to improve productivity and complete essential tasks such as filing information, managing an office and its supplies, answering and directing phone calls, writing and answering emails, dealing with suppliers and scheduling appointments. Higher-level administrators can oversee the daily administrative operations of an entire company or project. Due to the lack of administrator employee in PTTJ procurement department only having three admin employees they must work faster to handle a higher volume of work, and errors increases. With the increase workload it could add stress towards the employee to complete work and meet performance expected. Stress can lead to absenteeism and lower productivity that will undoubtedly affect the progress of work.

In this era of technologies, the use of software or system is essential to the growth of the organization. It can also help to increase productivity and maintain a systematic process in controlling the workflow. For example, to track daily orders made to suppliers. Tracking daily order makes fulfillment process easier for PTTJ procurement dept. and their customer. In this case PTTJ's customer is the foreman that request the spare part and

making the necessary repairs and service of the machineries. Due to the increase of machineries the request for spare parts is also multiplying, increasing the chances to miss certain order requested that will increase breakdown time and decelerate site progression. Furthermore, without tracking the daily order it will make double order of the same spare part occurs more often. Without proper order tracking related document would not arrive at admin in an orderly fashion resulting in late matching of invoice, that leads to late payment to supplier. Supplier will declare account block if payment wise does not meet their expectation that makes urgent spare parts needed cannot be obtained. Thus, repair cannot be made and progress of work will be affected.

The machineries condition is vital in having a stable progress of work to meet the required dead line. According to **'machinemetrics'**, machine condition monitoring is the ability to assess the health of a machine over a period of time. This can include things like its efficiency, since losses in efficiency may indicate an underlying issue. It also includes wear and tear on parts, performance indicators such as output of defective parts, usage statistics, and maintenance statistics. In knowing one machineries life expectancy site person in charge would be able to prepare for the worst outcome, to ensure the progress at site will not be highly affected. For example, excavator's average lifespan is between 7,000 hours to 10,000 hours which is about three until five years. Basically, any machineries that is older than three years should be strictly monitored to avoid excessive damage that leads to unnecessary maintenance expenses or large amount of machine downtime.

Based on oral interview towards the current method used for site requisition machinery part orders at PTTJ is not systematic and centralized between workshop department and Procurement department (PTTJ). The current method depends on 'WhatsApp' medium between workshop department and Procurement department (PTTJ), which often causes the problem of overlooking the spare part order due to too much information that needs to be known about the machineries. Based on the survey by oral interview, the most common problem they are facing is not receiving Delivery Order (DO) on time, while the worst-case scenario is that the delivery order is lost or misplaced by workshop department. In conclusion, a more systematic and centralized method is required

to overcome this issue that procurement department is having. Hence, implementing the IR4.0 is highly suitable in creating a more systematic and centralized tracking centre to assist the process and reduce their common issues. A more systematic tracking center for the ordering of machine spare parts at PTTJ needs to be developed to solve the constrains faced with the existing method.

1.3 Objective of Study

The aim of the objective is to develop the electronic Systematic Tracking Center (e-STC) for site requisition machinery spare part orders at PTTJ using wix.com to be more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. Hence to achieve this aim, objectives listed are:

1. To identify the constraint elements of existing tracking method for site requisition machinery spare part orders at PTTJ.
2. To develop the e-STC for site requisition machinery spare part orders at PTTJ using wix.com.
3. To test the effectiveness of e-STC for site requisition machinery spare part orders at PTTJ.

1.4 Scope of Study

The scope of the project is at the headquarters and two construction site which are Kota Elmina Lot 88564 (Old Lot 1455), Lot 88563 (Old Lot 1446), Lot 88564 (Old Lot 1455), dan Sebahagian Tanah Kerajaan (Rizab Jalan) Mukim Rawang, Daerah Gombak, Selangor Darul Ehsan, Kota Elmina Township and site Bandar Bukit Raja (BBR), Bandar Bukit Raja 2, Mukim Kapar, District Of Klang, Selangor as shown in Figure 1.3 Construction Site Area At Kota Elmina and Figure 1.4 Construction Site Area At Bandar Bukit Raja. Limited to employees from different positions in procurement department staffs, in Figure 1.2 Headquarters Location (Google Maps) which is place at headquarters Pembinaan Tetap Teguh Jentera and workshop department at site. The reason for choosing these two-location site because it is near to headquarters based at Shah Alam and for observation. This study is a technological solution for managing spare parts orders using Site Requisition Order and it will track the spare parts order. This project will develop a website using Wix.com to build the Site Requisition Order. The Site Requisition Order enable to track the spare parts order when the foreman check the condition machinery on site and use Site Requisition Order to update machinery condition and ordering spare parts. Then, the procurement department staffs will open the Site Requisition Order and do the documentation to ordering spare parts machinery. The work flow for the documentation in sub-topic 1.5 Significant of Study. The respondents of Site Requisition Order will be among procurement and workshop department staffs.

Figure 1.2: Headquarters Location (Google Maps)

Figure 1.3: Construction Site Area at Kota Elmina

Figure 1.4: Construction Site Area at Bandar Bukit Raja

1.5 Significant of The Study

This system is invented to be tracked machinery condition and spare parts order using website. This website developed using wix.com then the procurement staff will open the website to track spare parts order and machinery condition so the staff can do the documentation for buying spare parts from suppliers. This website is accessible to everyone, they can open the website and access it easily. The website is also easy to use and really useful for users. Figure 1.5: Significant of Study shows the correlation of machinery at site and workflow procurement department.

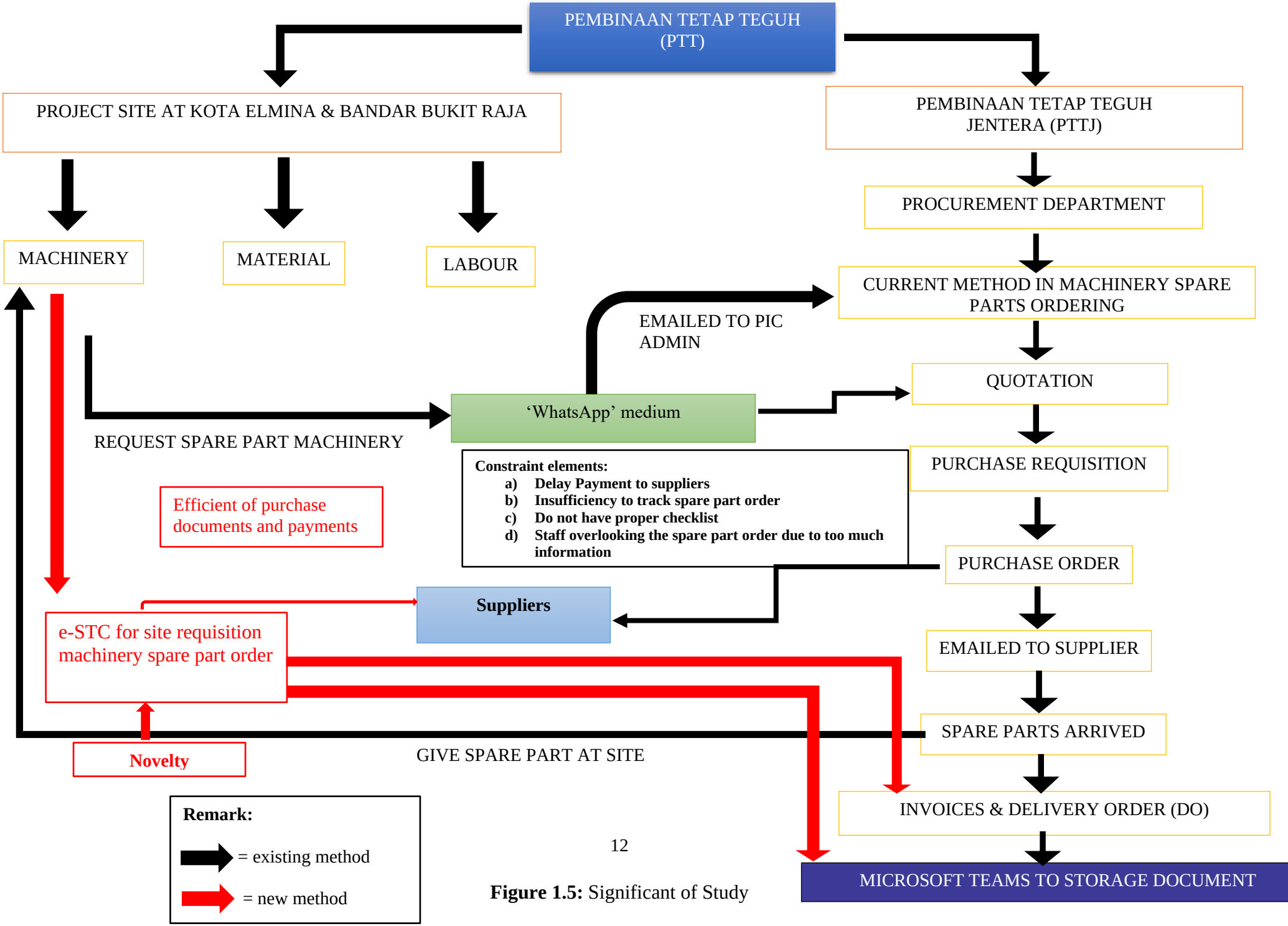


Figure 1.5: Significant of Study

The issues that arise with the current process is delay of payment to suppliers due to procurement department not receiving the necessary document to complete their matching or receiving it past the due date of the terms given. Meanwhile, the lack of administrator employee makes it more challenging for them to track their daily order efficiently and completing their responsibilities on time. Alongside that, site foreman does not have a proper checklist form in inspecting the machineries condition that could lead to unnecessary maintenance cost. Originally, the current method in use is when site foreman requests spare part to procurement department after a thorough checking of the reported breakdown machine. Thereafter, procurement Person Incharge (PIC) will deal with supplier to get quotation for the parts requested in regards of stock availability, delivery time, price and terms. Subsequently, getting approval to issue material requisition order and purchase order to be emailed to supplier. In this case, by implementing the e-STC for site requisition order it will bring great benefit in making the process of ordering spare part smoother and more systematic. It will also save procurement department more time, since the request will directly notify both the supplier and procurement department. This way will also decrease the problem of double order and miss order because the order request is more centralized. Ultimately, the necessary document like Delivery Order (DO) will not be easily overlook as all the orders is being monitored closely.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Construction is the ultimate goal of a design and machines make it possible to achieve that goal. Proper planning, selection, procurement, installation, operation & maintenance of construction equipment plays an important role on construction project (Sachin D. Bugad, 2019). The overall cost of construction is a function of the design of the construction operations and its execution. The mechanized construction is indispensable under certain conditions for a fast, efficient, and quality-oriented execution of the projects. The ability to win contracts and realize them with a profit is determined for the construction contractor by two vital assets: people and equipment. The efficiency and productivity of construction equipment mainly depends upon the type of maintenance management systems that is adopted by site supervisors (Sachin D. Bugad, 2019). So, it is necessary to give proper attention on maintaining equipment in healthy condition.

Nonetheless, new technology has a tremendous impact on a country that is at the forefront of the industrialized world. Refer to Malaysian development construction technique and simplify all work accomplished in this development. Even in this technological sector, it is possible to reduce conventional building consumption. As a result, the use of technology in the construction sector will have a favorable influence in terms of increasing efficiency and decreasing time required. Furthermore, by utilizing technologies such as apps or software systems, it can be monitored from anywhere and streamlines daily work with the touch of a fingertip.

The researcher will offer an overview of the literature to be completed in this chapter. By partnering with another researcher, the researcher may also discover a better method from the previous case study.

2.2 The Construction Equipment

Construction equipment are used for highway projects, irrigation, buildings, power projects etc., along with labor and materials, is one of the three major inputs into the building construction process. One of the reasons for the development and use of construction equipment is to enable construction activities that are beyond the limits of human strength to be performed, as well as to achieve the high standards required by current construction technologies and design. The second goal is to make the construction process more cost effective.

Many of the work activities during project construction require heavy equipment or "big iron." Equipment is a critical resource in the execution of most construction projects 15-30% of total project cost has been accounted towards equipment and machinery. Construction accounted for approximately 10% of the US gross national product at the turn of the century, employing approximately 4.5 million people. One of the major reasons that construction has attained this status is the use of heavy construction equipment. In fact, the role of heavy construction equipment today is mission critical and has an indirect impact on the quality of our lives on a daily basis. Heavy construction work usually necessitates the use of high-volume or high-capacity equipment. These specifications are typically driven by the large amount of work to be done and the time required to complete it. This work is further classified based on whether the structure is vertical or horizontal. Vertical construction typically necessitates less surface work, earth moving, and excavating, as well as more lifting. Horizontal construction usually necessitates more surface work and less lifting.

Building construction projects today are highly mechanized. With the rapid industrialization and urbanization of construction and the gradual shift to offsite prefabrication of structural and finishing elements that are then assembled (rather than manufactured) on site, production equipment is giving way to transportation equipment. As a result, material handling and lifting equipment dominates construction sites as an essential resource, accounting for a significant portion of the project's construction costs.

Pembinaan Tetap Teguh (PTT) is one of the Malaysia's leading construction company, specialized in Earthworks and Infrastructure works. PTT is an ISO certified company in ISO 14001:2004, ISO 9001:2008 and OHSAS 18001:2007. PTT also registered with CIDB as a G7 Contractor. PTT being the 1st fleet owner of Caterpillar

745C Articulated Truck & one of the largest fleet owners of Caterpillar heavy equipment in Malaysia PTT also have several heavy equipment types which are articulated trucks, excavator, loader, bulldozer, dumper, roller, skid steer loader and backhoe loader in order to fulfil the needs of workers to do earthwork stages on site. Here, the explanation about the machinery will be stated.

2.2.1.1 Articulated trucks

Articulated trucks are a type of heavy-duty dump truck that many praise for their versatility and adaptability. Unlike rigid haulers, articulated trucks consist of both a cab and a narrow trailer, or dump box. The two connect via a pivoting hinge. They are ideal for applications on challenging worksites with little to no paved roads, steep slopes, slippery or sandy surfaces, or low ceiling height. This heavy equipment at many types of job sites, including mining, recycling, and scrapping, material and aggregate hauling, and utility construction.

Figure 2.1: Caterpillar 745C Articulated Truck (Source from Pembinaan Tetap Teguh)

2.2.1.2 Excavator

An excavator contains what is called a house, undercarriage, boom, stick, and bucket. These components feature the motors and gears to move the equipment, lift the bucket, and a spot for someone to sit and be in control of the machinery. The main uses for an excavator are digging trenches, holes, and foundations, providing the power to do these tasks much more easily and effectively than any other piece of heavy equipment on the market. In addition, excavators are commonly used for projects such as demolition,

dredging rivers, material handling, or just simply heavy lifting of objects.

Figure 2.2: The Excavator Model CAT320D (Source from Pembinaan Tetap Teguh)

2.2.1.3 Loader

A loader is a heavy equipment machine that often use in construction, primarily used to load material such as asphalt, demolition, debris, dirt, snow, feed, gravel, logs, raw minerals, recycles material, rock, sand and woodchip into or onto another type of machinery such as dump truck, conveyor belt, feed-hopper or railcar.

Figure 2.3: The Wheel Loader Model SD200N (Source from Pembinaan Tetap Teguh)

2.2.1.4 Bulldozer

A bulldozer is a crawler (continuous tracked tractor) equipped with a substantial metal plate (known as a blade) that use to push large quantities of soil, sand, rubble, or other

such material during construction or conversion work and typically equipped at the rear with a claw-like device (known as a ripper) to loosen densely-compacted materials.

Figure 2.4: The Bulldozer (Source from Pembinaan Tetap Teguh)

2.2.1.5 Dumper

A dumper is a vehicle designed for carrying bulk material often on building sites. Dumpers are distinguished from dump trucks by configuration: a dumper is usually an open 4-wheeled vehicle with the load skip in front of the driver, while a dump truck has its cab in front of the load. The skip can tip to dump the load; this is where the name "dumper" comes from. They are normally diesel powered. A towing eye is fitted for secondary use as a site tractor. Modern dumpers have payloads of up to 10 tones and usually steer by articulating at the middle.
of the chassis

Figure 2.5: The Dump Truck Model MGW 600 (Source from Pembinaan Tetap Teguh)

2.2.1.6 Roller

A road roller (sometimes called a roller-compactor, or just roller) is a compactor type engineering vehicle used to compact soil, gravel, concrete, or asphalt in the construction of roads and foundations, similar rollers are used also at landfills or in agriculture.

Figure 2.6: The Single Drum Roller Model SD110 (Source from Pembinaan Tetap Teguh

2.2.1.7 Skid Steer Loader

A skid steer is a type of machine that can use for anything from small-scale home projects to large-scale land management jobs. They are an asset to any worksite, thanks to the ability to connect different attachments to complete nearly any type of project. For example, with the right attachments, the use a skid steer loader for forestry, land clearing, landscaping and farming, road work, excavation, demolition and site cleaning.

Figure 2.7: The Skid Steer Loader (Source from Pembinaan Tetap Teguh)

2.2.1.8 Backhoe loaders

A backhoe loader is a single piece of equipment that can function as either a backhoe, a tractor, or a loader. The durable backhoe is located on the back of the machine, while the loading mechanism is in the front. The central operating machine is the tractor. Because it is capable of handling so many different jobs, the use a backhoe loader for things like farming, excavation, construction, hauling and digging.

Figure 2.8: The backhoe loader model Caterpillar 416F (Source from Pembinaan Tetap Teguh)

2.2.2 The Importance Owning Construction Equipment to Company

Pembinaan Tetap Teguh (PTT) is one of the Malaysia's leading construction company, specialized in Earthworks and Infrastructure works. According to Plant Automation Technology, Modern Construction equipment plays a vital role in the construction industry where business objectives are strictly time and margin driven. The modern construction equipment's are very swift and reliable with high-quality control measures embedded into them as they have evolved over the years. Proper utilization of these equipment helps in the economy, quality, safety, speed and timely completion of the project. It optimizes the usage of material, manpower, finance, and the shortage of skilled and efficient labor and at the same time keeps a direct check over the quality measures that are being used. These are the importance the construction company possess construction machinery:

2.2.2.1 Lower Operating Cost

The operating cost of construction equipment comes into play only when the machine starts to operate. In The Constructor article, the operating cost is dependent on the period of operation (hours), location of the construction site, the site conditions under which the machine is operated, the type and category of the equipment. For the repair and maintenance, the amount required for the repair and maintenance of the construction equipment subjected to wear and tear due to the daily operations it performs. Routine equipment maintenance is done on a scheduled and ongoing basis on each machine. These maintenance tasks are usually straightforward service work that can be done by machine operators and do not require highly specialized skills for example oil changes or filter changes, safety inspections, replacing deteriorating parts, tire inspections, pressure tests, checking transmission fluid levels, checking engine coolant levels and checking the parking brake.

Repair and maintenance cost covers a substantial percentage in the overall operating cost includes cost for replacement for equipment part, labor charges and cost for facilities arranged for repair and maintenance of equipment. For instance, the company rental an excavator with price range RM 22,500 based on terms and condition with the supplier inclusive of maintenance. Meanwhile, buying an excavator with price range RM 500,000 that can use bank loan for buying the machinery. The company just

need to pay 10% from the price to supplier and the rest of it can be used for another purpose. For maintenance, based on terms and condition the company get first 5000 hours or 2 years free maintenance from supplier.

2.2.2.2 Customization The Machine

The importance of having an inventory is that the demand for spare parts is often characterized by being intermittent. It means that demand can be infrequent and is extremely dispersed over time periods. In other words, the demand for spare parts is extremely sporadic. This irregular demand arrives every time a component fails or requires replacement. Furthermore, complexity increases due to variability in order quantity and size. Due to this sporadic nature of needing parts, the principles of creating an inventory are often not applied. Therefore, it is necessary to use alternative methods to ensure a smooth flow of return on investment. The way forward would be structured and proper inventory management. Buying replacement parts can be expensive to begin with, but this cost pales in comparison to the expense incurred during a breakdown without replacement parts available. Not having spare parts within reach can lead to the closure of the entire company. The work and the execution of the work are stopped while the arrival of the new spare parts is still awaited. Having spare parts available such as backhoe loader, mini excavator, excavator, telescopic handles among others, will completely avoid unwanted expenses. Spare parts inventory systems for construction equipment provide an improved repair time rate, which naturally leads to further savings. Efficient spare parts management helps reduce time wasted on assets that are not in use.

2.2.2.3 Time-saving

According to the **'free dictionary,'** save time is to complete a task in a shorter amount of time by doing it more quickly or efficiently. Same definition would apply to the construction machinery. If the company own the machine, the construction phase work can be done without having to wait. For instance, if the company rental the machinery, the procurement staff need to issue Machine Service Requisition (MSR) to the supplier to notify them the company needs a spare parts. After that, the supplier will send the spare parts, Delivery Order (DO) and Invoices to the company. This going to take some

times since we have to wait for the spare parts. Meanwhile, if the company own the machine, the site (foreman) can fix the machine without issue any documentation related to repair machinery.

2.3 Maintenance for Equipment

In onukeep website, equipment maintenance refers to any process required to keep a company's equipment in good operating order. Maintaining a system is usually related to maintenance actions such as repairing, replacing, overhauling, inspecting, servicing, adjusting, testing, measuring, and detecting faults in order to avoid any failure that would lead to interruptions in production operations (Duffuaa et al., 2001; Ismail et al., 2009). In order to keep the equipment functions in such a way it was conceived, it is necessary to maintain it in good functioning conditions. It may comprise both normal maintenance and corrective repair work. Mechanical assets, tools, heavy off-road vehicles, and computer systems are examples of equipment. The resources required to keep everything in excellent working order will differ depending on the type. According to paper the 9th AIC 2019 on Sciences & Engineering (9thAIC-SE), the study conducted indicate that the adoption of a good maintenance strategy allows us to keep the machines operational. However, the increase in mechanical forms and the complexity of the systems lead to an increase in unplanned failure shutdowns. Qarahasanlou, Barabadi, and Ayele point to component failure as resulting in downtime; the lack of system availability; and consequently, substantial losses in production performance, high maintenance costs, and so on. Correspondingly, equipment maintenance points to solutions enable those industrial pieces of machinery to get working again in the event of breakdowns. In Pembinaan Tetap Teguh Jentera (PTTJ), there are three types of maintenance which are for corrective and preventive maintenance.

2.3.1 Corrective maintenance

Also known as “run-to-failure (RTF),” “breakdown maintenance” and “reactive maintenance” all terms to refer to corrective maintenance (A. Wilson, 2013). Corrective maintenance (CM) is one of the maintenance policies by which maintenance actions, such as repair or replacement are carried out on a system to restore it to its required

functioning after it has failed (Paz and Leigh, 1994). However, this policy leads to high levels of system breakdown and high repair and replacement costs, due to sudden failures that potentially can occur. Corrective maintenance is a maintenance task performed to identify and rectify the cause failures for a failed system. Corrective maintenance covers maintenance tasks that are undertaken to identify, isolate and repair a fault in order to restore equipment, a machine, or a system to an operational condition so it can perform its intended function. Corrective maintenance tasks can be either planned or unplanned and occur for three different reasons: - when condition monitoring highlights an issue, when a potential fault is detected through routine inspection and when a piece of equipment breaks down. Corrective maintenance is often unavoidable, with maintenance teams having to respond to equipment breakdown or failure. Corrective maintenance is fine for when an asset can be easily repaired or replaced and parts are freely available but, in some instances, it can lead to unexpected and costly downtimes.

2.3.2 Preventive maintenance

Preventive maintenance is maintenance that is regularly and routinely performed on physical assets to reduce the chances of equipment failure and unplanned machine downtime that can be very costly for maintenance teams and facility managers. Preventive maintenance (PM) was introduced in the 1950s, after the recognition of the need to prevent failure (Murthy et al., 2002). As an alternative to corrective maintenance (CM), PM has been adopted for emerging technologies since such systems are generally more complex than those based on the use of hand tools. The basic principle of a PM system is that it involves predetermined maintenance tasks that are derived from machine or equipment functionalities and component lifetimes. Accordingly, tasks are planned to change components before they fail and are scheduled during machine stoppages or shutdowns. Preventive maintenance keeps equipment and assets running efficiently, maintains a high safety level for employees, and helps avoid large and costly repairs down the road. Overall, a properly functioning preventive maintenance program ensures operational disruptions are kept to a minimum. A preventive maintenance schedule helps you organize and prioritize your maintenance tasks (like creating a work order) so that a maintenance technician can create the best working condition and life span for the equipment. By conducting regular preventive maintenance, you can ensure

your equipment continues to operate efficiently and safely.

Features	Maintenance Policies	
	Corrective maintenance (CM)	**Preventive maintenance (PM)**
Maintenance approach	Reactive	Proactive
Maintenance category	Fixing after failure	Time-based maintenance (periodic)
Downtime	Highest	Less
Good for failure	Random-age based	Age-based
Expensive (manpower)	Maximum	Little less
Initial deployment cost	None	Slightly higher
Computational cost	Least	Little higher
Schedule required	Not applicable	Based on standard useful life of component or history of failures
Action	Inspect, repair or replace after failure	Inspect, repair or replace at predetermined intervals, forecasted by design and updated through experience
Prediction type	None	None

Table 2.1: Maintenance policies (Source: Parajapathi et al.,2012)

2.4 Industrial Revolution (IR 4.0)

The concept is not new and has been on the agenda of academic research for many years with various perceptions; however, the term "Industry 4.0" has only recently been launched and is widely accepted not only in academic life but also in industrial society. While academic research focuses on understanding and defining the concept, as well as attempting to develop related systems, business models, and methodologies, industry focuses on the evolution of industrial machine suits and intelligent products, as well as potential customers on this progress.

Industry 4.0 defines a methodology to generate a trans-formation from machine

dominant manufacturing to digital manufacturing. In order to achieve a successful transformation, Industry 4.0 standard should be well understood and a clear road map is to be generated and implemented. Evaluating Industry 4.0 components and respective features is important to define the basic pillars of a concrete future manufacturing environment.

Oztemel, E., & Gursev, S (2018) It is estimated by the experts that the Industry 4.0 and related progress along this line will have an enormous effect on social life. This will naturally trigger the manufacturing society to improve their manufacturing suits to cope with the customer requirements and sustain competitive advantage. World Economic Forum prepared a report by taking 800 experts view and provided an excellent set of recommendations and findings regarding the digital transformation. The report claims that the number of robots used in manufacturing will increase to 2.4 million by 2018. This transformation is opening the door to implanted technologies to human body, wearable internet, cooperating and coordinating machines, self-decision-making systems, autonomy problem solvers, learning machines etc.

The first industrial revolution began with the introduction of mechanical manufacturing facilities in the second half of the eighteenth century and continued throughout the nineteenth century. Electrification and the division of labor (i.e. Taylorism) fueled the second industrial revolution beginning in the 1870s. The third industrial revolution, also known as the "digital revolution," began in the 1970s, when advanced electronics and information technology advanced the automation of manufacturing processes. An initiative called "Industry 4.0," which brought together representatives from business, politics, and academia Oztemel, E., & Gursev, S (2018), promoted the idea of digitization alongside some autonomy and self-behavior of machines as a way to strengthen the competitive power of the German manufacturing industry. Figure 2 depicts the historical progression of industrialization.

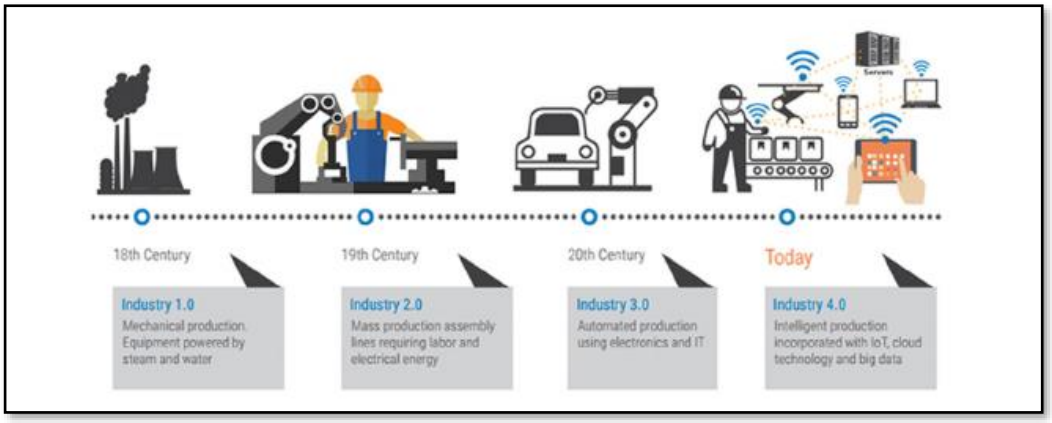


Figure 2.9: Historical perspective of industrial revolutions. (Source from Journal of Intelligent Manufacturing)

2.5 Internet Of Things (IoT)

According to Oracle Malaysia, the Internet of Things (IoT) describes the network of physical objects "things" that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. Rafirullah and Sarmad (2012) stated with the continuous advancements in technology a potential innovation, IoT is coming down the road which is burgeoning as an ubiquitous global computing network where everyone and everything will be connected to the Internet. 'e-' is a prefix that stands for "electronic" and refers to information technologies, business, and almost anything connected to or transmitted over the Internet. Some examples of its use include e-business, e-commerce, e-book, and e-mail.

IoT is constantly evolving and is a hot research topic with limitless possibilities. Its imagination is limitless, and it is on the verge of reshaping the current form of the internet into a modified and integrated version. The number of devices that use internet services is growing increasing by the day, and having them all connected by wire or wireless will provide us with a powerful source of information at our fingertips. The concept of allowing intelligent machines to interact is a cutting-edge technology, but the technologies that comprise the IoT are not new to us.

The basic idea of IoT is to allow autonomous exchange of useful information between invisibly embedded different uniquely identifiable real-world devices around us, fuelled by the leading technologies like Radio-Frequency IDentification (RFID) and

Wireless Sensor Networks (WSNs) which are sensed by the sensor devices and further processed for decision making, on the basis of which an automated action is performed.

IoT refers to the increasing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems. These devices and the communication between these devices can benefit e-STC by providing enough quality data to generate the information required to make the right decisions at the right time.

2.5.1 Microsoft Teams

Microsoft Teams is a persistent chat-based collaboration platform complete with document sharing, online meetings, and many more extremely useful features for business communications. By having an excellent team space is key to being able to make creative decisions and communicate with one another. Shared workspace software makes this much easier to achieve, especially if a particular team is based in a very large company, has many remote employees, or is made up of a significant amount of team members. Microsoft Teams features make it stand out from other collaboration software.

Firstly, teams and channels. Teams are made up of channels, which are conversation boards between teammates. Conversations within channels and teams. All team members can view and add to different conversations in the General channel and can use an '@' function to invite other members to different conversations, not unlike Slack. A chat functions. The basic chat function is commonly found within most collaboration apps and can take place between teams, groups, and individuals. Secondly, document storage in SharePoint. Every team who uses Microsoft Teams will have a site in SharePoint Online, which will contain a default document library folder. All files shared across all conversations will automatically save to this folder. Permissions and security options can also be customized for sensitive information. Thirdly, online video calling and screen sharing. Enjoy seamless and fast video calls to employees within your business or clients outside your business. A good video call feature is great to have on a collaboration platform. One can also enjoy simple and fast desktop sharing for technical assistance and multi-user real-time collaboration.

Another feature is online meetings. This feature can help enhance your

communications, company-wide meetings, and even training with an online meetings function that can host up to 10,000 users. Online meetings can include anyone outside or inside a business. This feature also includes a scheduling aid, a note-taking app, file uploading, and in-meeting chat messaging. Lastly, audio conferencing. This is a feature will not find in many collaboration platforms. With audio conferencing, anyone can join an online meeting via phone. With a dial-in number that spans hundreds of cities, even users that are on the go can participate with no internet required.

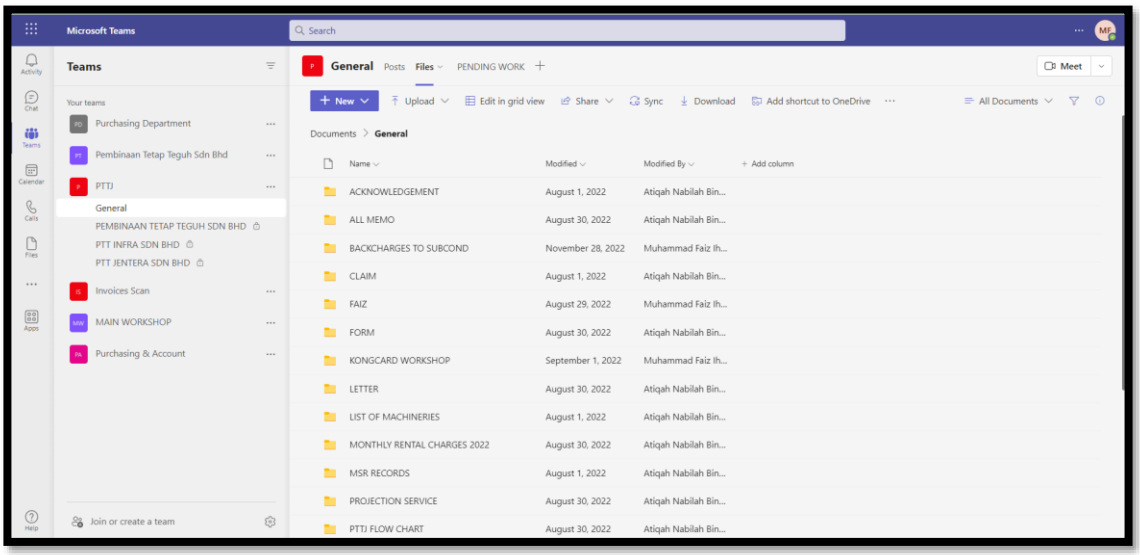


Figure 2.10: Microsoft teams as a document storage related to machinery

2.5.2 Microsoft Teams for document storage

Microsoft SharePoint 2010 makes it easier for people to work together by allowing them to set up Web sites to share information with others, manage documents from start to finish, and publish reports. Document management with SharePoint allows users to manage common document types, such as Word, Excel, PowerPoint, and OneNote, and create folders to save and manage those documents in customer engagement apps. Microsoft Teams integration with Dynamics 365 allows users to co-author documents and automatically sync documents to customer engagement apps using SharePoint. For each tenant, there is a single SharePoint instance, with documents in Dynamics 365 and files in Microsoft Teams all on the same SharePoint site.

The relationship between SharePoint permissions and permissions to customer engagement apps is not automatic. To access documents between Microsoft Teams

and customer engagement apps, you need explicit permission to use document management for customer engagement apps and SharePoint. To store and manage documents in the context of a record on a SharePoint Server, use the Files tab in Microsoft Teams or the Documents tab in customer engagement apps. Documents are stored on a SharePoint Server that allows a user on Microsoft Teams to access the documents as long as they have appropriate permissions. A user's access to files in Microsoft Teams or customer engagement apps depends on their access to the SharePoint site the file is stored in.

2.5.3 Microsoft Teams conducted by PTTJ

Key features are explored to support the documentation options in Microsoft Team meeting. Additional screenshots regarding these features are attached in this sub topic.

2.5.3.1 Conversation Channels

User can dedicate chat channels to certain topics, making it easier to keep messaging relevant and resolve problems faster, without distraction. With channels separated by topic, there is far less clutter. It also makes finding what you’re looking for seamless, as you don’t have to scroll through a lot of irrelevant messages. This means less time wasted and less frustrated employees. The Conversation tab in Microsoft Teams appears in the General channel. It also shows up in any other additional channels user create. All class members can contribute to this channel. In other channels, the @mention button can be used to invite people to the conversation. Conversations vary from chats, as everyone in the channel can view them. They can view the files that are shared in the conversation, too, by going to the Files tab.

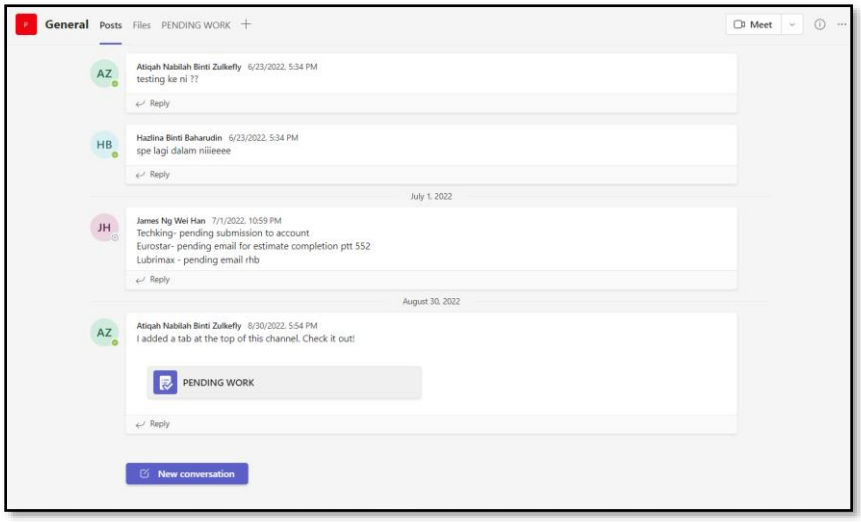


Figure 2.11: Example group chat in PTTJ Microsoft Teams

2.5.3.2 File storage in Microsoft Teams

Files that user upload to a channel are stored in team's SharePoint folder. These files are available in the Files tab at the top of each channel. Files that upload to a one-on-one or group chat are stored in OneDrive for Business folder and are shared only with the people in that conversation.

i) Acknowledgement Account

Procurement is the act of obtaining or purchasing goods or services, typically for business purposes. Procurement is most commonly associated with businesses because companies need to solicit services or purchase goods, usually on a relatively large scale. It can also include the overall procurement process, which is critically important for companies leading up to their final purchasing decision. Procurement and procurement processes can require a substantial portion of a company's resources to manage. Procurement budgets typically provide managers with a specific value they can spend to procure the goods or services they need. The process of procurement is often a key part of a company's strategy because the ability to purchase certain materials or services can determine if operations will

be profitable. Procurement processes will be dictated by company standards often centralized by controls from the accounts payable (AP) division of accounting. The procurement process includes the preparation and processing of a demand as well as the end receipt and approval of payment. The completed document will scan and upload in folder 'Scan invoices' according supplier name in Microsoft Teams and procurement staff update acknowledge account and statement vendor supplier to keep up to date and to prevent double payment or lost document.

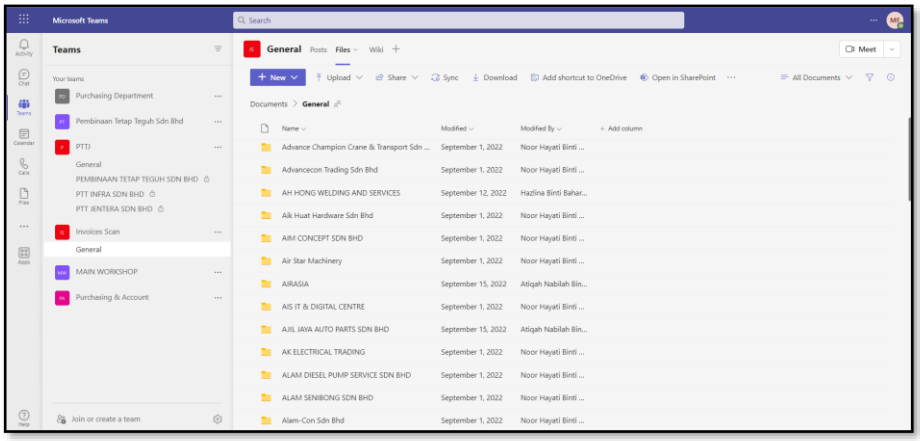


Figure 2.12: Scan invoices folder according supplier name

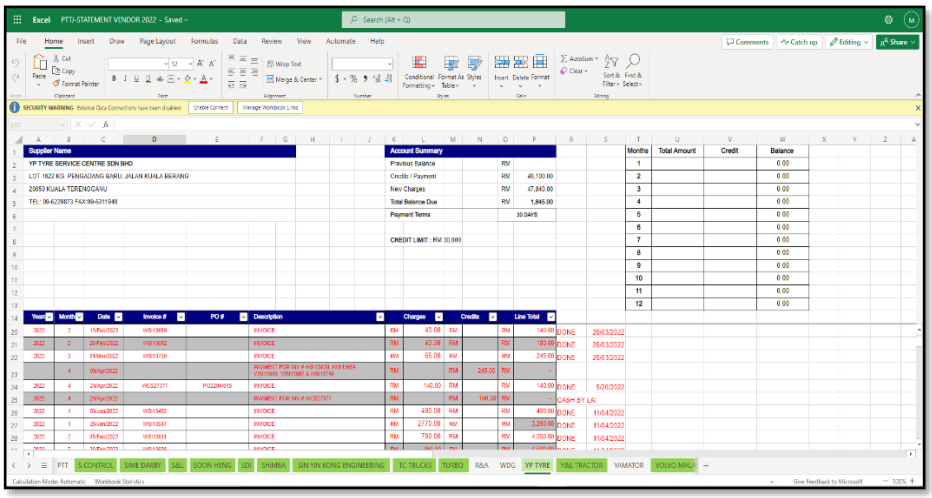


Figure 2.13: Invoices that sent to account need to update done at statement vendor

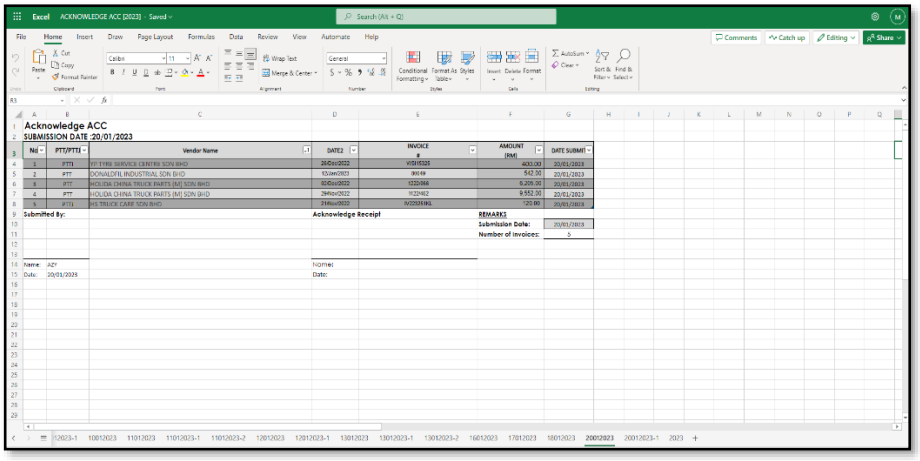


Figure 2.14: Updated invoices on date at acknowledgement account

ii) **Staff Claim, Site Expenses Claim and Staff Reimbursement Expenses**

Part of accounting services includes expense reimbursement. An expense reimbursement system can be thought of as repaying staff for making small purchase decisions on behalf of the organization.

Submitting and approving a purchase request for small items is a tedious process, which could slow down your business and operation. Thus, the expense reimbursement system allows staff to pay for small purchases set within the defined set of legal guidelines of the company, and the payments can be in cash or with a personal credit card. Typically, all staff need to do is submit a form with receipts (paper or electronic) at the end of the month, instead of the aforementioned pre-approval process. Eexpense reimbursement may include mileage claims & transportation, client activity & entertainment, general factory & office purchases, medical claims, staff meals, travel claims & flights, housing and healthcare & medication. The Staff Claim or Reimbursement Expense completed will scan and upload in folder ‘Scan invoices’ according supplier name in Microsoft Teams and procurement staff update staff claim or reimbursement expense to keep up to date and to prevent double

payment or lost document.

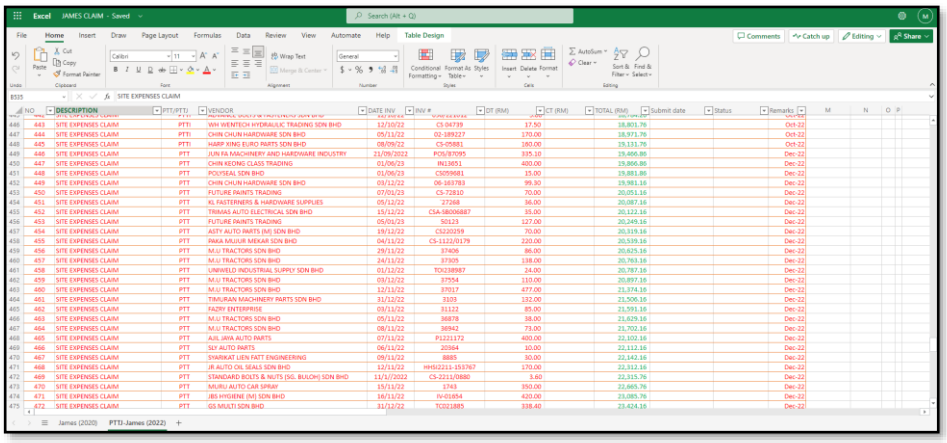
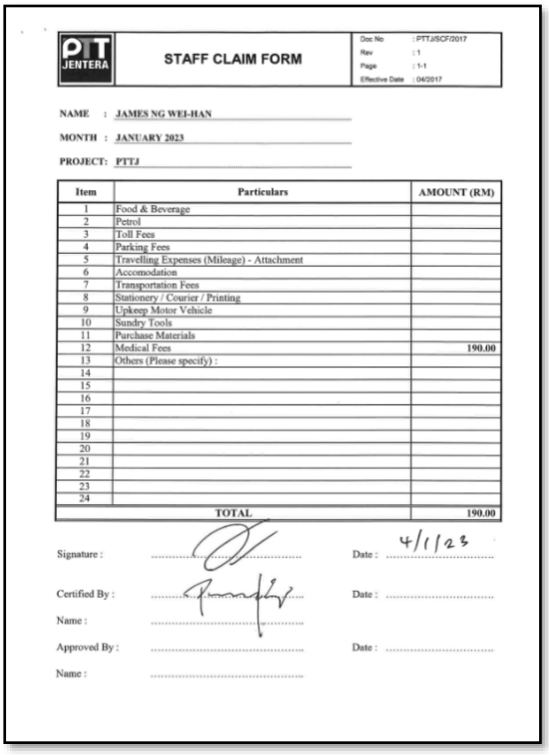


Figure 2.15: Staff Claim invoices update on Staff Claim file



STAFF CLAIM FORM

Doc No : PTTJ/SCF/2017
Rev : 1
Page : 1-1
Effective Date : 04/2017

NAME : JAMES NG WEI-HAN

MONTH : JANUARY 2023

PROJECT: PTTJ

Item	Particulars	AMOUNT (RM)
1	Food & Beverage	
2	Petrol	
3	Toll Fees	
4	Parking Fees	
5	Travelling Expenses (Mileage) - Attachment	
6	Accomodation	
7	Transportation Fees	
8	Stationery / Courier / Printing	
9	Upkeep Motor Vehicle	
10	Sundry Tools	
11	Purchase Materials	
12	Medical Fees	190.00
13	Others (Please specify) :	
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
	TOTAL	190.00

Signature : ..... Date : 4/1/23

Certified By : ..... Date : .....

Name : .....

Approved By : ..... Date : .....

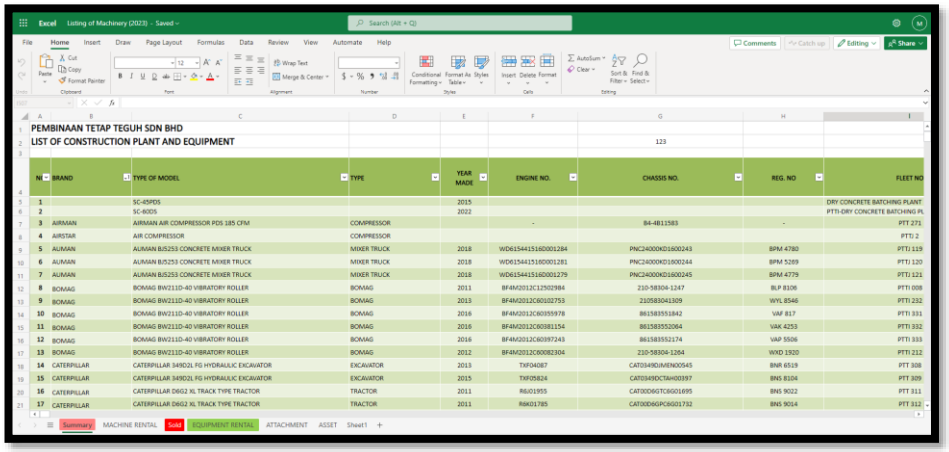
Name : .....

Figure 2.16: Example Staff Claim Form

iii) List Of Machineries

A Machineries List is a listing of all tagged equipment with equipment number, service description, capacity, dimension and size, weight, required power, PO number, reference P&ID numbers as well as key summary information of those tagged

equipment items. The Equipment List is initiated and developed by the process team through FEED, and updated and finalized by the equipment engineering (mechanical, etc.) team through EPC. The Equipment List is a deliverable document of the FEED and Detailed Design and Engineering generated by a Process and Mechanical disciplines.



PEMBINAAN TETAP TEGUH SDN BHD
LIST OF CONSTRUCTION PLANT AND EQUIPMENT

NO	BRAND	TYPE OF MODEL	TYPE	YEAR MADE	ENGINE NO.	CHASSIS NO.	REG. NO	FLEET NO
1		SC-65PDS		2015				DRY CONCRETE BATCHING PLANT
2		SC-60DS		2022				PTI-DRY CONCRETE BATCHING PL
3	AIRMAN	AIRMAN AIR COMPRESSOR PDS 185 CFM	COMPRESSOR		-	B4-4B11583	-	PTT 271
4	AIRSTAR	AIR COMPRESSOR	COMPRESSOR					PTI 2
5	AUMAN	AUMAN BJ5253 CONCRETE MIXER TRUCK	MIXER TRUCK	2018	WD615441516D001284	PNC24000KD1600243	BPM 4780	PTI 119
6	AUMAN	AUMAN BJ5253 CONCRETE MIXER TRUCK	MIXER TRUCK	2018	WD615441516D001281	PNC24000KD1600244	BPM 5289	PTI 120
7	AUMAN	AUMAN BJ5253 CONCRETE MIXER TRUCK	MIXER TRUCK	2018	WD615441516D001279	PNC24000KD1600245	BPM 4779	PTI 121
8	BOMAG	BOMAG BW211D-40 VIBRATORY ROLLER	BOMAG	2011	BF4M2012C12502984	210-58304-1247	BLP 8106	PTI 008
9	BOMAG	BOMAG BW211D-40 VIBRATORY ROLLER	BOMAG	2013	BF4M2012C60102753	21058304309	WYL 8546	PTI 232
10	BOMAG	BOMAG BW211D-40 VIBRATORY ROLLER	BOMAG	2016	BF4M2012C60355978	861583551842	VAF 817	PTI 331
11	BOMAG	BOMAG BW211D-40 VIBRATORY ROLLER	BOMAG	2016	BF4M2012C60382154	861583552064	VAK 4253	PTI 332
12	BOMAG	BOMAG BW211D-40 VIBRATORY ROLLER	BOMAG	2016	BF4M2012C60397243	861583552174	VAP 9506	PTI 333
13	BOMAG	BOMAG BW211D-40 VIBRATORY ROLLER	BOMAG	2012	BF4M2012C60082304	210-58304-1264	WXD 1920	PTI 212
14	CATERPILLAR	CATERPILLAR 349D2L FG HYDRAULIC EXCAVATOR	EXCAVATOR	2013	TXF04087	CAT0349DJMEN00545	BNR 6519	PTT 308
15	CATERPILLAR	CATERPILLAR 349D2L FG HYDRAULIC EXCAVATOR	EXCAVATOR	2015	TXF05824	CAT0349DCTAH00397	BNS 8104	PTT 309
16	CATERPILLAR	CATERPILLAR D6G2 XL TRACK TYPE TRACTOR	TRACTOR	2011	R6J01955	CAT0D6GTC6G01695	BNS 9022	PTT 311
17	CATERPILLAR	CATERPILLAR D6G2 XL TRACK TYPE TRACTOR	TRACTOR	2011	R6K01785	CAT0D6GPC6G01732	BNS 9014	PTT 312

Figure 2.17: List of machineries at Pembinaan Tetap Teguh

2.5.4 QnE Server Software (QnE)

QNE Software assumes no responsibility for any errors or omissions in the software or documentation available on its website. In no event shall the QNE Software be liable to you or any third party for any special, punitive, incidental, indirect, or consequential damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of use, data, or profits, arising out of or in connection with the use of this software, whether or not the QNE Software was advised of the possibility of such damages, and regardless of the theory of liability. You use software downloaded from the QNE Software site at your own discretion and risk, and you agree to accept full responsibility for any harm to your computer system or data loss as a result of such acts. You may not get any warranty for the program based on any advice or information gained from the QNE Software or the QNE Software web site, whether spoken or written. Accounting Software is available for free download for a limited time, after which you must purchase a license to continue using it. Accounting software may be downloaded for free for a trial period.

QNE Software is a tried-and-true Malaysian software that is excellent for a wide

range of industries due to its localized software features and capabilities. We are excited to provide user-friendly accounting, inventory, POS, and payroll software solutions to a wide range of industries, and we are pleased that QNE users are pleased with our software and support services

2.6 Applicable Codes and Standard

Codes and standards provide a common language and requirements for the design, construction, and operations of buildings. Such codes and standards have long served as the main tool of governments in setting agreed-upon norms in a jurisdiction.

The Department of Standards Malaysia (STANDARDS MALAYSIA) is the national standardization and accreditation body. The main function of the Department is to foster and promote standards, standardization, and accreditation as a means of advancing the national economy, promoting industrial efficiency and development, benefiting the health and safety of the public, protecting the consumers, facilitating domestic and international trade and furthering international cooperation in relation to standards and standardization. Malaysian Standards are developed through consensus by committees which comprise of balanced representation of producers, users, consumers, and others with relevant interests, as may be appropriate to the subject in hand. To the greatest extent possible, Malaysian Standards are aligned to or are adoption of international standards. Approval of a standard as a Malaysian Standard is governed by the Standards of Malaysia Act 1996 (Act 549). Malaysian Standards are reviewed periodically. The use of Malaysian Standards is voluntary except in so far as they are made mandatory by regulatory authorities by means of regulations, local by-laws or any other similar ways.

The adoption of the IEC Standard as a Malaysian Standard was recommended by the Working Group on Low Voltage Switchgear and Control gear under the authority of the Electrotechnical - 1 Industry Standards Committee. This Malaysian Standard is identical with IEC 60204-1:2005, Safety of machinery – Electrical equipment of machines – Part 1: General requirements, published by the International Electrotechnical Commission (IEC). However, for the purposes of this Malaysian Standard, the following applies:

a) in the source text, "this International Standard" should read "this Malaysian Standard";

and

b) the comma which is used as a decimal sign (if any), to read as a point;

c) The basis IEC 60204-1 is printed in English and French languages. However, only the English version is retained for this Malaysian Standard; and

d) references to International Standards should be replaced by equivalent Malaysian

Standards as follows:

Referenced International Standards	Corresponding Malaysian Standards
IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*	MS IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*
IEC 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*	MS IEC 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*
IEC 60034-11, *Rotating electrical machines – Part 11: Thermal protection*	MS IEC 60034-11, *Rotating electrical machines – Part 11: Thermal protection*
IEC 60364-4-41, *Electrical installations of buildings – Part 4 –41 Protection for safety –Protection against electric*	MS IEC 60364-4-41, *Electrical installations of buildings – Part 4 –41 Protection for safety – Protection against electric*
IEC 60364-4-43, *Electrical installations of buildings – Part 4 –43 Protection for safety –Protection against overcurrent*	MS IEC 60364-4-43, *Electrical installations of buildings – Part 4 –43 Protection for safety – Protection against overcurrent*
IEC 60364-5-52, *Electrical installations of buildings – Part 5 –52: Selection and erection of electrical equipment – Wiring systems*	MS IEC 60364-5-52, *Electrical installations of buildings – Part 5 –52: Selection and erection of electrical equipment – Wiring systems*

2.7 Stakeholders in Construction Project

Construction project stakeholders are individuals or groups/organizations who have some aspects of right or ownership in the project and can contribute to it; or will incur or justifiably perceive they will incur a direct benefit or loss as a result of either the works during the project or the outcome of the project. The narrow definition of stakeholders is only useful for identifying those stakeholders with direct stakes and economic relationships with the project and excludes those without direct economic relationships but may be capable of influencing the project implementation process. Customers can alter their purchasing patterns, suppliers can alter how they manufacture and distribute their products, and governments can alter the laws and regulations. The secret to a company's long-term success is ultimately managing relationships with

internal and external stakeholders.

2.7.1 Pembinaan Tetap Teguh (PTT)

Pembinaan Tetap Teguh (PTT) is one of the Malaysia's leading constructions companies that specialized in Earthworks and Infrastructure works. With their focus on green and environmental - friendly construction, work ethics, occupational health and safety, PTT offers competitive creative solutions not least for the most challenging and impactful assignments. Pembinaan Tetap Teguh (PTT) guiding principle is to provide genuine value to its clients and engage them in close, long-term partnerships that result in exceptional performance in the upkeep, innovation, and development of the built environment. PTT as a main contractor oversees and manages the construction of a building project. The work is delivered under a contractual agreement. There are a number of forms of contract and it is important to understand, the role of the Main Contractor will vary depending on the type of construction contract.

2.7.2 Pembinaan Tetap Teguh Jentera (PTTJ)

Pembinaan Tetap Teguh Jentera (PTTJ) is a subsidiary company under Pembinaan Tetap Teguh (PTT). A subsidiary is a company that is owned or controlled by a parent or holding company. The main scope of this subsidiary company is to manage all the equipment's including repair and service under Pembinaan Tetap Teguh. PTTJ also own equipment and rent their equipment's to holding company which are PTT. In PTT, there are about 400 equipment's including rental. For the repair and maintenance, the amount required for the repair and maintenance of the construction equipment subjected to wear and tear due to the daily operations it performs. Routine equipment maintenance is done on a scheduled and ongoing basis on each machine. These maintenance tasks are usually straightforward service work that can be done by machine operators and do not require highly specialized skills for example oil changes or filter changes, safety inspections, replacing deteriorating parts, tire inspections, pressure tests, checking transmission fluid levels, checking engine coolant levels and checking the parking brake.

2.7.3 Stakeholders Involved in Project Kota Elmina (Phase 1B/2) and Bandar Bukit Raja Phase2/3B (I8)

2.7.3.1 Sime Darby Property (SDP)

Sime Darby Property (SDP) as a client in both project has joined forces with Tropical Rainforest Conservation and Research Centre (TRCRC) in pioneering the ERKC – a hub to promote forestry research, conservation, education and recreation. SDP also was the leading developer of sustainable townships and communities. Sime Darby Property is Malaysia's biggest property developer in terms of land bank, with approximately 15,400 acres available land bank with a total estimated GDV of RM104bil. Their excellent track record in developing residential, commercial and industrial properties is represented by the 25 strategically located and active townships, integrated and niche developments built to date. These townships and developments are connected to major highways and transportation hubs within key growth areas from the central region of Klang Valley to Negeri Sembilan and Johor in the South. Sime Darby Property marks its presence in the United Kingdom as part of a Malaysian consortium to develop the iconic Battersea Power Station Project in central London.

2.7.3.2 Ranhill Consulting Sdn. Bhd

Ranhill Consulting Sdn. Bhd is the consultant for Kota Elmina project. Ranhill Bersekutu Sdn. Bhd. (RBSB) (198101006302) & Ranhill Consulting Sdn. Bhd. (RCSB) (199601022517) are leading Malaysian Bumiputera engineering firm established in 1973. RCSB is registered with Malaysian Board of Engineers (BEM) and Ministry of Finance (MOF) along with other private agencies or entities. The company's history dates back to more than 50 years through its earlier overseas affiliation. The firm is a multi-disciplinary consultancy providing comprehensive engineering (Geotechnical, Civil, Structural, Mechanical and Electrical), Project Management and Ecologically Sustainable Design/Green Building technology services. They have been involved in diverse and comprehensive range of projects and have engineered over 2000 projects covering feasibility studies, conceptual design, schematic design, detailed design, construction management, environmental monitoring project management and auditing. Significant engineering projects undertaken include roads, bridges, railways, water

supply, wastewater, drainage, irrigation, flood mitigation, storm water management, coastal engineering, power, telecommunications, townships, ports, airports, hospitals, universities, high-rise offices, hotels, resorts, condominiums, shopping complexes, recreational facilities, other industrial schemes and environmental-impact assessment (EIA), management and monitoring.

2.7.3.3 Jurutera Perunding Zaaba Sdn. Bhd

Jurutera Perunding Zaaba Sdn. Bhd is the consultant for Bandar Bukit Raja project. Jurutera Perunding Zaaba Sdn. Bhd. is an engineering consultancy firm with more than 30 years of experience and a staff force of about 200 personnel, entrusted with helping the growth of the nation through diverse services, including masterplans and policy-related studies, in a wide spectrum of engineering fields such as transportation, roads and highways, water resources and water supply, residential, commercial and industrial development, mechanical and electrical engineering.

2.7.3.4 Majlis Bandaraya Shah Alam (MBSA)

Majlis Bandaraya Shah Alam (MBSA)is an agency under the Selangor state government. MBSA is responsible for public health, sanitation, waste removal and management, town planning, environmental protection and building control, social and economic development and general maintenance functions of urban infrastructure.

2.8 Tracking system

A tracking system is used for the tracking and monitoring of people, vehicle or any other objects on the move and supplying a timely ordered sequence of location data for further processing. It is well known that spare parts management is difficult because the parts can be expensive, their demand is highly erratic and intermittent, yet their shortage costs can be very large (Aberdeen Group, 2003). Moreover, spare parts typically carry high obsolescence risk due to their specific functionalities.

2.9 Constraint of existing methods for site requisition machinery spare part orders in Procurement Department at PTTJ

Identifying and overcoming procurement challenges is time, money, and effort well spent since procurement has a direct impact on an organization's bottom line. While procurement challenges can vary based on an organization's size, line of business, etc., Here are four (4) Procurement Department issues in PTTJ. The constraint element of existing method are delay payment, easy to track order, systematic tracking medium and effective communication.

2.9.1 Delay payment for spare parts machinery to supplier

Operational management is a business that maximizes the use of all factors of production, both labor (HR), machinery, equipment, the raw material (raw materials), and other elements of production in the transformation process to become various kinds of products or services (Huo and Hong, 2013). Also be seen that the most significant weakness factor for the company is the potential for machine reliability to be reduced due to a considerable outage delay and some payments to suppliers were delayed due to the approved payment system

2.9.2 Insufficiency to track spare part orders

Spare part management deals with the procurement and ordering of the components of equipment used in manufacturing or service industries, in order to keep equipment in operating condition (Kennedy et al. 2002). When a spare part is ordered, it can only be delivered to any one of the unvisited ports on the given route. Whilst, in practice, direct delivery of parts to a vessel is possible (e.g., using transport), the cost of this operation is likely to be prohibitive, for which reason we exclude such possibilities here.

2.9.3 PTTJ do not have a systematic tracking medium

A checklist is a list of items you need to verify or check or inspect. They are used in a variety of fields from construction to health service. A proper

checklist helps to identify maintenance actions on equipment to maintain it in good conditions and to improve plant reliability. In PTTJ, when foreman inspect the machine, they will upload the machine condition through 'WhatsApp' application group to procurement staff to take note that led to overlook. A proper checklist will help to ensure that all the relevant actions and elements are included. It is essential that each item on checklist is easily understood by the people using it, therefore keep it simple and include do steps.

2.9.3.1 WhatsApp Group medium for updating information center

Staff members in a WhatsApp group might overlook information since the lack of a regular tracking medium. WhatsApp groups are intended for real-time communication and are frequently used for informal talks, brief updates, or team discussions. In PTTJ, when foreman inspect the machine, they will upload the machine condition on site through 'WhatsApp' application group to procurement staff to take note that led to overlook. While they are useful for instant communication, they may not be the best platform for long-term information tracking.

2.9.4 Poor communication among procurement and workshop department staff

Poor communication among procurement and workshop department staff can have several detrimental effects on the overall functioning and efficiency of an organization. When there is poor communication between the procurement and workshop departments, there is a higher chance of misalignment in terms of identifying the required spare parts. The workshop department may not effectively communicate their specific needs and requirements to the procurement team, leading to incorrect or inadequate parts being procured. This can result in delays in repairs, increased downtime, and additional costs. Poor communication can lead to inefficiencies in the procurement processes. For instance, without proper communication, the procurement team may not have a clear understanding of the urgency of certain spare parts required by the workshop. This can lead to delays in processing purchase orders or expedited shipping, which further prolongs equipment downtime. Poor communication

can lead to increased instances of rework and errors. For example, if the workshop department does not effectively communicate changes in repair needs or specifications, the procurement team may order incorrect parts or quantities. This results in wastage of time, effort, and resources, as well as delays in resolving equipment issues.

2.10 Systematic Tracking Center

A systematic tracking centre is a facility or system that is dedicated to tracking and monitoring specified information, activities, or occurrences in an organized and structured manner. It is usually outfitted with the tools, technology, and procedures required to collect, record, analyse, and report on the monitored data. A systematic tracking center is a dedicated facility or system that provides the infrastructure, tools, and processes for organized and structured tracking of specific information, activities, or events. It helps organizations or entities effectively monitor, analyse, and respond to the data or events being tracked, enabling better decision-making and improved overall performance.

The common issue that arises in the process of PTTJ in maintaining and servicing PTT's machinery is the insufficiency to track orders properly made by site and office, the checklist to check the condition of the machineries is not properly showed and documented. Delay Payment to suppliers due to incomplete documentation for purchasing spare part order and insufficiency to track spare part order due to unsystematic tracking method. Poor communication among procurement and workshop department staff also affected.

2.11 Develop the e-STC for site requisition machinery spare parts order using wix.com

The process of developing new application using Wix.com. Wix is a cloud-based website builder that includes web hosting and design services. Wix provides customizable website templates and a drag-and-drop HTML5 web site builder that includes apps, graphics, image galleries, fonts, vectors, animations and other options. Users also may opt to create their web sites from scratch.

2.12 Wix.com

Wix is a cloud-based website builder that includes web hosting and design services. Its user-friendly drag-and-drop tools and over 500+ ready-made templates enable you to design your website without the need for specialized knowledge or the employment of a web expert. Wix speeds up the web building process and provides you the creative freedom to create the website of your dreams. Wix is an excellent website builder for small and medium-sized ecommerce companies. It has more than 200 million registered users worldwide and is available in 17 languages.

Wix sites are optimized for mobile, built, maintained, and managed easily through the Wix website. No matter what user experience level is, Wix has an option for creating your site. Wix Editor – The standard drags and drop website builder; users can choose from and customize a huge number of templates. Wix ADI (Artificial Design Intelligence) – Wix ADI creates a tailor-made website for users, making it the quickest and easiest way to set up a Wix site. Corvid by Wix – The most technical option for creating a Wix site, Corvid is an open development platform for users to code and design their site from scratch.

2.12.1 Features in wix.com

2.12.1.1 Ease of use

Wix is the beginner-friendly website builder out there. The editor looks beautiful, and it is effortless to use. When user open the editor for the first time, user will be welcomed by their simple on boarding system that starts with a short video. The video is provided about one minute long is a clear message about how straightforward the process is. If user have any previous experience with building website, user will only need a few minutes to browse around Wix to learn pretty much everything user need. The location of their elements is exactly where user would expect them to be, making the layout extremely intuitive. If user is a complete beginner, it will take an extra few minutes to look around until familiarize with the editor.

2.12.1.2 Templates

Wix has hundreds of templates available. Among those hundreds of templates, user can really find dozens of styles, and something to appeal to everyone. The diversity of categories is simply amazing. Wix proves that they really can cater to everyone's needs. If user looking for something very basic, a fairly common template for photography or business, or even something more unique like a drag queen promotional template, Wix has it all. Figure 2.7 show templates that are available in wix.com for user to choose.

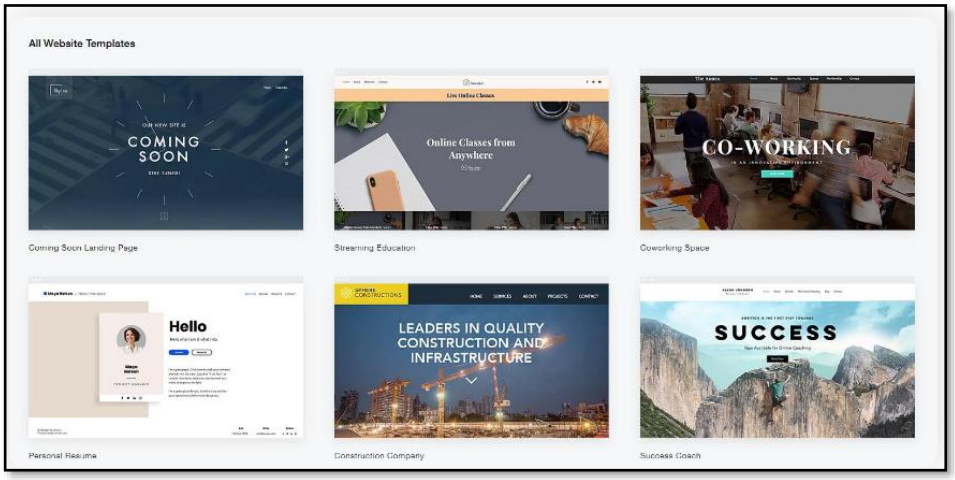


Figure 2.18: Wix templates (Source from Wix.com)

2.12.1.3 Design flexibility

If user want to place an element on one side of the screen, user have to do is move it there. User can move everything as easy as you would move an icon from one side of desktop to the other. User also can choose from a variety of items such as text, images, buttons, galleries, menus, lists, and much more. Editing website elements is as easy as adding them to the page. Clicking on an element opens a menu that provides element-specific options. Everything is in reach, and all options are visual that means user do not have to know HTML, CSS, or any other technicality. This means that instead of Googling the terms user doesn't understand, user can focus on building your site exactly how you imagined it in the first place.

CHAPTER 3

METHODOLOGY

3.1 Introduction

According to **'Gradcoach'**, research methodology refers to the practical "how" of any given piece of research that specifically it's about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives. This chapter will draw up the method and techniques used to obtain the effectiveness of the systematic tracking center for site requisition order machinery spare parts. In this chapter included sub topics which is study location, sample size, research design, data collection, data analysis and hypothesis to achieve the objectives. Explanations are also provided on how instruments were validated and how data will collect and analyzed. Besides, the objectives of this study will turn into the collection of data from two source which is primary source (survey questionnaire) and secondary source (literature review). Other methodologies and findings for this study are in journals or other benefit to improve as future studies. This website develops using wix.com to build systematic tracking center for site requisition machinery spare part orders (e-STC) that can be used by foreman to update the machinery condition, purchase machinery spare parts and based on the orders, the purchasing staff can prepare the documentation to purchase spare parts from suppliers. This application is designed for efficient to track orders and updated machinery condition compared to current method which is 'WhatsApp' group.

A set of questionnaires will distribute to procurement department team member at PTTJ as well as foreman. Accordingly, they provide the effectiveness of the website to solve the problem on site and headquarters. During the questionnaire being distributed to respondents which is procurement department team member and foreman, they can overlook at the e-STC For Site Requisition Machinery Spare Part Order and how it works. To meet the study aim and objectives, the research process is divided into

four primary activities, which are:

i. Research literature review.
ii. Study machinery and identify related document for purchasing spare parts to suppliers.
iii. Design thinking process.
iv. Data analysis

3.2 Design Research

Research design is the conceptual structure within which research is conducted and includes the collection and analysis of data which are relevant to the research (Kothari, 2004). It is the plan that demonstrates the approach and strategy of investigation used to obtain valid and reliable data that met the research objectives and answered research questions. The researcher used a case study design because it emphasizes a full contextual analysis of fewer events or conditions and their interrelationships. Based on Kothari (2004), has explained case study as complete and careful observation form of a qualitative analysis of a social unit that places more emphasis on the full analysis of a limited number of events or conditions and their interrelations.

A research topic's design describes the type of research for example experimental, survey research, correlational, semi-experimental, review and its sub-type are experimental design, research problem, and descriptive case-study. There are three main sorts of designs for research which is data collection, measurement, and analysis. The type of research problem that an organization faces will determine the research design, not the other way around. The study's design phase determines which tools to use and how to use them.

Impactful research reduces data bias and increases trust in the accuracy of collected data. In experimental research, the desired outcome is generally considered to be a design that produces the smallest margin of error. The essential components are as follows:

i. Accurate purpose statement
ii. Techniques to be implemented for collecting and analyzing research
iii. The method applied for analyzing collected details
iv. Type of research methodology

v. Probable objections for research

vi. Settings for the research study

vii. Timeline

viii. Measurement of analysis

Hence, the purpose of design research is to discuss and explains method used by researcher in provide a plan of study that permits accurate assessment in conducting the usability using systematic tracking system for site requisition machinery spare part order using wix.com. Figure 3.1 shows the method of illustrated to create e-STC For Site Requisition Machinery Spare Part Order at Pembinaan Tetap Teguh Jentera (PTTJ). Table 3.1 shows that research design method of this study.

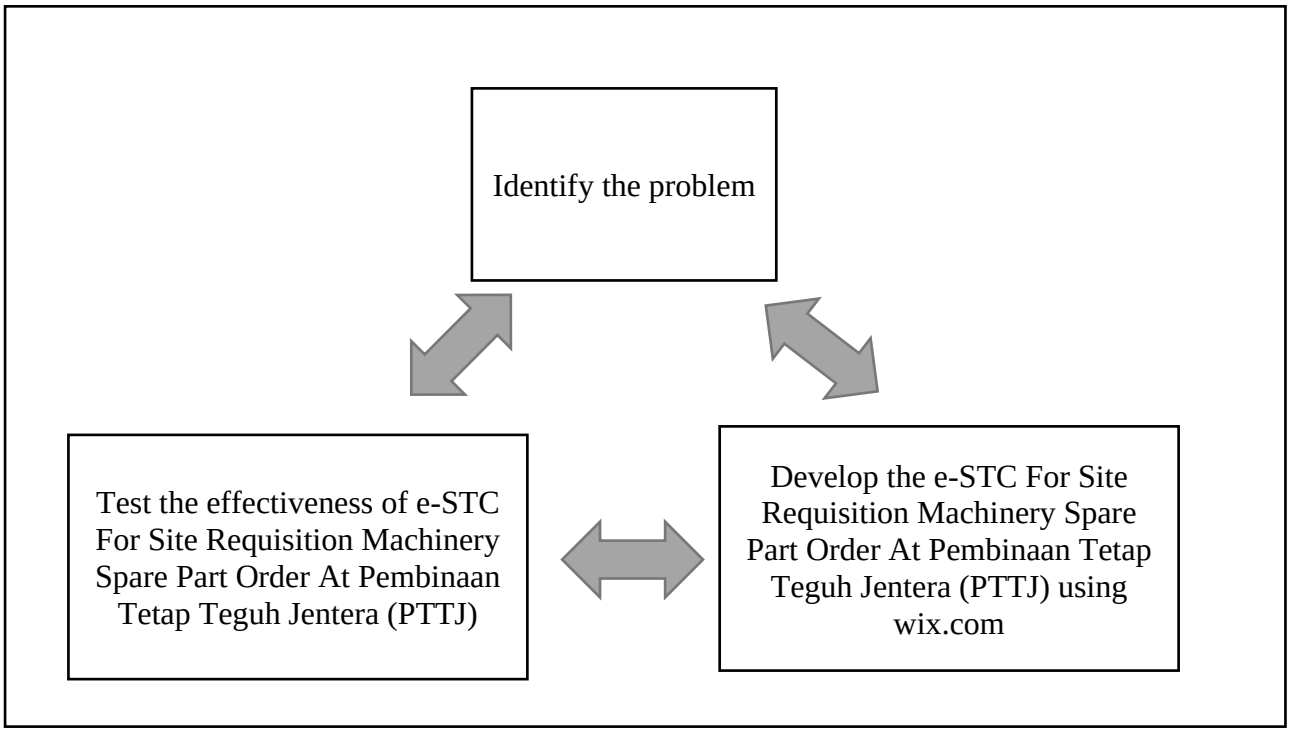


Figure 3.1: The method of illustrated to create the e-STC For Site Requisition Machinery Spare Part Order at Pembinaan Tetap Teguh Jentera (PTTJ)

Objectives	Method	Instrument	Analysis	Expected outcome
1. To identify the constraint element of existing tracking method for site requisition machinery spare part orders at PTTJ	Survey	i. Quantitative ii. Google Form iii. Respondents	SPSS Software i. Reliability Test ii. Frequency Analysis iii. Descriptive Analysis: • Excel: Average mean	Identify the constraint elements of existing tracking method for site requisition machinery spare part orders at PTTJ for ideate the innovation of systematic tracking center.
2. To develop the e-STC for site requisition machinery spare part orders at PTTJ using wix.com.	Develop	i. Using Wix.com	Efficient of e-STC for users (procurement staff and workshop department)	Develop the e-STC for site requisition machinery spare part orders at PTTJ using wix.com to be more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers.
3. To test the effectiveness of e-STC for site requisition machinery spare part orders at PTTJ.	Survey	i. Quantitative ii. Questionnaire iii. Respondents iv. Google Form	SPSS Software i. Reliability Test ii. Frequency Analysis iii. Descriptive Analysis • Excel-Average mean • Paired T-test	Test the effectiveness of e-STC for site requisition machinery spare part orders at PTTJ by the procurement staff and workshop department at the site.

Table 3.1: Design Research

3.3 Development of Research

The progress of research is illustrating as a research framework in this study by design thinking. Figure 3.2 illustrates the research development for this project. The flow illustrating the path of research development from problem statement to literature review, data collection, design of system or product, testing and evaluate the effectiveness.

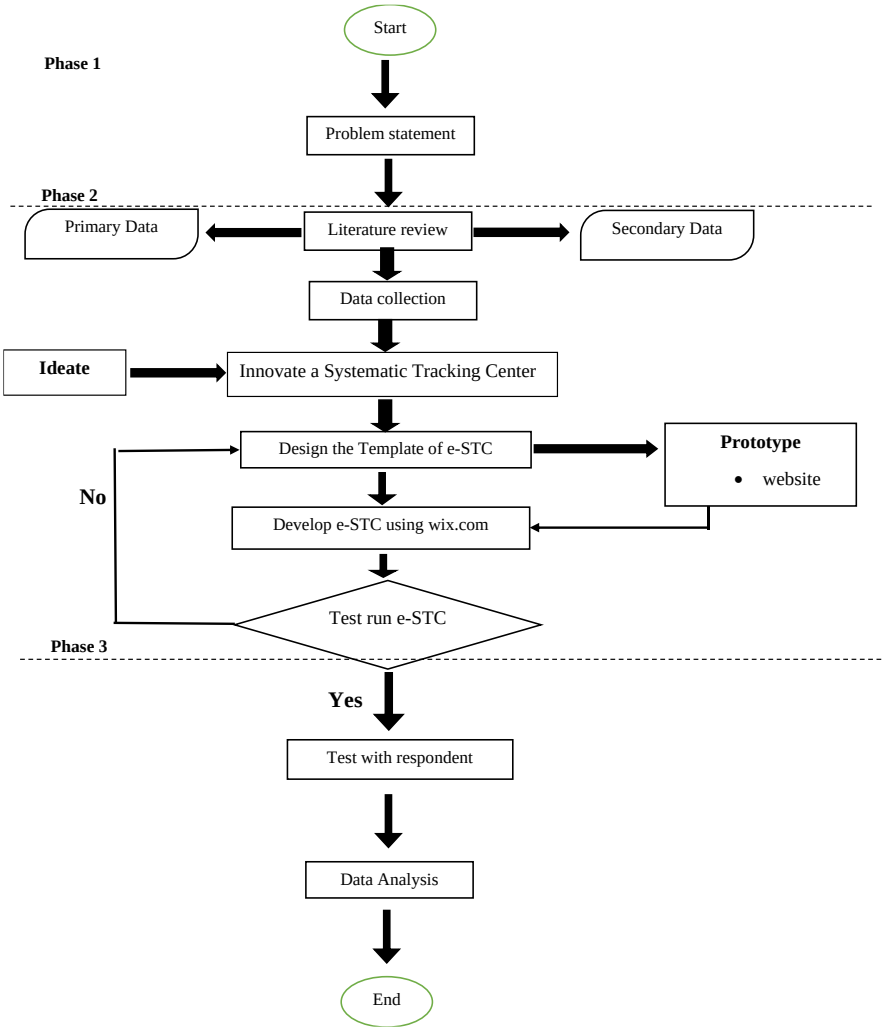


Figure 3.2: Flow of Research Framework

This framework provides as a guideline to conduct this project. This figure represents the process in this study is separated by parts. This development research is a process approach from the beginning to the end of e-STC for Site Requisition Machinery Spare Part Order at Pembinaan Tetap Teguh Jentera (PTTJ). During this process, Figure 3.3 show a flow chart is created for this system to ensure that the project run steadily.

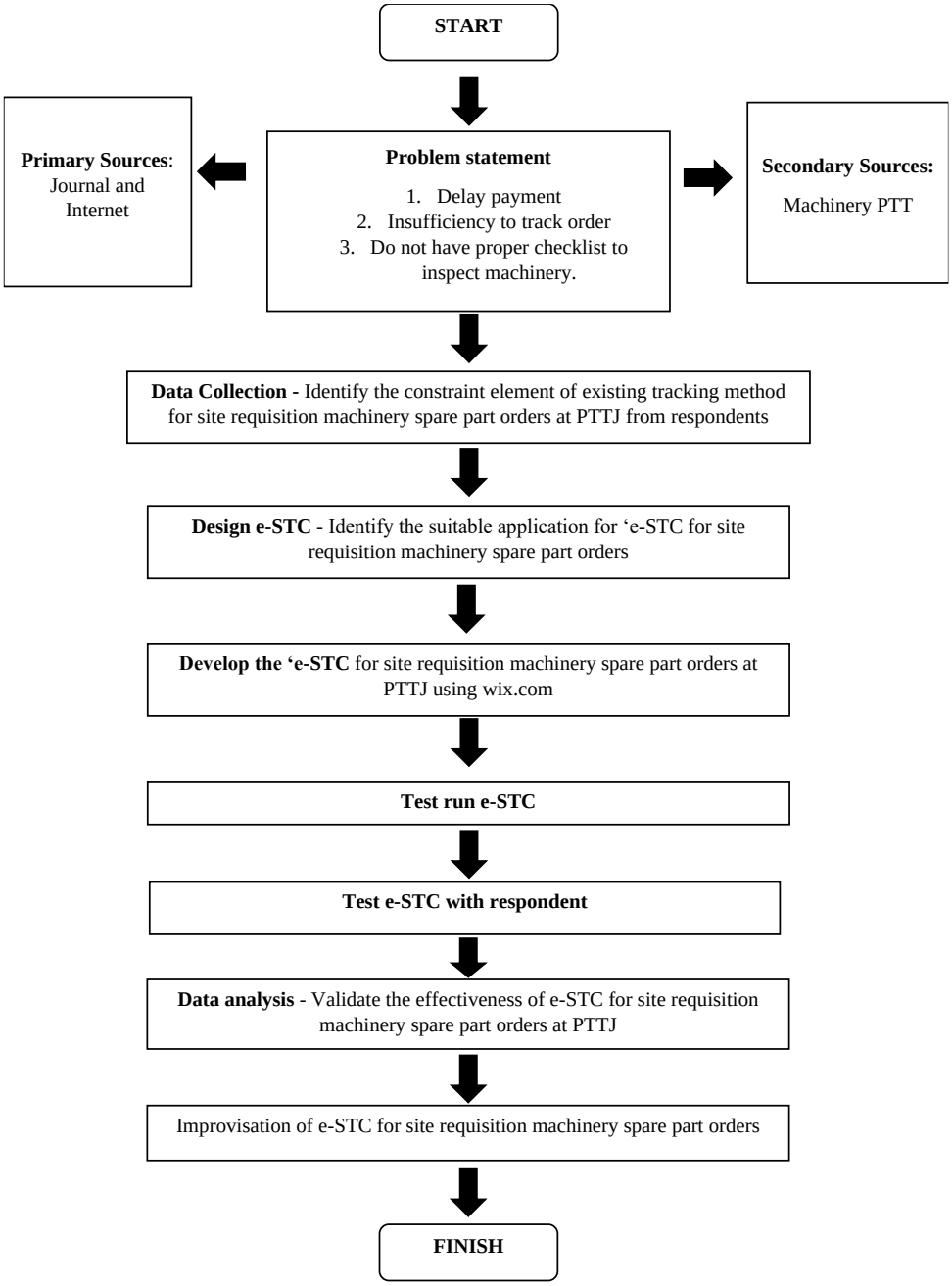


Figure 3.3: The details of research development

This study's methodology is broken down into multiple parts, each of which will be detailed in depth. In addition, various approaches were utilized to conduct interviews, study the results of research studies, conduct a literature review, create a questionnaire, and preview the project's progress. Throughout the process of finishing this project, four phases of approach will be used in Figure 3.4 Research flow of Methodology:

Phase 1 – Problem Discovery and Literature Reviews

Phase 2 – Method of Collection Data (Primary Source and Secondary Source)

Phase 3 – Production of System (Testing of Data, Analysis and Interpretation Of Data), and Recommendation and Conclusion

Phase 4 – Final Outcome (Archive the Objectives)

3.3.1 Research Flow of Methodology

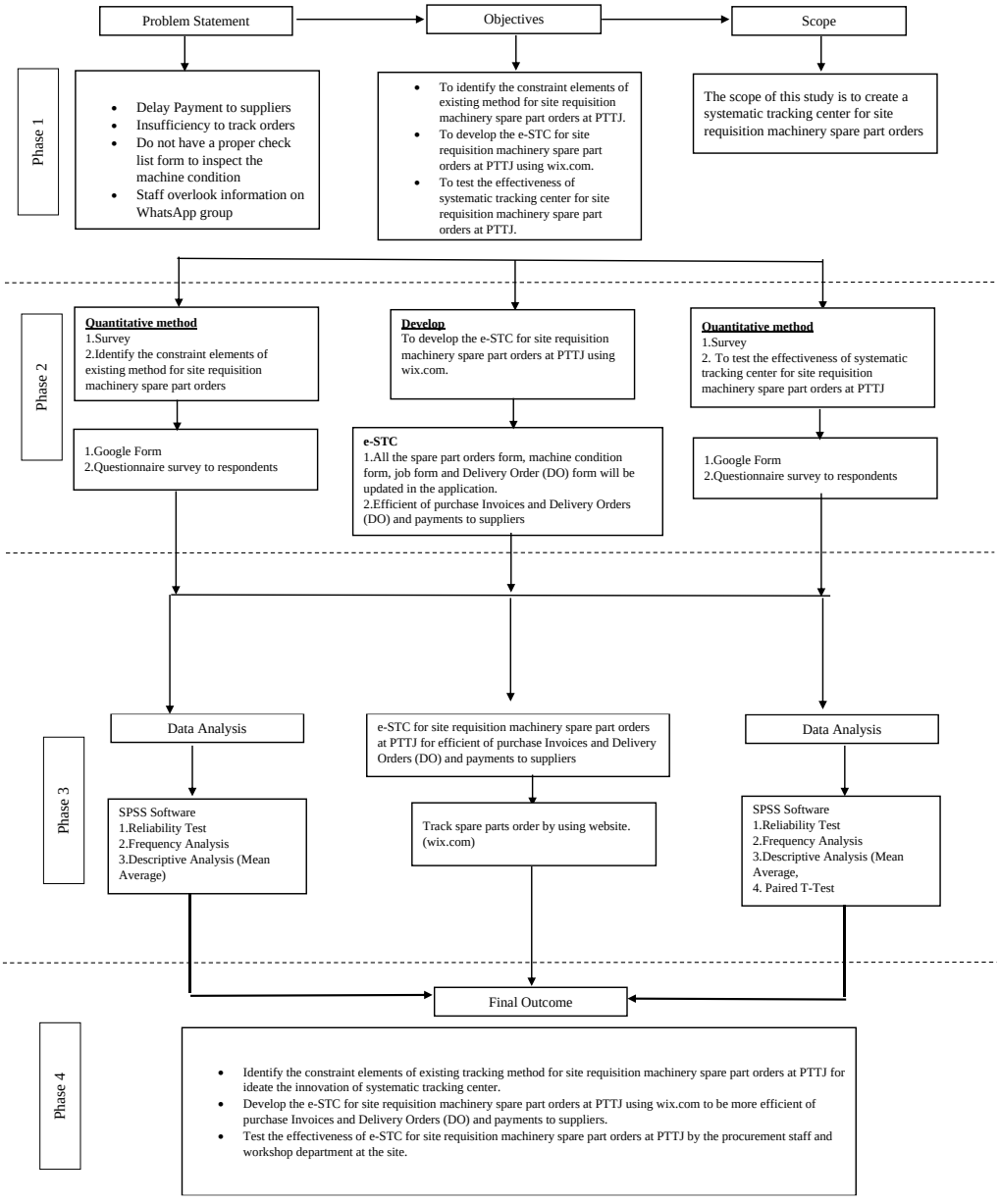


Figure 3.4 Research flow of Methodology

Phase 1- Problem Discovery and Literature Reviews

The most significant aspect of this phase is identify the problem statement, aim and objectives and scope of study. The objectives of the study to develop an understanding of the constraint elements to ideate the innovation of systematic tracking center. This phase focuses on gathering information for the project's growth as well as meeting with the supervisor and mentor.

Phase 2–Method of Collection Data

The major aim of this phase is to evaluate the constraint element of existing method at PTTJ. Fact-finding techniques, questionnaires, and oral interview are all used in the analysis. The information gathered will be utilized to construct the model, prototype as a website is developed, data collection gather with quantitative method by questionnaire and moving on to the following stages.

Phase 3–Method of Data Analysis

SPSS Software version 26 is used to generate the result for the constraint elements of tracking system in existing method and to generate the result for the testing of systematic tracking center website. Paired T Test is used to compare the effectiveness within existing method and systematic tracking center website. The development of systematic tracking center website using wix.com.

Phase 4–Final Outcome

The final outcome is expected in resulting in identify the constraint elements of existing tracking method for site requisition machinery spare part orders at PTTJ for ideate the innovation of systematic tracking center. Therefore, the electronic Systematic Tracking Center (e-STC) need to develop for site requisition machinery spare part order to be more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. Hence, the effectiveness of e-STC for site requisition machinery spare part orders at PTTJ shall be tested by the procurement staff and workshop department at the site as respondents.

They are the changes in policies, people, and communities that aim to achieve with this application. Outcomes can be positive or negative, and they can happen unintentionally. These statements are specific and measurable, letting to know when they have accomplished the goal. While they lead to creation, the final outcomes focus more on the broad mission.

3.4 Data Collection

The methods of collection provide detailed instructions on how to collect data from a questionnaire using a Google form. In this study, the quantitative method was chosen. This method allows for the collection of reliable and accurate data, as well as quick data collection and a broader scope of data analysis. The site, respondents, and research method will all be discussed. These data ensure that all project objectives can be met.

3.4.1 Location

This study will conduct at PTT HQ under procurement department PTTJ and site because the analyst believes procurement department know the circumstance and situations facing related to machinery. Respondents are related person who are responsible for documentation order spare parts.

3.4.2 Respondents

Respondents are those individuals who complete a survey or interview for the researcher, or who provide data to be analyzed for the research study. Respondents can be any age, but determined by the scope of the study, and must agree to informed consent to participate. A survey was given to 30 respondents consists of procurement department staff, site, and foreman to answer questions from the survey. The validity of a sample size depends on various factors such as the research design, research methodology, and statistical analysis techniques.

In general, a larger sample size allows for more accurate and precise analysis of data, and reduces the risk of sampling error. However, in some cases, a sample size of 30 respondent can provide enough data for meaningful analysis, particularly if the study aims to identify basic patterns or relationships in the data. According to Uma Sakaran (2003) sampling is a process of selecting an adequate number of populations to be reviewed so that the study and understanding of the nature or characteristics of the sample can represent the population.

One of the most used method is the Krejcie and Morgan Sampling Method. To simplify the process of determining the sample size for a finite population, Krejcie & Morgan (1970), came up with a table using sample size formula for finite population.

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Figure 3.5: The sample size by Krejcie & Morgan 1970 (Sources from Google search)

The sample size was determined using Krejcie and Morgan Table (1970) whereby for population of 30 respondents, 28 samples were adequate.

3.4.3 Questionnaire Survey

The questionnaire was used by the researchers to collect data for this study. Data could be gathered using a Google form. When researchers understand what the study requires, the questionnaire is an effective data collection tool. The questionnaire will be distributed to respondents via Google Form links.

In this study, the questionnaire is divided into two questionnaire which are Pre-test and Post-test. For pre-test, consists of three (3) sections. Section A will focus on the demographic information of the respondent meanwhile Section B will focus on constraint elements of existing tracking method for site requisition machinery spare part orders at PTTJ and Section C will focus on the need of electronic systematic tracking center (e-STC) for Site Requisition Machinery Spare Part Order at PTTJ. Summary of information about the questions in this questioner is listed in Table 3.2. Link for pre-test Google Form is:
https://docs.google.com/forms/d/e/1FAIpQLScQqhohl48bLDB6jnvZqkrJVJjXFuHxedCGKmZqCIf2iSMr5w/viewform

Table 3.2: Distribution of the questioner items for pre-test

Section	Aspects of evaluation
A	Demography
B	Constraint elements of existing method in machinery spare part order at PTTJ
C	The Need Of electronic systematic tracking center (e-STC) for Site Requisition Machinery Spare Part Order at PTTJ

For post-test consists of two (2) section. Section A will focus on the demographic information of the respondent meanwhile Section B will focus on Elements of systematic tracking center (e-STC). Summary of information about the questions in this questioner is listed in Table 3.3. Link for post-test Google Form is:
https://docs.google.com/forms/d/e/1FAIpQLSfObGa4z4S21OwzF2XBQm7-jS28bc1k1tjYfP8exVqs41hRZQ/viewform

Table 3.3: Distribution of the questioner items for post-test

Section	Aspects of evaluation
A	Demography
B	Elements of systematic tracking center (e-STC)

The likert scale will be used to determine the respondents level of agreement on each item.

Table 3.4: Likert scale items

Scale	Description
1	Strongly Disagree
2	Disagree
3	Satisfactory
4	Agree
5	Strongly Agree

3.5 Technology Acceptance Model (TAM)

The current global era, information systems are important in helping organizations run their activities. Without a good information system, it will be very difficult, given that the current global flow has become one of the main needs of the activities in an organization. An information system becomes indispensable as it can assist in carrying out the activities undertaken within the organization. Information systems today have become a major requirement in the running of the organization. In accepting a new technology system, not everyone will can be well understood. Therefore, it is important to assess or measure the level of acceptance and understanding recipients and users of information technology by measurement behavior of the user.

The Technology Acceptance Model (TAM) is a framework developed by Fred D. Davis in 1986. Davis's model in the adaptation of Theory Reasoned Action which assumes that one adopts a technology is generally determined by the cognitive

process and aims to satisfy the wearer or maximize the usefulness of the technology. TAM is used to examine and measure factors that influence decisions whether one accepts or rejects the information technology. The TAM model is developed from psychological theory that explains that computer user behavior is based on belief, attitude, intention, and user behavior relationship. The purpose of this model is to explain the main factors of user behavior toward acceptance technology users. In more detail explain the acceptance of IT with certain dimensions that can affect the acceptance of IT by the user.

3.5.1 Perceived ease of use

According to Davis in "Information Management and PSM Evaluation System", perceived ease of use is defined as a measure in which a person believes that a computer can be easily understood and used. Meanwhile, perception of ease is defined as the extent to which a person believes that by using technology will be free of a business so that if person believe that the information system easy to use then he will use it and vice versa (Jogiyanto,2008).

3.5.2 Perceived usefulness

According to Davis, perceived usefulness is defined as a measure by which the use of technology is believed to provide benefits to the person using it and the perception of usefulness as the subjective ability of future users where using a specific application system will improve performance in the organizational context. Usability perception is a level where one believes that the use of a particular technology will provide benefits or provide a positive impact that will be obtained when using the technology

3.5.3 Behavioral intention

Behavioral intention to use is tend behavior of a person in doing technology. Interest in behavior can be seen from the level of technology use so it can be predicted from the attitude and attention. The motivation to keep using such technology, as well as the desire to motivate other users

3.5.4 Attitude towards using technology

The extrinsic elements such as societal norms, subjective standards, and conducive environments impact attitudes towards utilizing technology. The impact of others' thoughts and behaviors on an individual's attitude is referred to as social norms. Subjective norms are a person's opinion of whether key individuals in their life believe they should utilize technology. The availability of resources, support, and infrastructure required for implementing the technology is referred to as a facilitating condition.

3.6 Data Analysis

Data analysis is the methodical application of statistical and/or logical approaches to describe and demonstrate, compress, and recapitulate, and assess data. Depending on the business and the goal of the analysis, there are various methodologies and strategies for performing analysis. All of these different approaches to data analysis are based on two major areas of research: quantitative methods.

When the data is collected, the Statistical Package for the Social Sciences (SPSS) software will be used to calculate it. The data will be represented by a pie chart displaying the percentages of respondents and tables. Furthermore, SPSS version 26, Excel Solution for mean data and Social Science Statistic includes a number of statistical methods that can be used, such as:

i. Descriptive statistics, including methodologies such as frequencies, cross-tabulation, and descriptive ratio statistics.
ii. Numeral outcome prediction such as linear regression
iii. Prediction for identifying groups, including methodologies such as cluster analysis and factor analysis.

For the test of effectiveness of e-STC for Site Requisition Machinery Spare Parts Orders, paired T-test will be used.

3.6.1 Reliability test

Sekaran &Bougie (2016), the reliability of a measure indicates the extent to which it is without bias (error free) and hence ensures consistent measurement across time and

across the various items in the instrument. In other words, the reliability of a measure is an indication of the stability and consistency with which the instrument measures the concept and helps to assess the “goodness” of a measure. The data gain from SPSS use Cronbach’s Alpha.

3.6.2 Frequency test

A frequency table depicts the distribution of data based on variable options. Frequency charts can help to identify which alternatives appear frequently in the dataset. Frequency test is useful for gaining a better grasp of each variable and determining whether variables need to be recoded. A frequency table has no formula because it displays the count of each choice in a variable.

3.6.3 Descriptive test

Descriptive test is used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data. Descriptive test is used to present quantitative descriptions in a manageable form. In a research study may have lots of measures. Or may measure many people on any measure. Descriptive statistics help us to simplify large amounts of data in a sensible way. Each descriptive statistic reduces lots of data into a simpler summary.

3.6.4 Mean and Average Mean

A form of average is the mean (or arithmetic mean). It is calculated by adding the values and dividing the total number of values by the number of values. The term "average" refers to the value derived by dividing the total of a collection of quantities by the number of quantities in the set. The square root of the variance yields the standard deviation. Another measure of variability is the average deviation, often known as the mean absolute deviation.

3.6.5 Paired T-test

When determining the difference between two variables, a paired t-test is utilized. Time is commonly used to separate these two elements. When there are two data values in paired measurements, the test can be employed. For example, pre-test and post-test results were collected and will be utilized to calculate the final result. Furthermore, the distribution of discrepancies between the matched measurements should be normal.

3.7 Develop of e-STC For Site Requisition Machinery Spare Part Order

A product prototype is a scale model. In other words, a prototype offers visualization solutions. Prototypes allow the researcher to gather useful product input from stakeholders, partners, or customers. Whatever tactics you use, the basic goal remains the same. The purpose of this phase remains the same, namely to develop a rough draught solution in order to determine whether it would be advantageous to the problem (Lauff,2018). This information might be used to develop a product that meets their requirements.

3.7.1 Design e-STC using templates in wix.com

Wix offers 800+ website templates to help get you started on your website creation journey. Each of these templates have been carefully researched to make sure they best fit current trends and industry needs.

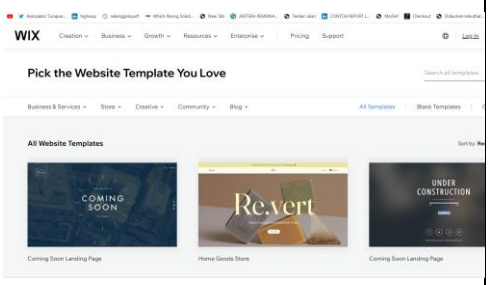
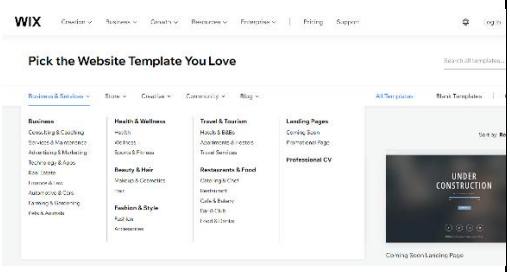
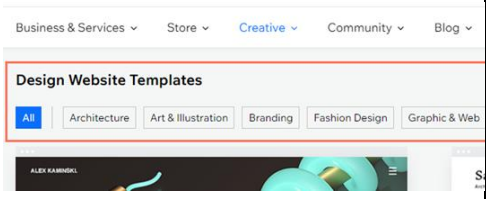
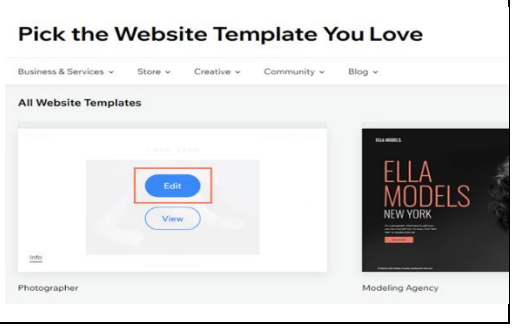
Wix have templates catering for all kinds of creative, community and business intents. Uset have access to a huge range of template designs - spanning from a recipe blog to a wedding event site, a non-profit initiative to an educational hub, a travel and tourism site to a financial consultancy - the possibilities are endless.

Wix templates are organized into categories for easy browsing: Business & Services, Store, Creative, Community and Blog. Hover over each one to discover subcategories.

User will find that templates in each category are already set up with popular design trends, layouts, features and tools that are in line with the common goals in your industry. Table 3.4 shows steps on design e-STC using templates

in wix.com.

Table 3.5: Steps on design e-STC using templates in Wix.com

Step 1: Go to the Template Page 	Step 2: Click the drop-down of the category your business best fits: Business & Services, Store, Creative, Community or Blog. 
Step 3: Select the relevant sub-category. 	Step 4: Hover over the template you like best and click Edit. This will open the Wix Editor, where user can begin building their site 

3.7.2 Develop e-STC using wix.com for systematic tracking center

In general, design research refers to a framework for planning and carrying out a particular research project. Design research is an important part of the research since it covers all four major considerations: the conceptual framework, who and what to study, and the tools and procedures to be utilized for data collection and analysis. During the planning phase, the Wix.com was created.

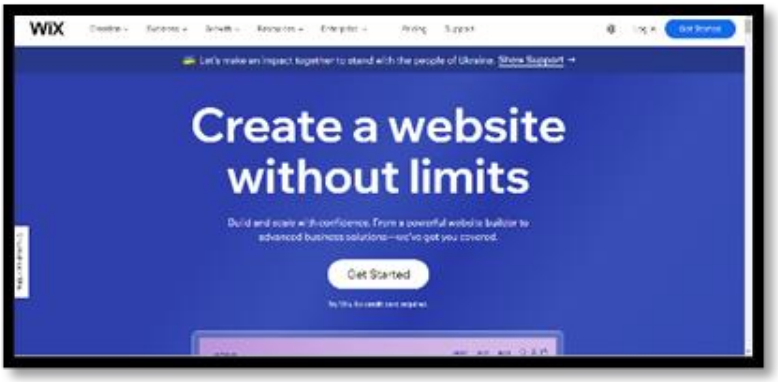


Figure 3.6: Wix.com homepage

This system is used website as tools for the project. Website is an emerging technology that turns the information and connectivity field into a wireless networking environment that facilitates the use of mobile devices. As reported, the growth in the number of new technologies devices was motivated by the advancement of mobile networks, such as the ability to access the network by computers such as desktops, laptops and notebooks. (CHUN, 2018).

The development of this "e-STC for Site Requisition Machinery Spare Part Order" website is a user-friendly which can be access everywhere anywhere. The functions of the website are to update order spare parts, job part during inspection, machine condition after inspection, and upload Delivery Order (DO) on site. Next the website form in the Google link (https://mfaizihsan.wixsite.com/pttjenterasdnbhd) to be used for users as shown on Figure 3.7: Homepage e-STC for Site Requisition Machinery Spare Part Order.

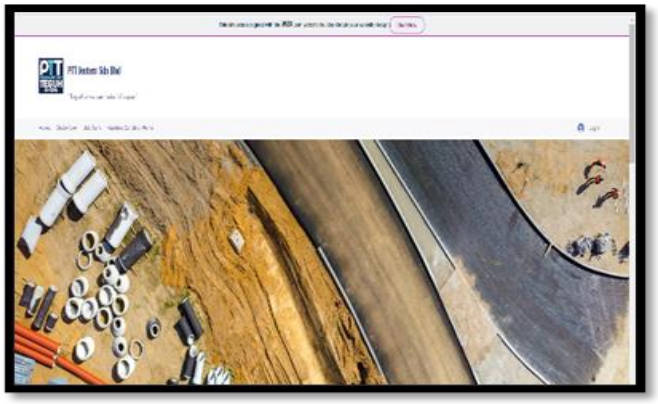


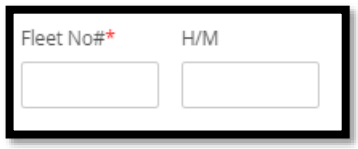
Figure 3.7: Homepage e-STC for Site Requisition Machinery Spare Part Order.

This website also can be function as a reference and storage for procurement department and it can store all related documents to be share to workshop department. This website also functions as checking information of all the work that need to be run at site.

3.7.2.1 Step to create the button in systematic tracking center

i. Order form

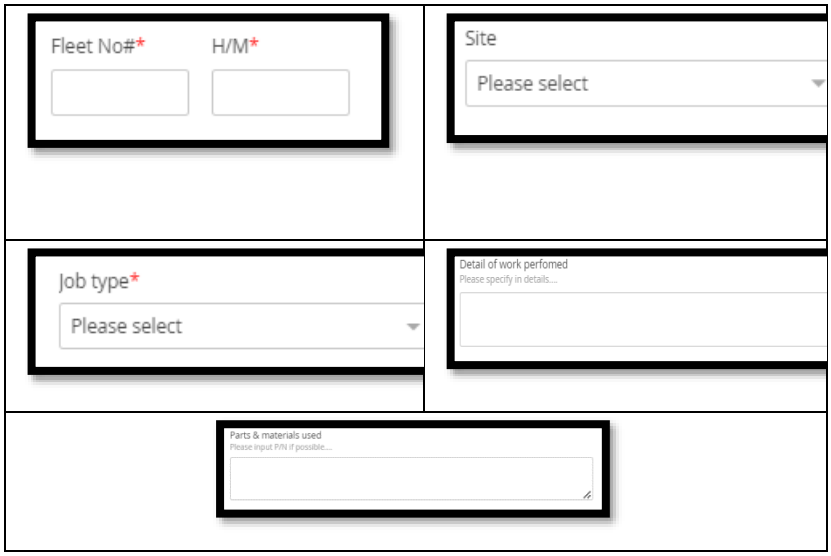
Table 3.6: Steps to create Order form button

	
Ordered by was create to know who is ordering	Date for the day order
	
	
	

ii. Job form button

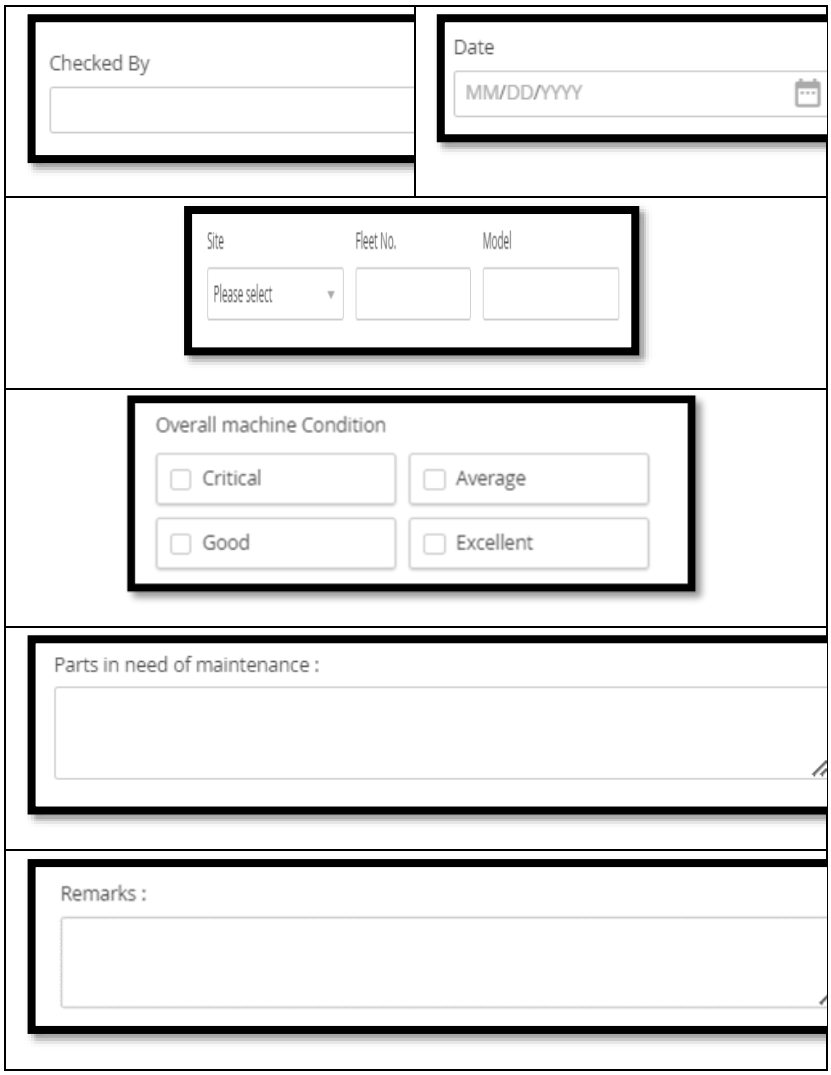
Table 3.7: Steps to create Job form button



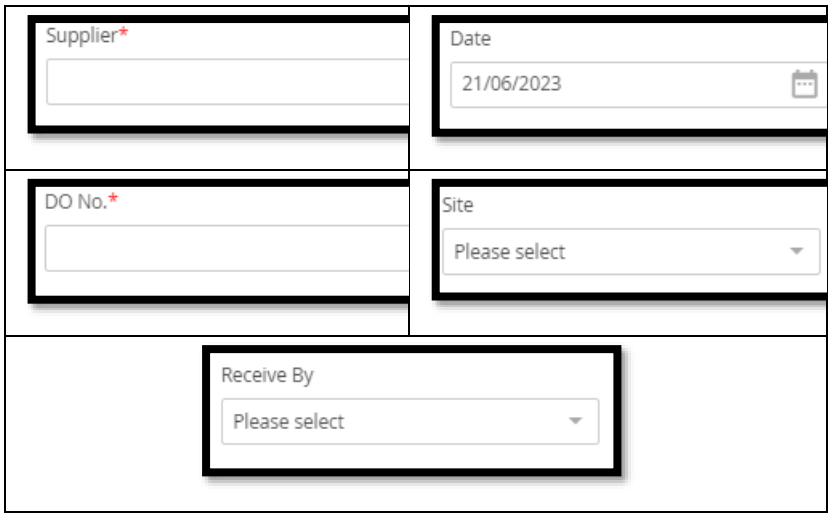
iii. Machine condition form

Table 3.8: Steps to create Machine condition form button

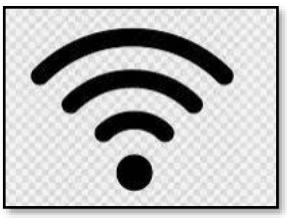


iv. Delivery Order form

Table 3.9: Steps to create Delivery Order Button



3.7.3 Material Used

Computers / Laptops  To create application, store data and test the functionality of the website.	Smartphone  To test the functionality of the website.
Internet/ Wifi  To link the computer and internet connect to upload the data.	Wix.com  To develop the e-STC for Site Requisition Machinery Spare Parts Order
Microsoft Teams	Excel spreadsheets

 To upload the documents in the application.	 To edit Microsoft Excel spreadsheets online without converting.

3.8 Summary

This chapter discusses the methods for data collection and information in the study, which can be summarized. To determine the outcomes, the collected data will be examined. Furthermore, this chapter focuses on the assessment process's location, respondents, research technique, data analysis, and processes.

According to analysis, the use of systematic tracking center is better that current method. In comparison, the current method uses ‘WhatsApp’ to update the machinery condition and spare parts order that can lead to overlooking. In term of adaptability, this e-STC is convenient, easy, and straightforward to use. In the long run become benefits to all the procurement department staff and foreman when they want to update the machinery condition and spare parts order and started documentation for ordering spare parts to supplier.

Furthermore, the approaches that will be used will be presented entirely on the basis of the existing challenges, as well as the selection of appropriate systems when applied and applicable to the location. This is based on all attainable work and is based on available sources such as publications, interviews, and experiences. Following this chapter, the process route that will be implemented for this project and applied to the work environment on site will be attached.

CHAPTER 4

DATA AND ANALYSIS

4.1 Introduction

In this chapter, the researcher should have an idea of what the project's predicted outcome will be. It is also one of the pre-project planning tasks, and researchers carefully analyzed what data will be created over the course of the project's execution. The researchers want to know that the information they collect will help them achieve their objectives. Also, demographic information for survey respondents has been described further in this chapter. The quantitative technique of distribution of the questionnaire to more than 30 respondents provided feedback and was processed using SPSS. The e-STC For Site Requisition Machinery Spare Part Order is expected to aid in the achievement of the following objectives.

For Objective 1, to ideate the innovation of systematic tracking center was done after identify the constraint element of existing tracking method for site requisition machinery spare part orders at PTTJ. Objective 2, which is develop the e-STC for site requisition machinery spare part orders at PTTJ using wix.com and to answer Objective 3, which was to test the effectiveness of e-STC for site requisition machinery spare part orders at PTTJ by quantitative method and SPSS questionnaire.

4.2 To identify the constraint element of existing tracking method for site requisition machinery spare part orders at PTTJ

4.2.1 Data Collection

This study presents the findings of a questionnaire issued to respondents, who included project managers, engineers, site supervisors, assistant managers, quantity surveyors, and others, to determine the necessity for the e-STC For Site Requisition Machinery Spare Part Order. This questionnaire is divided into three sections: Section

A, Section B and Section C. Section A contains demographic information. Section A contains demographic information. In Section B, issues related to Systematic Tracking Center System on by Existing Method for Procurement Department in Invoices and DO Section. Meanwhile for Section C, the need of e-STC for Site Requisition Order. This questionnaire has been distributed for 30 respondents by PTTJ procurement staff, site and foreman by google form thru links.

4.2.2 Demographic Data

Section A is a demographic data section that includes five questions on the respondent's backgrounds. The respondents of pre and post questionnaire was same. The items are as follows:

a) Gender

b) Age

c) Position

d) Work Experience

4.2.2.1 Gender

This research included 22 (73.30 percent) male respondents and 8 (26.7 percent) female respondents. Male respondents exceed female respondents by a wide margin, as seen by the proportion. This is because a male, rather than a woman, dominated the responses at the Pembinaan Tetap Teguh (PTT) working on the workshop and construction site, whereas most of the females are related to documentation. The number of respondents by gender is shown in Table 4.1 below.

Table 4.1: The number of respondents by gender

No	Gender	No. of respondent	Percentage (%)
1	Male	22	73.3
2	Female	8	26.7
	Total	2	100

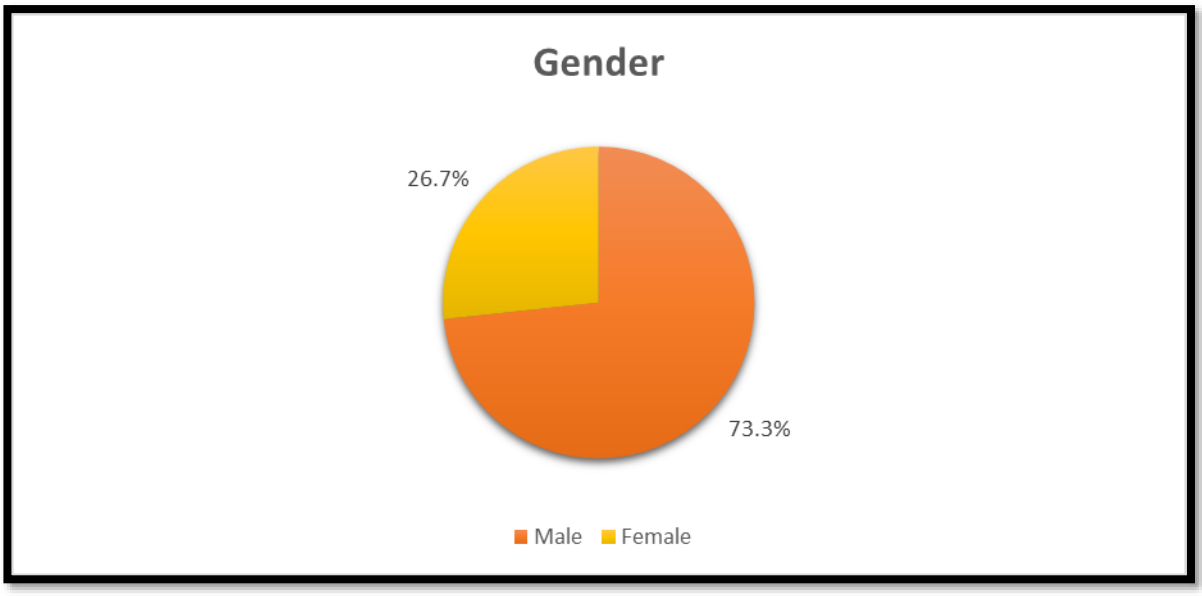


Figure 4.1: The percentage of respondents by gender

4.2.2.2 Age

Table 4.2 shows the age groupings of the respondents in this research. The age groups were divided into four categories by the researchers. This section was formed to assist with data processing and identifying respondents on the job site and office. In this survey, the age group 26-35 years old has the most responses, with 20 more than 50 percent (66.7 percent), followed by 18-27 years old, which has 6 respondents (20 percent) different 3 respondents than 36-45 years old. Only one respondent (3.3 percent) are 55-64 years old. There is not a single person above the age of 65 years who has responded.

Table 4.2: The number of respondents by age

No	Age	No. of respondent	Percentage (%)
1	18-24 years old	6	20
2	25-34 years old	20	66.7
3	35-44 years old	3	10
4	45-54 years old	0	0
5	55-64 years old	1	3.3
6	65 years or older	0	0

Total	2	100

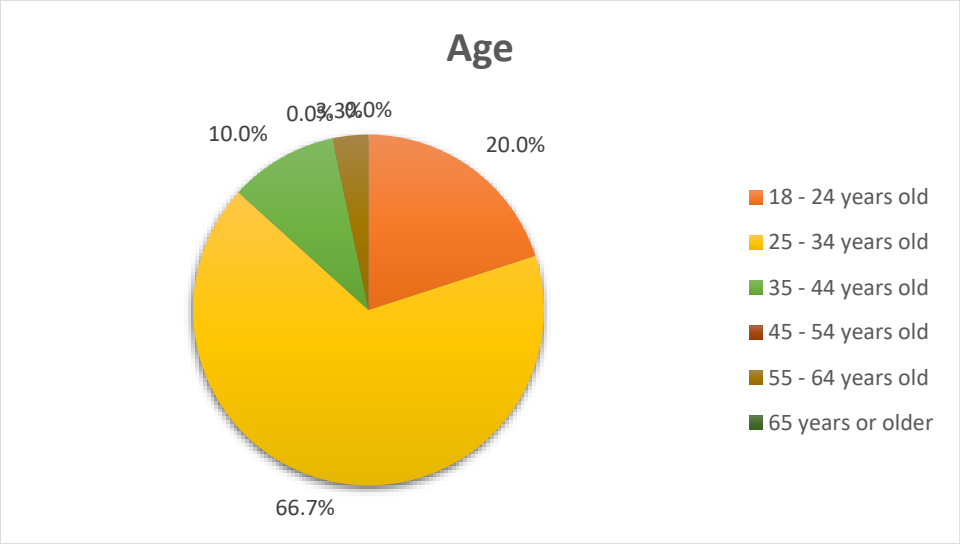


Figure 4.2: The percentage of respondents by age

4.2.2.3 Position

The job title at the construction site, which comprises Workshop Manager, Assistant Workshop Manager, Foreman, Admin Junior Executive, Admin Executive, Admin Assistant, Engineer, Quantity Surveyor, Project Manager and Others is the final piece of demographic information. Table 4.4 shows that Foreman had the most respondents, with 15 respondents (50 percent). The other respondents consist of project coordinator, project planner, intern PTTJ, general manager procurement & purchasing and manager procurement & purchasing came in second with 6 replies (19.8 percent). The site supervisor or assistant manager is placed third, with 7 respondents (20%), followed by the engineer with 4 responses (11.4%) and others with 3 respondents (8.6 percent).

Table 4.3: The number of respondents by position

No	Age	No. of respondent	Percentage (%)
1	Workshop Manager	1	3.3
2	Assistant Workshop Manager	1	3.3
3	Foreman	15	50
4	Admin Junior Executive	1	3.3
5	Admin Executive	2	6.7
6	Admin Assistant	3	10
7	Engineer	1	3.3

8	Quantity Surveyor	0	0
9	Project Manager	0	0
10	Others: Project Coordinator Project Planner Intern PTTJ General Manager Procurement & Purchasing Manager Procurement & Purchasing	6	19.8
Total		30	100

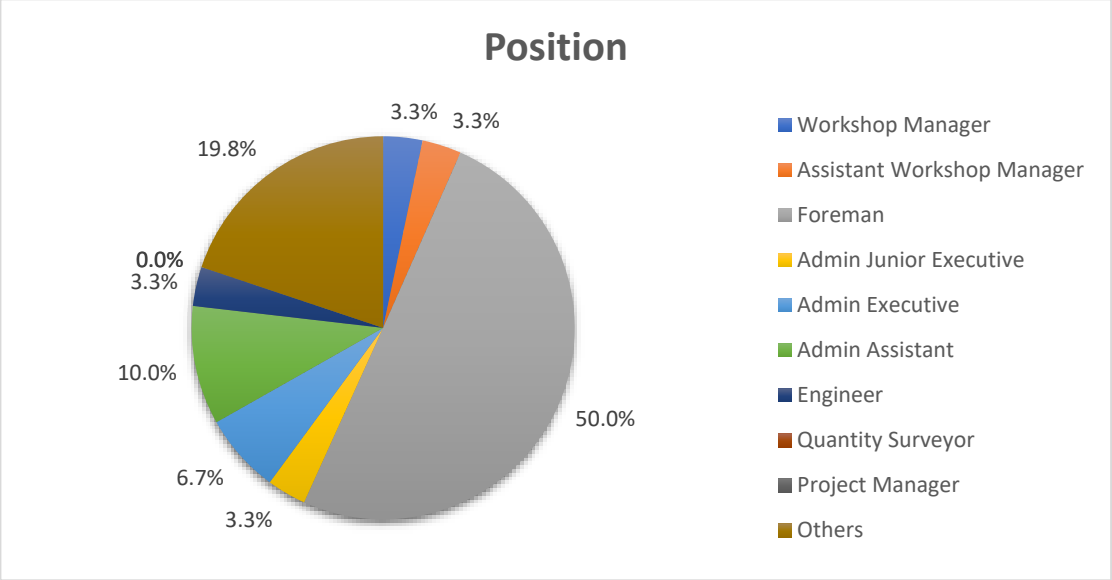


Figure 4.3: The number of respondents by position

4.2.2.3 Work experience

Majority respondents in this survey (60 percent) had 2 to 5 years of building experience, with six respondents having fewer than two years of construction experience (20percent). There are 4 respondents with 6 to 10 years of job experience, accounting for 13.3 percent of the total, and 2 respondents with more than 10 years of work

experience (6.7 percent). The number of responses by experience is shown in Table 4.4 below.

Table 4.4: The number of respondents by work experience

No	Age	No. of respondent	Percentage (%)
1	< 2 years	6	20
2	2-5 years	18	60
3	6-10 years	4	13.3
4	>10 years	2	6.7
Total		30	100

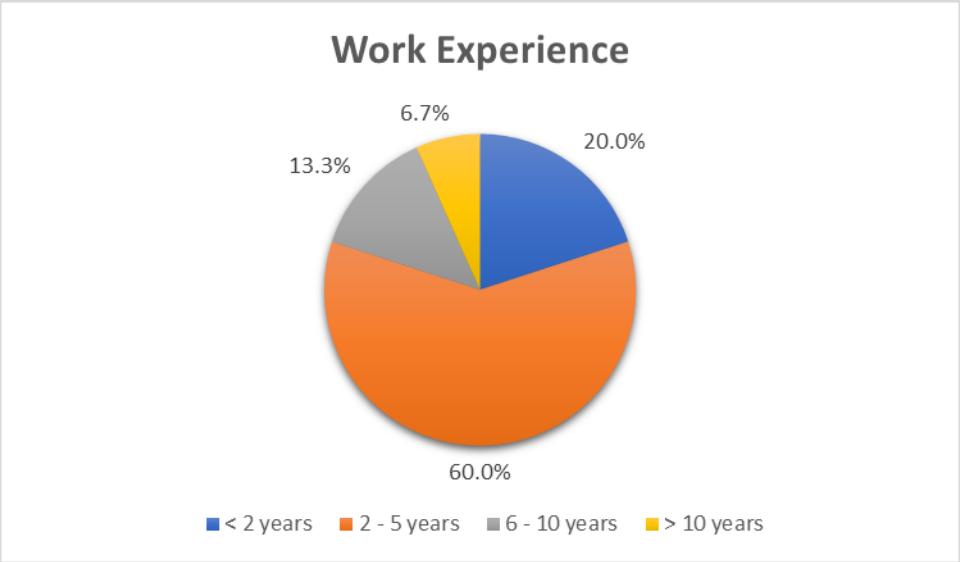


Figure 4.4: The number of respondents by work experience

4.2.3 Respondent Perspective

Section B presents the respondents' perspectives on issues related to Systematic Tracking Center System on by Existing Method for Procurement Department in Invoices and DO Section. Respondents were asked to choose their level of agreement on a scale of 1 to 5. This survey displays the results of a questionnaire distributed to respondents, which included Workshop Manager, Assistant Workshop Manager, Foreman, Admin Junior Executive, Admin Executive, Admin Assistant, Engineer, Quantity Surveyor, Project Manager, and others to determine what team needs to improve construction productivity and what system criteria that team will want to

develop to monitor construction productivity. Below table shown the data collection of issues related to existing method.

Level of Agreement				
Strongly Disagree	**Disagree**	**Slightly Agree**	**Agree**	**Strongly Agree**
1	**2**	**3**	**4**	**5**

Table 4.5: Issues Related by Existing Method for Procurement Department in Invoices and DO Section

No	**Constraint elements of existing tracking method**	**Existing tracking method for site requisition machinery spare part orders at PTTJ**	**Level of Agreement**				
			Strongly Agree	**Agree**	**Slightly Agree**	**Disagree**	**Strongly Disagree**
			5	**4**	**3**	**2**	**1**
1	Minimize Delay Payment	a) Perceived ease of use i) easy to minimize delay payment and blocking order from suppliers	0	0	1	29	0
		ii) improve performance in managing documents	0	0	0	28	2
		iii) increase work productivity in arranging invoices for machinery spare parts order in HQ	0	0	1	29	0
		iv) very helpful to avoid delay payment to suppliers	0	0	0	28	2
2		b) Perceived usefulness	0	0	2	24	4

	Easy to Track Spare Part Orders	i)	easy to follow up status spare parts order					
		ii)	easy to track documents for machinery spare parts order in HQ	0	0	2	24	4
		iii)	easy to trace machinery service status	0	0	2	26	2
		iv)	faster to update machine condition on site	0	0	2	24	4
3	Systematic tracking medium	c)	Attitude towards using technology	0	0	0	29	1
		i)	Easy to update machinery on site					
		ii)	Systematic tracking medium to avoid missing information for spare parts orders	0	0	0	29	1
		iii)	Able to control the miss recording in spare part orders	0	0	0	29	1
		iv)	Able to control overlook information in spare part orders	0	0	0	29	1
4	Effective communication	d)	Behavioural intention to use	0	0	0	29	1
		i)	Avoid duplicate order in spare part orders					
		ii)	Avoid missing order in spare part orders	0	0	0	29	1
		iii)	Easy to communicate among workshop department and	0	0	1	29	0

			procurement department					
		iv)	Faster to update inspection of machinery on site	0	0	1	29	0

Section C presents the respondents' perspectives on The Need Of electronic systematic tracking center (e-STC) for Site Requisition Machinery Spare Part Order. Respondents were asked to choose their level of agreement on a scale of 1 to 5. This survey displays the results of a questionnaire distributed to respondents, which included Workshop Manager, Assistant Workshop Manager, Foreman, Admin Junior Executive, Admin Executive, Admin Assistant, Engineer, Quantity Surveyor, Project Manager, and others to determine what team needs to improve construction productivity and what system criteria that team will want to develop to monitor construction productivity. Below table shown the data collection of issues related to existing method.

Level of Agreement				
Strongly Agree	**Agree**	**Slightly Agree**	**Disagree**	**Strongly Disagree**
5	**4**	**3**	**2**	**1**

Table 4.6: The need of electronic systematic tracking center (e-STC) for Site Requisition Machinery Spare Part Order

No	**Constraint elements of existing tracking method**	**Existing tracking method for site requisition machinery spare part orders at PTTJ**	**Level of Agreement**				
			Strongly Agree	**Agree**	**Slightly Agree**	**Disagree**	**Strongly Disagree**
			5	**4**	**3**	**2**	**1**
1	The Need Of electronic systematic tracking center (e-	i) Systematic tracking center is need to develop to manage the job of machinery repairing and services.	21	6	3	0	0

	STC) for Site Requisition Machinery Spare Part Order	ii) Systematic tracking center need to develop to minimize delay payment	23	6	1	0	0
		iii) Systematic tracking center need to develop for easy to track spare part order using online order form	21	6	3	0	0
		iv) Systematic tracking center need to develop for faster systematic tracking medium by online machine condition form	24	5	1	0	0
		v) Systematic tracking center need to develop to avoid miss recording in spare part order	19	8	3	0	0
		vi) Systematic tracking center need to develop to avoid duplicate order in spare part orders	19	9	2	0	0
		vii) Systematic tracking center need to develop to avoid missing order in spare part orders	19	11	0	0	0
		viii) Systematic tracking center need to develop for effective communication	19	8	3	0	0
		viiii) Systematic tracking center need to develop for more efficient of purchase by online Delivery Orders (DO) form	20	8	2	0	0

		x) Systematic tracking center need to develop for more efficient payments to suppliers	19	11	0	0	0

4.2.4 Data Analysis

SPSS is an acronym that stands for Statistical Package for the Social Sciences, and it is used by a wide range of academics to analyze complex statistical data. SPSS will be used to analyze the data in this study. The methodical application of statistical and logical approaches to explain, demonstrate, and condense data. Data should be summarized and evaluated.

4.2.4.1 Reliability Test

Reliability analysis allows you to study the properties of measurement scales and the items that compose the scales. The Reliability Analysis procedure calculates several commonly used measures of scale reliability and provides information about the relationships between individual items in the scale. The Cronbach's Alpha has the range between 0-1. But, may experts saying that the result of reliability analysis is must more than 0.7 to get conformity of consistency for the questionnaire. Based on the Nunnaly (1980), the score below 0.6 is poor, between 0.60 and 0.70 is acceptable, between 0.8 and 0.9 is good and above 0.9 is excellent. The value obtained for the coefficients Cronbach's Alpha is greater than 0.7. From pre-test, the Reliability test show as Table 4.7 below. The result 0.901 show that is excellent.

Table 4.7: Reliability Test Cronbach's Alpha Based on Standardized Items

Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
0.888	0.901	16

4.2.4.2 Frequency Analysis

Frequency analysis is a general method of analysis that is used in a wide range of scientific disciplines, not just social measurement research. Furthermore, it is a statistical branch that investigates the frequency of occurrences and evaluates metrics such as central tendency, dispersion, percentiles, and so on. Using SPSS version 26 to obtain the analysis frequency date. The Table 4.8 below is the result for pre-test in frequency analysis, identify the constraint elements of existing tracking method

Table 4.8: Frequency Analysis for existing method

No	Constraint elements of existing tracking method	Existing tracking method for site requisition machinery spare part orders at PTTJ	Level of Agreement				
			Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
			5	4	3	2	1
1	Minimize Delay Payment	e) Perceived ease of use v) easy to minimize delay payment and blocking order from suppliers	0 (0.00%)	0 (0.00%)	1 (3.33%)	29 (96.67%)	0 (0.00%)
		vi) improve performance in managing documents	0 (0.00%)	0 (0.00%)	0 (0.00%)	28 (93.34%)	2 (6.66%)
		vii) increase work productivity in arranging invoices for machinery spare parts order in HQ	0 (0.00%)	0 (0.00%)	1 (3.33%)	29 (96.67%)	0 (0.00%)
		viii) very helpful to avoid delay payment to suppliers	0 (0.00%)	0 (0.00%)	0 (0.00%)	28 (93.34%)	2 (6.66%)

2	Easy to Track Spare Part Orders	f) Perceived usefulness v)	easy to follow up status spare parts order	0 (0.00%)	0 (0.00%)	2 (6.66%)	24 (80.01%)	4 (13.33%)
		vi)	easy to track documents for machinery spare parts order in HQ	0 (0.00%)	0 (0.00%)	2 (6.66%)	24 (80.01%)	4 (13.33%)
		vii)	easy to trace machinery service status	0 (0.00%)	0 (0.00%)	2 (6.66%)	26 (86.68%)	2 (6.66%)
		viii)	faster to update machine condition on site	0 (0.00%)	0 (0.00%)	2 (6.66%)	24 (80.01%)	4 (13.33%)
3	Systematic tracking medium	g) Attitude towards using technology v)	Easy to update machinery on site	0 (0.00%)	0 (0.00%)	2 (6.66%)	26 (86.68%)	2 (6.66%)
		vi)	Systematic tracking medium to avoid missing information for spare parts orders	0 (0.00%)	0 (0.00%)	0 (0.00%)	29 (96.67%)	1 (3.33%)
		vii)	Able to control the miss recording in spare part orders	0 (0.00%)	0 (0.00%)	0 (0.00%)	29 (96.67%)	1 (3.33%)
		viii)	Able to control overlook information in spare part orders	0 (0.00%)	0 (0.00%)	0 (0.00%)	29 (96.67%)	1 (3.33%)
4	Effective communication	h) Behavioural intention to use v)	Avoid duplicate	0 (0.00%)	0 (0.00%)	0 (0.00%)	29 (96.67%)	1 (3.33%)

			order in spare part orders					
		vi)	Avoid missing order in spare part orders	0 (0.00%)	0 (0.00%)	0 (0.00%)	29 (96.67%)	1 (3.33%)
		vii)	Easy to communicate among workshop department and procurement department	0 (0.00%)	0 (0.00%)	1 (3.33%)	29 (96.67%)	0 (0.00%)
		viii)	Faster to update inspection of machinery on site	0 (0.00%)	0 (0.00%)	1 (3.33%)	29 (96.67%)	0 (0.00%)

Table 4.9: Percentage of the respondents agree and disagree with the current method

Constraint elements of current method in machinery spare part order at PTTJ	**Level of Agreement**				
	Strongly Disagree	**Disagree**	**Slightly Agree**	**Agree**	**Strongly Agree**
	1	**2**	**3**	**4**	**5**
Minimize delay payment	3.33%	95.01%	2%	0%	0%
Easy to track order	11.66%	81.68%	7%	0%	0%
Systematic tracking medium	4.16%	94.17%	2%	0%	0%
Effective communication	2.50%	96.67%	1%	0%	0%
Total %	100%			0%	

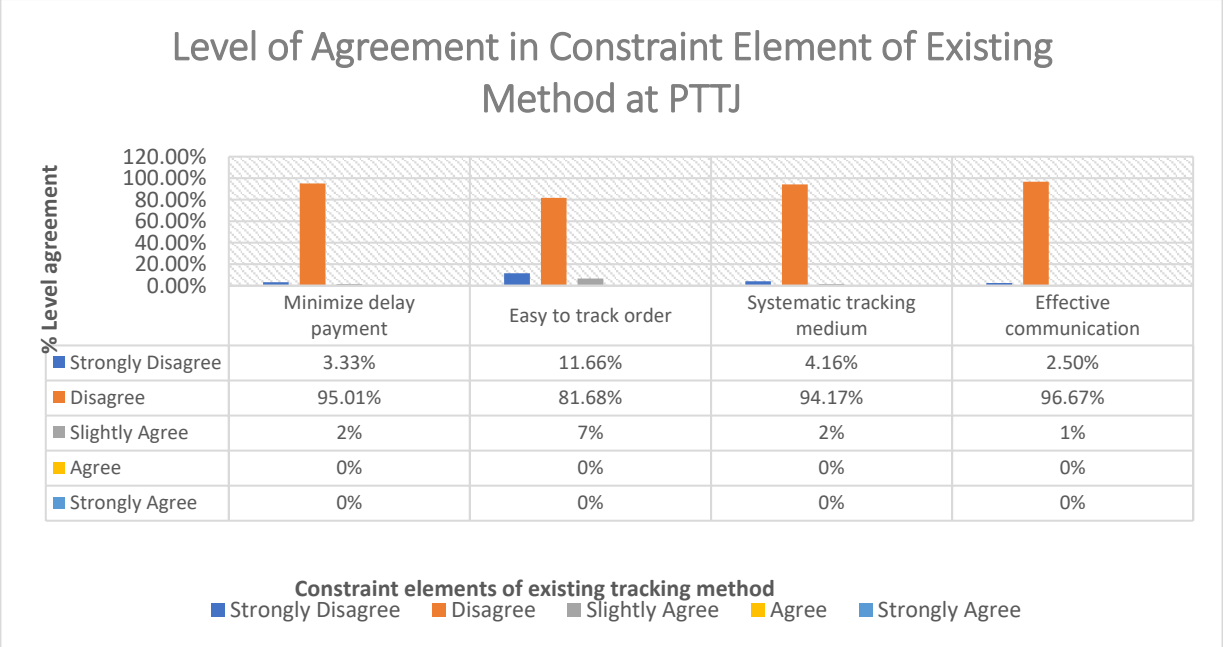


Figure 4.5: Percentage of level agreement of existing method

Figure 4.5 shows 100% of respondents do not agree with the use of existing methods for ordering spare parts of machinery at PTTJ . From the percentage that shows that 100% respondent not agree in every four (4) element in existing method for efficient medium to purchase Invoices and Delivery Orders (DO) spare parts machinery and payment to suppliers.

4.2.4.3 Descriptive Test of Average Mean

Descriptive statistics are those that describe or characterize a data set's properties. It also distinguishes between two sorts of measurements: measures of central tendency and measures of variability (or spread). Furthermore, central tendency a data set's focus point is described by measurements. Variability or spread measures describe the dispersion of data within a collection.

Table 4.10: Mean of Constraint elements for existing method at PTTJ

	N	**Mean**		**Std.**	**Variance**
	Statistic	Statistic	Std. Error	**Deviation**	**Statistic**
Minimize Delay Payment	30	2.03	0.033	0.183	0.033
	30	1.93	0.046	0.254	0.064

	30	2.03	0.033	0.183	0.033
	30	1.93	0.046	0.254	0.064
Easy to Track Order	30	1.93	0.082	0.450	0.202
	30	1.93	0.082	0.450	0.202
	30	2.00	0.068	0.371	0.138
	30	1.93	0.082	0.450	0.202
Systematic Tracking Medium	30	2.00	0.068	0.371	0.138
	30	1.97	0.033	0.183	0.033
	30	1.97	0.033	0.183	0.033
	30	1.97	0.033	0.183	0.033
Effective Communication	30	1.97	0.033	0.183	0.033
	30	1.97	0.033	0.183	0.033
	30	1.97	0.033	0.183	0.033
	30	2.03	0.033	0.183	0.033

Table 4.10 show the result of respondent related to Mean of Constraint elements for existing method at PTTJ. There are 4 constraint elements of existing method in machinery spare part order at PTTJ. The data was generated by using SPSS Software, version 26.

Table 4.11: Mean and average mean of the categories for existing method

No	Constraint elements of existing tracking method	Mean	Average Mean	Average Mean (%)
1	Minimize delay payment	2.03	1.98	25.10
		1.93		
		2.03		
		1.93		
2	Easy to Track Spare Part Orders	1.93	1.95	24.68
		1.93		
		2.00		

		1.93		
3	WhatsApp group medium	2.00	1.98	25.06
		1.97		
		1.97		
		1.97		
4	Effective communication	1.97	1.99	25.16
		1.97		
		1.97		
		2.03		
Total Average		**1.97**	**7.89**	**100**

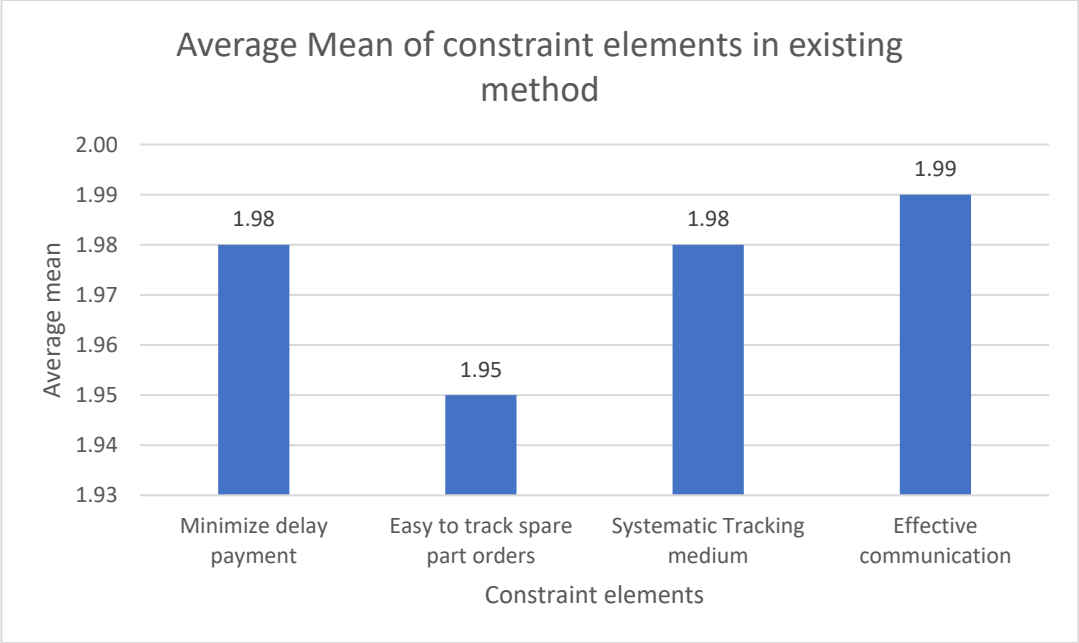


Figure 4.6: Average mean in existing method

According to the statistics in Table 4.12 and Figure 4.6 above, the highest average mean in element effective communication is 1.99 average mean. Secondly, minimize delay payment and systematic tracking medium is 1.98 average mean, and lastly, easy to track spare part order is 1.95 average mean.

Table 4.12: Average Mean of existing method

Variables	**Mean**	**Interpretation**
Minimize Delay Payment	1.98	Low
Easy to Track Spare Part Orders	1.95	Low
Systematic Tracking Medium	1.98	Low

Effective communication	1.99	Low

Table 4.13: Mean Range Interpretation (Source from Google search)

No	Mean Range	Interpretation
1	4.51 - 5.00	Very High
2	3.51 - 4.50	High
3	2.51 - 3.50	Medium
4	1.51 - 2.50	Low
5	1.00 - 1.50	Very Low

Table 4.13 above shows, respondent level of usability toward current method shows for all variables tested the average mean score were less than 2.50 meaning that the mean range level of existing method was low (refer to table 4.13). By referring to the interpretation of 5-point mean rating from Srisaard (2002). It needs systematic and efficient tracking center medium. However, an electronic system is important to use in construction industry which need to achieve IR 4.0. Based on 4.2.44: The need of electronic systematic tracking cennter in pre-test questionnaire is about the need of electronic systematic tracking center (e-STC) for site requisition machinery spare part order at PTTJ as Table 4.14 below show that it is between 0.6-0.7 is acceptable.

Table 4.14: Reliability Test Cronbach's Alpha Based on Standardized Items

Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
0.752	0.741	10

Table 4.15: Mean for electronic Systematic Tracking Center (e-STC) for Site Requisition Machinery Spare Part Order at PTTJ

	N Statistic	Mean		Std. Deviation	Variance Statistic
		Statistic	Std. Error		
i) Systematic tracking center is need to develop to manage the job of machinery	30	4.60	0.123	0.675	0.455

repairing and services.					
ii) Systematic tracking center need to develop to minimize delay payment	30	4.73	0.095	0.521	0.271
iii) Systematic tracking center need to develop for easy to track spare part order using online order form	30	4.60	0.123	0.675	0.455
iv) Systematic tracking center need to develop for faster systematic tracking medium by online machine condition form	30	4.73	0.095	0.521	0.271
v) Systematic tracking center need to develop to avoid miss recording in spare part order	30	4.53	0.124	0.681	0.464
vi) Systematic tracking center need to develop to avoid duplicate order in spare part orders	30	4.57	0.114	0.626	0.392
vii) Systematic tracking center need to develop to avoid missing order in spare part orders	30	4.63	0.089	0.490	0.240
viii) Systematic tracking center need to develop for effective communication	30	4.53	0.124	0.681	0.464
viiii) Systematic tracking center need to develop for more efficient of purchase by online Delivery Orders (DO) form	30	4.57	0.114	0.626	0.392
x) Systematic tracking center need to develop for more efficient payments to suppliers	30	4.63	0.089	0.490	0.240

From pre-test, Section C show the mean resulted in ten (10) elements for the need of electronic tracking center at PTTJ are show as Table 4.15. There are 10 elements electronic Systematic Tracking Center for Site Requisition Machinery Spare Part Order at PTTJ. The data was generated by using SPSS Software, version 26. Based on the Table 4.15, score mean is

more than 4.50 in mean range in every element, resulted as high interpretation by referring the mean range interpretation in Table 4.13.

Table 4.16: Mean for electronic Systematic Tracking Center for Site Requisition Machinery Spare Part Order at PTTJ

The need of electronic Systematic Tracking Center to develop for Site Requisition Machinery Spare Part Order at PTTJ;		**Mean**
i) Systematic tracking center is need to develop to	Manage the job of machinery repairing and services.	4.60
ii) Systematic tracking center need to develop to	Minimize delay payment	4.73
iii) Systematic tracking center need to develop for	Easy to track spare part order using online order form	4.60
iv) Systematic tracking center need to develop for	Faster systematic tracking medium by online machine condition form	4.73
v) Systematic tracking center need to develop to	Avoid miss recording in spare part order	4.53
vi) Systematic tracking center need to develop to	Avoid duplicate order in spare part orders	4.57
vii) Systematic tracking center need to develop to	Avoid missing order in spare part orders	4.63
viii) Systematic tracking center need to develop for	Effective communication	4.53
viiii) Systematic tracking center need to develop for	More efficient of purchase by online Delivery Orders (DO) form	4.57
x) Systematic tracking center need to develop for	More efficient payments to suppliers	4.63
	Average Mean	4.612

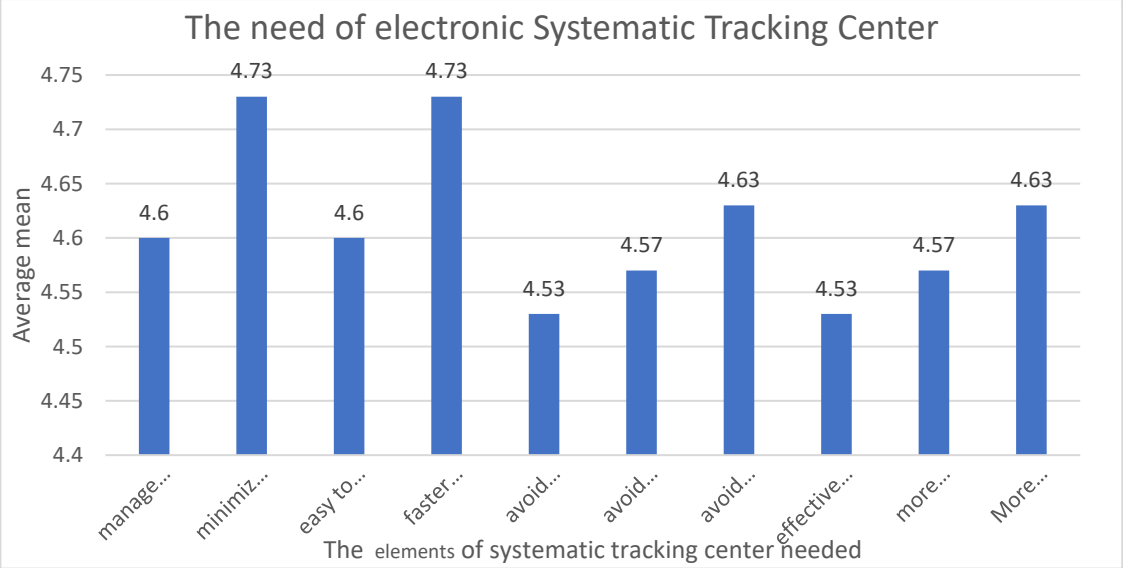


Figure 4.7: Element for the need of electronic Systematic Tracking center for Site Requisition Machinery Spare Part Order at PTTJ

Based on Figure 4.7, elements for the need of electronic systematic tracking center should consider to solve the constraints of existing method. More than 4.50 mean range score for every elements which are the need of electronic Systematic Tracking Center to developed for Site Requisition Machinery Spare Part Order at PTTJ. Based on Table 4.16, average mean for all elements is 4.61 was resulted high interpretation as refer to Table 4.13.

4.3 Develop the e-STC for Site Requisition Machinery Spare Parts Order using wix.com

The Internet of Things (IoT) has a broad intensity of things like sensors, cameras, signaling equipment, etc. It will ensure to solve client requests effectively and build up the correct directions. Internet of things connects the devices & humans with the learning of innovation. The IoT will be set up in a Web Development industry to make web architecture and User Interface is more creative and interactive. In develop the e-STC for Site Requisition Machinery Spare Parts Order, wix.com were selected as a web builder that will be used to develop this invention. Wix.com is easy to use and use internet access which can be used via mobile phone, computer, laptop, and tablet to access this website.

4.3.1 Method to develop e-STC for Site Requisition Machinery Spare Parts Order

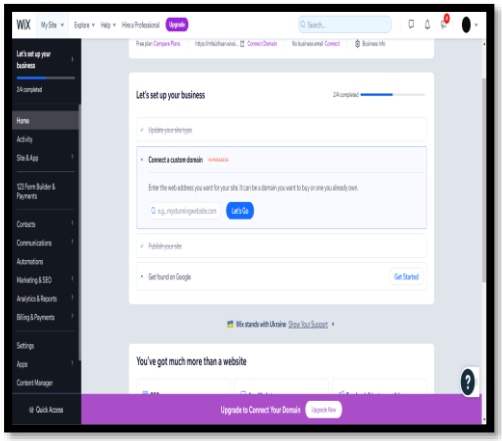
The existing method depends on ‘WhatsApp’ group medium between workshop department and Procurement department (PTTJ), which often causes the problem of overlooking the spare

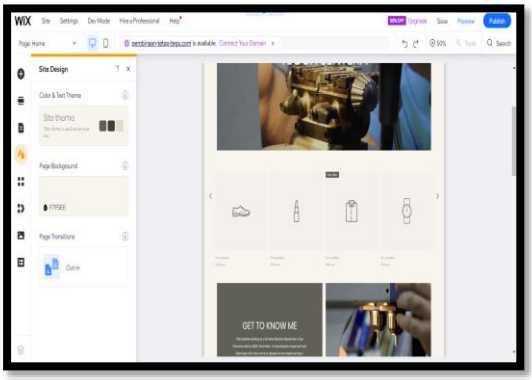
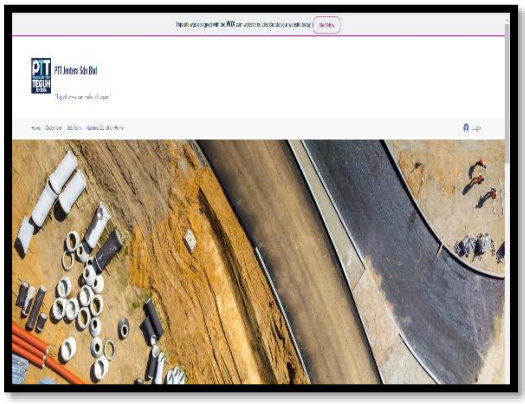
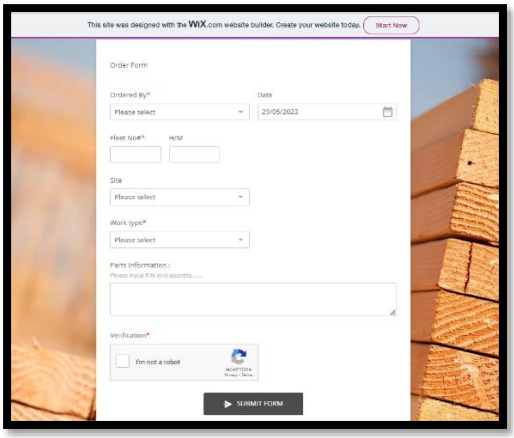
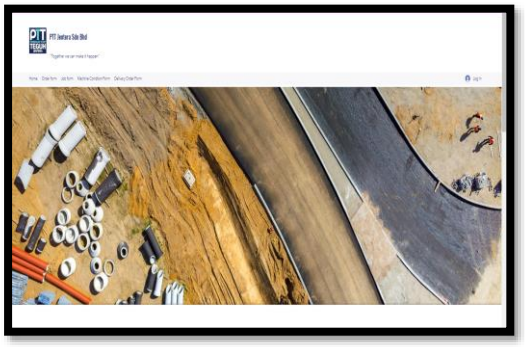
part order due to too much information that needs to be known about the machineries. Besides that, the insufficiency to track orders occur due to the overload of tasks being completed by the admins. In conclusion, a more systematic and centralized method is required to overcome this issue that procurement department is having.

4.3.2 The Process to Develop e-STC for Site requisition machinery spare parts order.

The process to develop of e-STC for site requisition machinery spare part order at PTTJ as show in Table 4.17 below. There are several steps to create, design and develop the website of the tracking system.

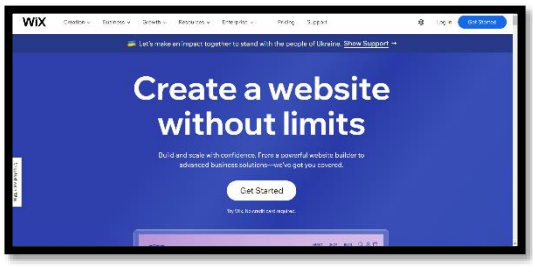
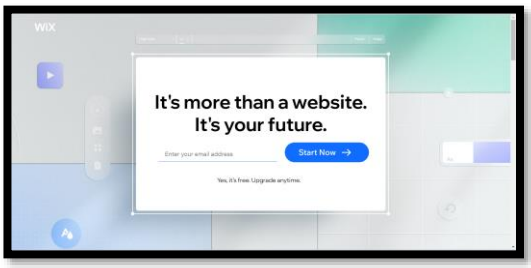
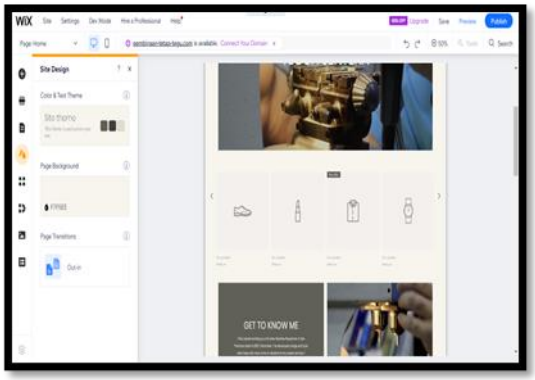
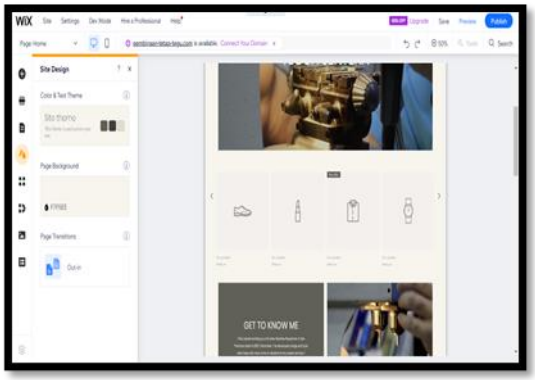
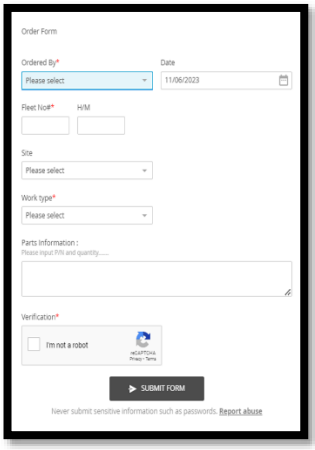
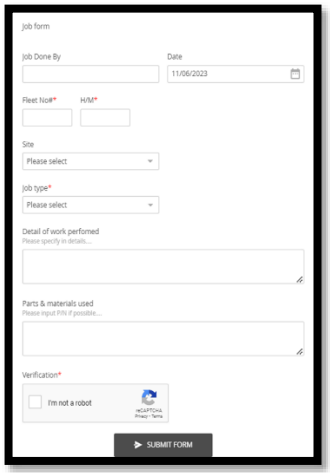
Table 4.17: The process to develop e-STC

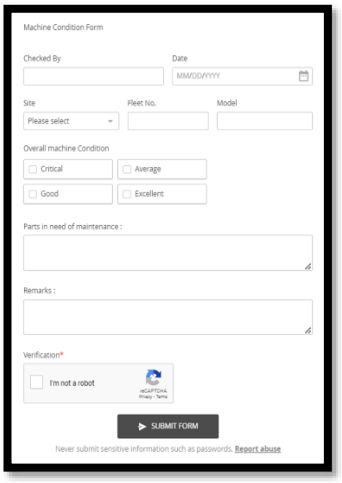
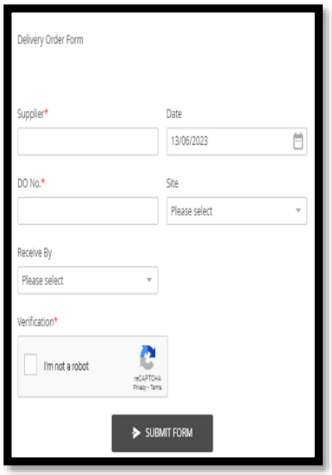
Process	Work Description
	Step 1: Create an account in Wix.com Create an account using an email.
	Step 2: Set up the website with Wix ADI Set up the website based on the type of site are building.

	Step 3: Choose template from Wix.com Choose templates from the relevant sub-category that been chose from.
	Step 3: Design the website Design the website based on the preference.
	Step 3: Build the website by adding form Create a form for each section using templates in Wix.com. There are four (4) section in this website. First, Order form section for spare part orders. Next is Job form for foreman update during inspection. Third, Machine condition form for foreman update after inspection and lastly, Delivery Order form for user upload documents related.
	Step 4: Final product website development

4.3.3 Final Product of e-STC for Site Requisition Machinery Spare Parts Order

The product was successfully developed by using Wix.com. Based on the aim of the objective is to develop the systematic tracking center for site requisition machinery spare part orders (e-STC) at PTTJ for more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. The product needs to be achieved the objective of efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers.

<table>
<tr><td colspan="2">Final product</td></tr>
<tr><td>Step 1: Wix.com homepage
 
</td><td>Step 2: Sign Up or Log In
 
</td></tr>
<tr><td>Step 3: Design website using wix.com template
  </td><td>Step 4: Create details for Home Page
  </td></tr>
<tr><td>Step 5: Order Form to order spare parts
 
</td><td>Step 6: Job Form for foreman update during inspection
 
</td></tr>
</table>

Step 7: Machine Condition Form for foreman update after inspection	Step 8: Delivery Order for user upload documents
	

4.3.4 Analysis the Development of e-STC for Site Requisition Machinery Spare Parts Order

Based on the constraint element of existing tracking method, more than 85% of respondents agree based on the 4 categories to develop e-STC for Site Requisition Machinery Spare Parts Order for more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. The basic goal of efficiency analysis is to understand how inputs are transformed into valuable output.

4.3.5 Test the Product

Product testing is the process of assessing a product's qualities or performance. It is also known as customer testing or comparative testing. The completed product was tested with a questionnaire distributed via Google form links. This product was tested on 30 members of the site team and headquarters employees. Personnel from workshop department and procurement department at Pembinaan Tetap Teguh Jentera. The questionnaire was created using Davis' Technology Acceptance Model (1989). The Technology Acceptance Model (TAM; Davis, 1989) is one of the most prominent theories of technology adoption, stating that two major components impact an individual's willingness to use new technology: perceived ease of use and perceived value (Neil Charness,2016). This study measures TAM's most recognized

characteristics, which are perceived ease of use, perceived usefulness, attitude toward using technology, and behavioral intention to use. The sample size was estimated using the Krejcie and Morgan Table (1970), which showed that 28 samples were sufficient for a population of 30 respondents. This research, on the other hand, includes the entire population. Before releasing the product to the public, four (4) users were chosen to test e-STC, it is resulted on their expertise with e-STC, to take the user experience to the next level. Finally, the product is more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. At the same time, the documents can be easy to view on site.

4.4 To Test the Effectiveness of e-STC for Site Requisition Machinery Spare Part Orders

The study shows the research results and data in post-test, which are collected by Quantitative method from the questionnaire and distribution for the respondents and all of 30 respondents were answer the questionnaire by Google Form.

4.4.1 Data Collection

For e-STC for site requisition machinery spare part orders post-questionnaire, for pre-test and post-test thirty (30) respondent were reply and answer the questionnaire by Google Form. The result were process and the data collection as Table 4.18 below.

4.4.2 Data Collection of Level Agreement

Table 4.18: e-STC for site requisition machinery spare part orders at PTTJ

No	Constraint elements of existing tracking method	e-STC for site requisition machinery spare part orders at PTTJ	Level of Agreement				
			Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
			5	4	3	2	1
1	Minimize Delay Payment	i) Perceived ease of use ix) easy to minimize delay	21	6	3	0	0

			payment and blocking order from suppliers					
		x)	improve performance in managing documents	23	6	1	0	0
		xi)	increase work productivity in arranging invoices for machinery spare parts order in HQ	21	6	3	0	0
		xii)	very helpful to avoid delay payment to suppliers	23	6	1	0	0
2	Easy to Track Order	j)	Perceived usefulness	19	8	3	0	0
		ix)	easy to follow up status spare parts order					
		x)	easy to track documents for machinery spare parts order in HQ	19	9	2	0	0
		xi)	easy to trace machiner	19	11	0	0	0

			y service status					
		xii)	faster to update machine condition on site	16	10	4	0	0
3	Systematic tracking medium	k) Attitude towards using technology		21	9	0	0	0
		ix)	Easy to update machinery on site					
		x)	Systematic tracking medium to avoid missing information for spare parts orders	20	10	0	0	0
		xi)	Able to control the miss recording in spare part orders	15	13	2	0	0
		xii)	Able to control overlook information in spare part orders	12	16	2	0	0
4	Effective communication	l) Behavioural intention to use		7	20	3	0	0
		ix)	Avoid duplicate order in spare part orders					
		x)	Avoid missing order in spare part orders	20	10	0	0	0
		xi)	Easy to communicate	15	13	2 (	0	0

			among workshop departme nt and procurem ent departme nt					
		xii)	Faster to update inspection of machiner y on site	8	19	3	0	0

The respondent's perspective on the new method had been presented in Section B. From questionnaire distributed for post-test to rate their level of agreement on a scale of 1 to 5. The respondent's perspective on the e-STC for site requisition machinery spare part orders at PTTJ is shown in table 4.13. Most of the respondents indicate on a scale of 5(Strongly Agree).

4.4.3 Respondent Perspective

4.4.3.1 Reliability Test for e-STC for Site Requisition Machinery Spare Part Orders

There are four (4) elements need to scale by respondents in questionnaire, to test the effectiveness usage of e-STC. In addition, the questions were on the 5-point Likert Scale with responses in level of agreement from “Strongly agree” to “Strongly disagree”. To determine if the questionnaire could “reliably” measure the latent variable like the effectiveness of e-STC, Cronbach alpha test was conducted. The acceptable reliability value is 0.6. Therefore, the questionnaire’s reliability result is acceptable 0.60-0.70 score and then the questionnaire is considered “reliable”. The result as shown in Table 4.19 below.

Table 4.19: Reliability test for e-STC

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.743	0.731	16

4.4.3.2 Frequency Analysis for e-STC for Site Requisition Machinery Spare Part Orders

The result for frequency analysis for e-STC for Site Requisition Machinery Spare Part Orders as show in Table 4.20 below to process the data for frequency analysis using SPSS software version 26.

Table 4.20: Frequency Analysis Constraint elements of e-STC

No	Elements of systematic tracking center (e-STC)	e-STC for site requisition machinery spare part orders at PTTJ	Level of Agreement				
			Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
			5	4	3	2	1
1	Minimize Delay Payment	m) Perceived ease of use xiii) easy to minimize delay payment and blocking order from suppliers	21 (70.00 %)	6 (20.00 %)	3 (10.00%)	0 (0.00%)	0 (0.00%)
		xiv) improve performance in managing documents	23 (76.67 %)	6 (20.00 %)	1 (3.33%)	0 (0.00%)	0 (0.00%)
		xv) increase work productivity in	21 (70.00 %)	6 (20.00 %)	3 (10.00%)	0 (0.00%)	0 (0.00%)

			arranging invoices for machinery spare parts order in HQ					
		xvi)	very helpful to avoid delay payment to suppliers	23 (76.67 %)	6 (20.00 %)	1 (3.33%)	0 (0.00%)	0 (0.00%)
2	Easy to Track Spare Part Order	n) Perceived usefulness						
		xiii)	easy to follow up status spare parts order	19 (63.33 %)	8 (26.67 %)	3 (10.00%)	0 (0.00%)	0 (0.00%)
		xiv)	easy to track documents for machinery spare parts order in HQ	19 (63.33 %)	9 (30.00 %)	2 (6.66%)	0 (0.00%)	0 (0.00%)
		xv)	easy to trace machinery service status	19 (63.33 %)	11 (36.67 %)	0 (0.00%)	0 (0.00%)	0 (0.00%)
		xvi)	faster to update machine condition on site	16 (53.33 %)	10 (33.33 %)	4 (13.33%)	0 (0.00%)	0 (0.00%)
3	Systematic tracking medium	o) Attitude towards using technology						
		xiii)	Easy to update machinery on site	21 (70.00 %)	9 (30.00 %)	0 (0.00%)	0 (0.00%)	0 (0.00%)
		xiv)	Systematic tracking medium to avoid	20 (66.67 %)	10 (33.33 %)	0 (0.00%)	0 (0.00%)	0 (0.00%)

			missing information for spare parts orders					
		xv)	Able to control the miss recording in spare part orders	15 (50.00 %)	13 (43.33 %)	2 (6.66%)	0 (0.00%)	0 (0.00%)
		xvi)	Able to control overlook information in spare part orders	12 (40.00 %)	16 (53.33 %)	2 (6.66%)	0 (0.00%)	0 (0.00%)
4	Effective communication	p)	Behavioural intention to use	7 (23.33 %)	20 (66.67 %)	3 (10.00%)	0 (0.00%)	0 (0.00%)
		xiii)	Avoid duplicate order in spare part orders					
		xiv)	Avoid missing order in spare part orders	20 (66.67 %)	10 (33.33 %)	0 (0.00%)	0 (0.00%)	0 (0.00%)
		xv)	Easy to communicate among workshop department and procurement department	15 (50.00 %)	13 (43.33 %)	2 (6.66%)	0 (0.00%)	0 (0.00%)
		xvi)	Faster to update inspection of machinery on site	8 (26.67 %)	19 (63.33 %)	3 (10.00%)	0 (0.00%)	0 (0.00%)

Table 4.21: Percentage of the respondents agree and disagree with e-STC for Site Requisition Machinery Spare Part Orders

Elements of systematic tracking center (e-STC)	Level of Agreement				
	Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
	1	2	3	4	5
Minimize delay payment	0.00%	0.00%	6.67%	20.00%	73.34%
Easy to track order	0.00%	0.00%	7.50%	30.84%	60.83%
Systematic tracking medium	0.00%	0.00%	3.34%	40.00%	56.67%
Effective communication	0.00%	0.00%	6.67%	51.67%	41.67%
Total	0%		100%		

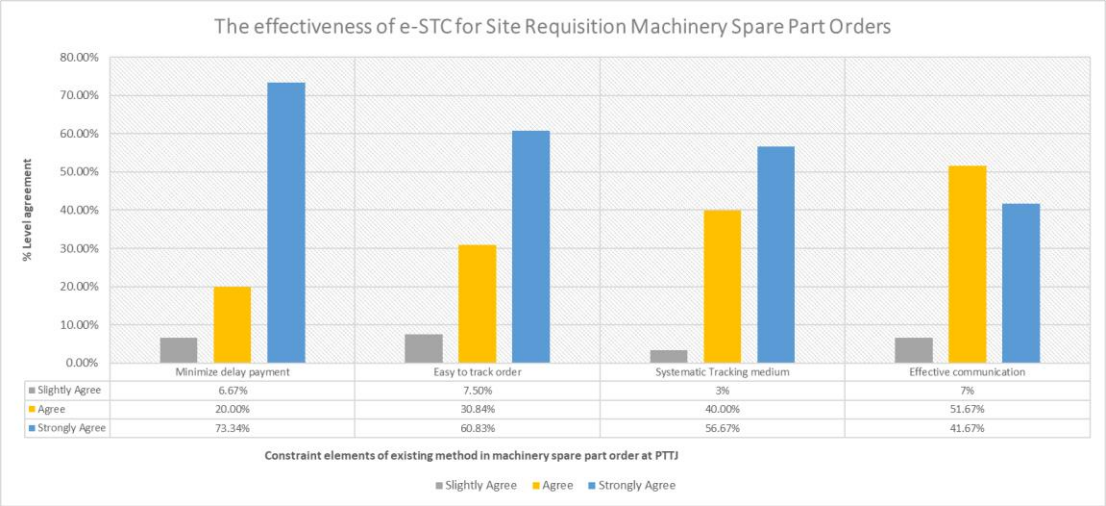


Figure 4.8: The effectiveness of e-STC for Site Requisition Machinery Spare Part Orders

Figure 4.8 shows the percentage of respondents who agree with the use of e-STC for ordering spare parts. From the percentage that shows that they need e-STC for more efficient to purchase Invoices and Delivery Orders (DO) spare parts machinery.

4.4.3.3 Descriptive Analysis of Average Mean for e-STC for Site Requisition Machinery Spare Part Orders

Descriptive statistics are those that describe or characterize a data set's properties. It also distinguishes between two sorts of measurements: measures of central tendency and measures of variability (or spread). Furthermore, central tendency a data set's focus point is described by measurements. Variability or spread measures describe the dispersion of data within a collection.

Table 4.22: Elements for e-STC for Site Requisition Machinery Spare Part Orders

Elements for e-STC for Site Requisition Machinery Spare Part Orders	**N Statistic**	**Mean**		**Std. Deviation**	**Variance Statistic**
		Statistic	Std. Error		
Minimize Delay Payment	30	4.60	0.123	0.675	0.455
	30	4.73	0.095	0.521	0.271
	30	4.60	0.123	0.675	0.455
	30	4.73	0.095	0.521	0.271
Easy to Track Order	30	4.53	0.124	0.681	0.464
	30	4.57	0.114	0.626	0.392
	30	4.63	0.089	0.490	0.240
	30	4.40	0.132	0.724	0.524
Systematic tracking medium	30	4.70	0.085	0.466	0.217
	30	4.67	0.088	0.479	0.230
	30	4.43	0.114	0.626	0.392
	30	4.43	0.111	0.606	0.368
Effective	30	4.17	0.108	0.592	0.351

Communication	30	4.67	0.088	0.479	0.230
	30	4.43	0.114	0.626	0.392
	30	4.17	0.108	0.592	0.351

Table 4.22 show the result of respondents related to mean score for electronic Systematic Tracking Center (e-STC) for Site Requisition Machinery Spare Part Order at PTTJ. There are four (4) elements of electronic Systematic Tracking Center (e-STC) for Site Requisition Machinery Spare Part Order at PTTJ to be consider in post-test. The data was generated by using SPSS Software, version 26. Based on the Table 4.23, mean score is more than 4.5 in average mean in every elements resulted high interpretation.

Table 4.23: Mean and average mean of the categories for e-STC for Site Requisition Machinery Spare Part Orders

No	e-STC for Site Requisition Machinery Spare Part Orders	Mean	Average Mean	Average Mean (%)
1	Minimize delay payment	4.6	4.67	25.79
		4.73		
		4.60		
		4.73		
2	Easy to track order	4.53	4.53	25.06
		4.57		
		4.63		
		4.40		
3	Systematic tracking medium	4.70	4.53	25.06
		4.67		
		4.43		
		4.33		
4	Effective communication	4.17	4.36	24.10
		4.67		

		4.43		
		4.17		
Total Average		**4.50**	**18.09**	**100**

Table 4.24: Mean of e-STC for Site Requisition Machinery Spare Part Orders

Variables	**Mean**	**Interpretation**
Minimize Delay Payment	4.67	Very High
Easy to Track Order	4.53	Very High
Systematic Tracking Medium	4.53	Very High
Effective communication	4.36	High

Table 4.24 above shows, respondent level of average mean toward current method shows for all variables tested the average mean score were more than 4.50 meaning that the mean range level of e-STC was high (refer to table 4.13). by referring to the interpretation of 5-point mean rating from Srisaard (2002). It shows that systematic and efficient tracking center medium helps to solve elements.

4.4.3.4 Paired sample statistics

Paired sample statistics is the test to compare the effectiveness of existing method for tracking Invoices and Delivery Orders (DO) and payment to suppliers with e-STC for Site Requisition Machinery Spare Part Orders.

Table 4.25: Paired sample statistics

	Paired sample statistics	
	Average Mean	
Effectiveness category	**Existing Method**	**e-STC**
Minimize Delay Payment	1.98	4.67
Easy Track Order	1.95	4.53
Systematic tracking medium	1.98	4.53
Effective Communication	1.99	4.36

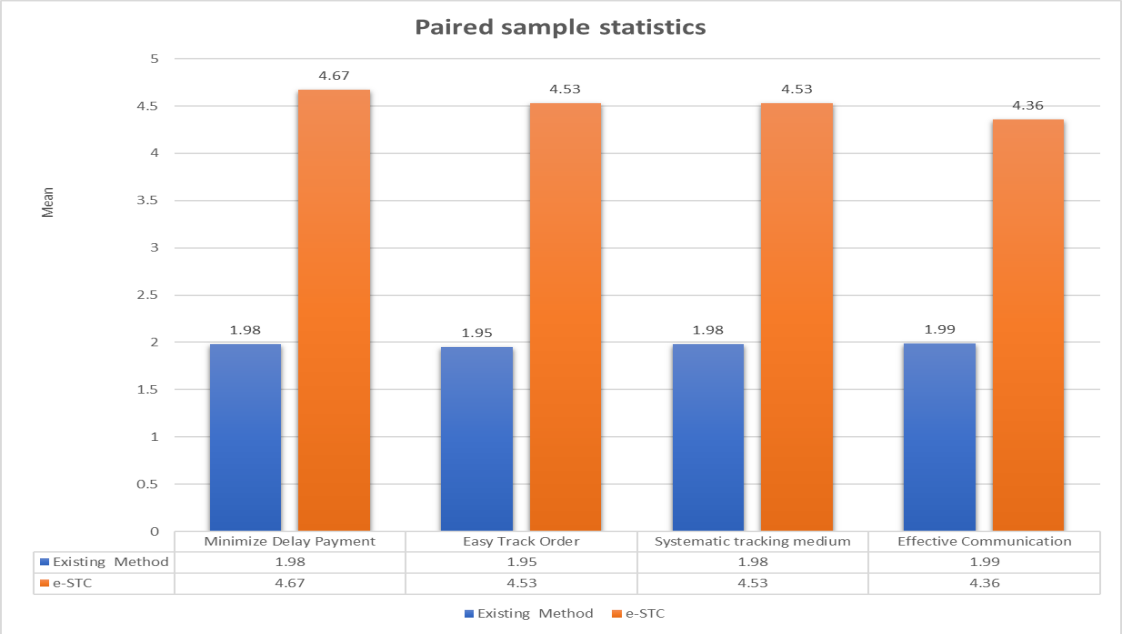


Figure 4.9: The average mean value of existing method and e-STC for Site Requisition Machinery Spare Part Orders

4.4.3.5 Paired Differences

Paired Differences test is to determine whether there is statistical evidence the mean difference between using existing method and e-STC for Site Requisition Machinery Spare Part Orders. It is tests to difference of each category of effectiveness of tracking system by using existing method with and e-STC for Site Requisition Machinery Spare Part Orders. As Table 4.26 show the result of paired differences.

Table 4.26: Paired Differences of Mean

No	Effectiveness element	Paired Differences
		Average Mean
1	Minimize delay payment	2.69
2	Easy to track order	2.58
3	WhatsApp group medium	2.55

4	Effective communication	2.37
	Average Mean in Paired Differences	**2.55**

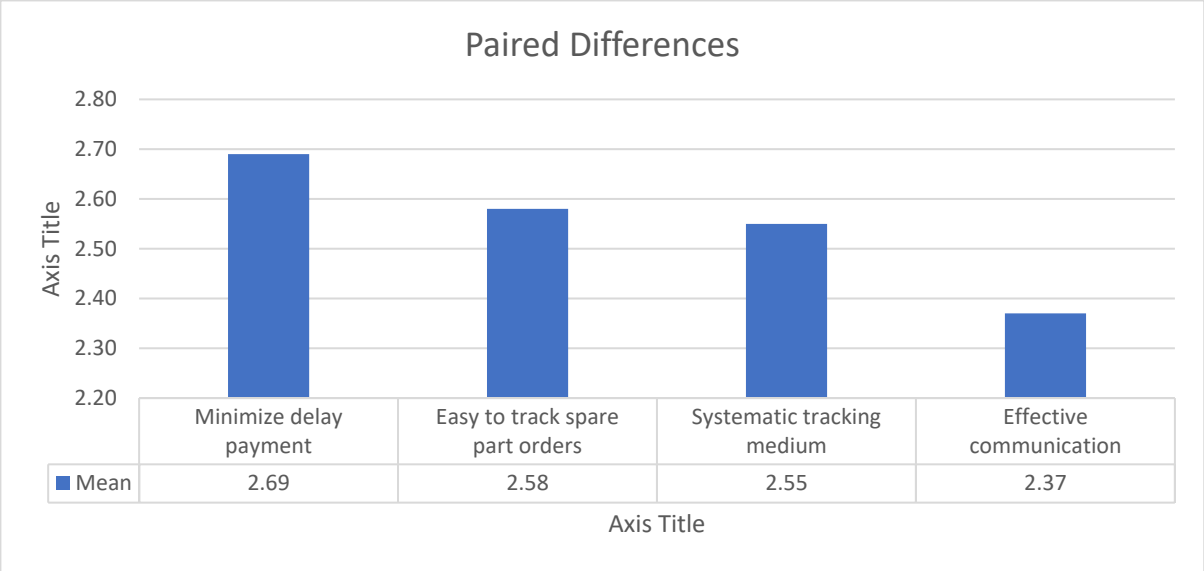


Figure 4.11: The difference average mean value of existing method and e-STC for Site Requisition Machinery Spare Part Orders

Based on Figure 4.11 shows that the bar chart of the paired differences between existing method and e-STC. It shows that minimize delay payment is a higher differences value average mean 2.69. Follow by systematic tracking medium average mean 2.58. Next, systematic tracking medium average mean 2.55 and lastly, effective communication average mean 2.37.

Overall, as the result shows all the elements have the differences value. A paired found this difference to be significant, t(4) =…, p=, p<0.05. Hence, e-STC is most efficient compared to existing method.

4.4.4.6 Paired Sample T-Test

In order to evaluate the effectiveness of e-STC in the project, a paired sample t test was performed. Results as shown in Table 4.22, respondent preferred using e-STC whereby all variable measured, minimize delay payment (Mean = 4.67), easy to track spare part order (Mean = 4.53), systematic tracking medium (Mean = 4.53), and effective communication (Mean = 4.36) were more higher compared with current method minimize delay payment (Mean = 1.98), easy to track spare part order (Mean = 1.95), systematic tracking medium (Mean = 1.98), and effective communication (Mean = 1.99). A paired sample t-test found this difference to be significant for all variables as show in Table 4.27, the value of t of minimize delay payment is 24.74 and the value of p is < .00001. The result is significant at p < .05. The value of t of easy to track spare part order is 28.83 74 and the value of p is < .00001. The result is significant at p < .05. The value of t of systematic tracking medium is 34.07 and the value of p is < .00001. The result is significant at p < .05. The result is significant at p < .05. The value of t of effective communication is 29.19 and the value of p is < .00001. The result is significant at p < .05. This mean that e-STC was more effective compare with the existing method.

Table 4.27: Result of Paired Differences

Pair	**Paired Different**	**t**	**Significant (two tailed)**
	Mean		
Minimize Delay Payment	2.69	24.74	.000
Easy to Track Spare Part Order	2.58	28.83	.000
Systematic tracking medium	2.55	34.07	.000
Effective communication	2.37	29.19	.000

4.5 Conclusion

Nowadays, having a systematic and efficient application is benefit in the construction sector. Apply technology in construction sector is the best practice to solve the problem. Therefore, the creation of electronic application is to assist in this process of develop the objectives to identify the problem in current method in several elements related such as delay payment, insufficiency to track orders and do not have a proper inspection form because of did not have systematic tracking medium and also not in effective communication. The need of systematic tracking medium was identify to develop the system can evaluate the effectiveness of the e-STC for Site Requisition Machinery Spare Part Orders while applied into the site or office.

Therefore, the electronic systematic system was developed as e-STC using wix.com and had been tested the effectiveness. With appropriate steps and methodology, any process of complete the project can be managed wisely and will produce a good result. From the data analysis 100% of respondents agree they need of electronic systematic tracking medium. The e-STC was develop based on the requirement of users. 100% of respondents agree the e-STC for effective system. This result obtained that the e-STC are very efficient to be used on tracking spare part orders, tracking documents at site office and construction site, easy to use and understand the result of the study has found the third objective can be achieved through the effectiveness the respondent is more preferred to using e-STC average mean=4.50 as a tracking system compared to existing method average mean=1.97 for systematic tracking center spare part orders.

Finally, from the data analysis result that the aim of the project achieved for more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. Objective 1 and 3 was achieved by using e-STC for Site Requisition Machinery Spare Part Order. From the paired T-Test shown that, 2.69 is the highest differences mean among the four (4) categories of the usage of e-STC for Site Requisition Machinery Spare Part Order.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

Based on the data analyzed in the previous chapter, this chapter provides a summary of the findings, conclusions, and recommendation. The effectiveness of the e-STC for Site Requisition Machinery Spare Part Orders more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers at the headquarters, Elmina West site office and Bandar Bukit Raja 2 was assessed by establishing how well some of the study's objectives were met.

5.2 Conclusion

The aim of this study is to develop the systematic tracking center for site requisition machinery spare part orders (e-STC) at PTTJ using wix.com for more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers. From oral interview, observation, and questionnaire data, it shows that the problems when purchase spare parts, the supplier sometime send the Invoices and Delivery Order (DO) to site and somehow the Procurement staff did not know the whereabout the documents and may lead to missing documents and need the supplier to send it back. From the findings, it shows that the existing method to be misunderstanding and the documentation is complicated.

The first objective of the study is to identify the need of systematic tracking center for site requisition machinery spare part order at PTTJ. From the findings, it shows that a systematic tracking system is need to arrange machine condition on site,

to track Invoices and Deliver Orders (DO), to ordering spare parts and arrange inspection form for machinery on site.

The second objective is to develop the e-STC for site requisition machinery spare part orders at PTTJ using wix.com after the problem is well-stated. In Chapter 3, Methodology has reviewed the methodology during the study specially to design website for development of the systematic tracking center. The e-STC for Site Requisition Machinery Spare Part Orders was develop by using Wix.com which is a website builder to user view the files and documents. It is also friendly user that can be access everywhere using gadgets.

To test the effectiveness of systematic tracking center for site requisition machinery spare part orders, a survey is distributed using Google Form as the last objective to target respondents. Based on the results, the respondents agree that the e-STC for Site Requisition Machinery Spare Part Orders is effective for more efficient of purchase Invoices and Delivery Orders (DO) and payments to suppliers.

Overall, from the findings of the oral interview, observation, and questionnaire, it can be determined that they have roughly problems with missing Invoices and Delivery Orders (DO) at site. All of the problems that occur give an impact on the respondents. The e-STC for Site Requisition Machinery Spare Part Orders was trialed at Procurement Department and Workshop Department and found to be effective in the procurement process and user friendly.

5.3 Advantages of Using e-STC for Site Requisition Machinery Spare Part Orders

There are a few advantages by using e-STC for Site Requisition Machinery Spare Part Orders which is smooth communication between Workshop Department and Procurement Department to gain information without any misunderstanding on detail process on tracking Invoices and Delivery Orders (DO). Moreover, using e-STC for Site Requisition Machinery Spare Part Orders also helps Procurement staff to update machine condition on site and Workshop staff can order spare parts without any double order. Next, the data on e-STC for Site Requisition Machinery Spare Part Orders is

property and casual that only admin can register the user so that not simply user can access the website.

a. e-STC for Site Requisition Machinery Spare Part Orders is online website storage and can be used with gadgets. This system is user-friendly where the system can be access anywhere and anytime and the machine condition report can be sharing with Microsoft Teams application.
b. Only authorize person or webmaster can enter the website by have the link.

5.4 Recommendations for the Improvement of using e-STC for Site Requisition Machinery Spare Part Orders

Future research on this issue should provide some suggestions for how to enhance and acquire more accurate results. To begin, future researchers will need the collaboration of all staff members in order to expand the number of samples. The sample size in this study was quite small, with only 30 respondents. The outcome will be more accurate if numerous samples are utilized. This is because researchers may collect more data in order to acquire more accurate and dependable results. Researchers will have additional options and benefits in future investigations, allowing them to achieve more precise results.

Because of the findings, the researchers would like to propose some recommendations that may be used as a guide or as a follow-up action to enhance the usage of extra functions that can be accessible without the use of the internet. Furthermore, the user will be alerted of the progress of construction work on the construction site by email, guaranteeing that the user is aware of it.

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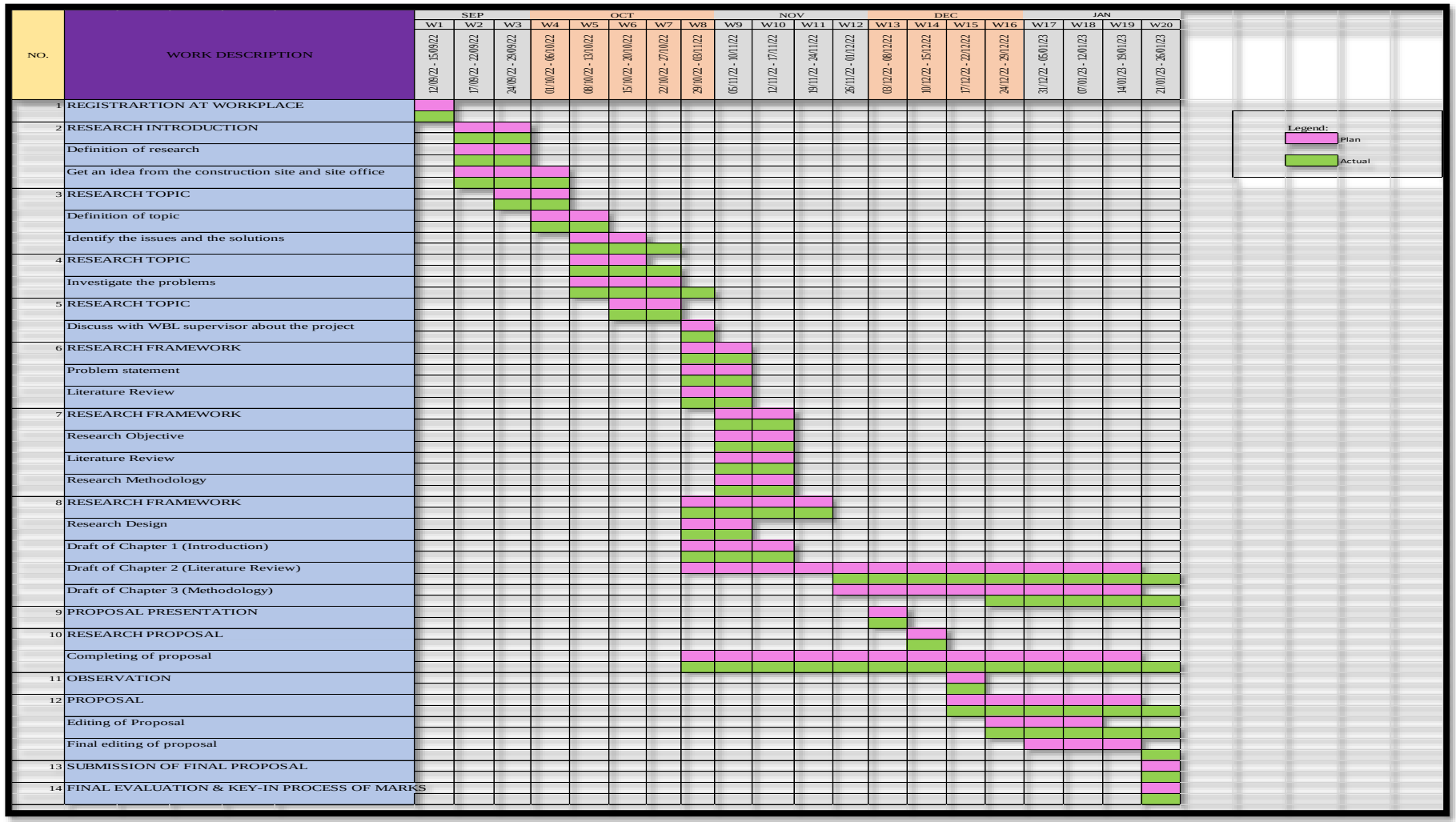
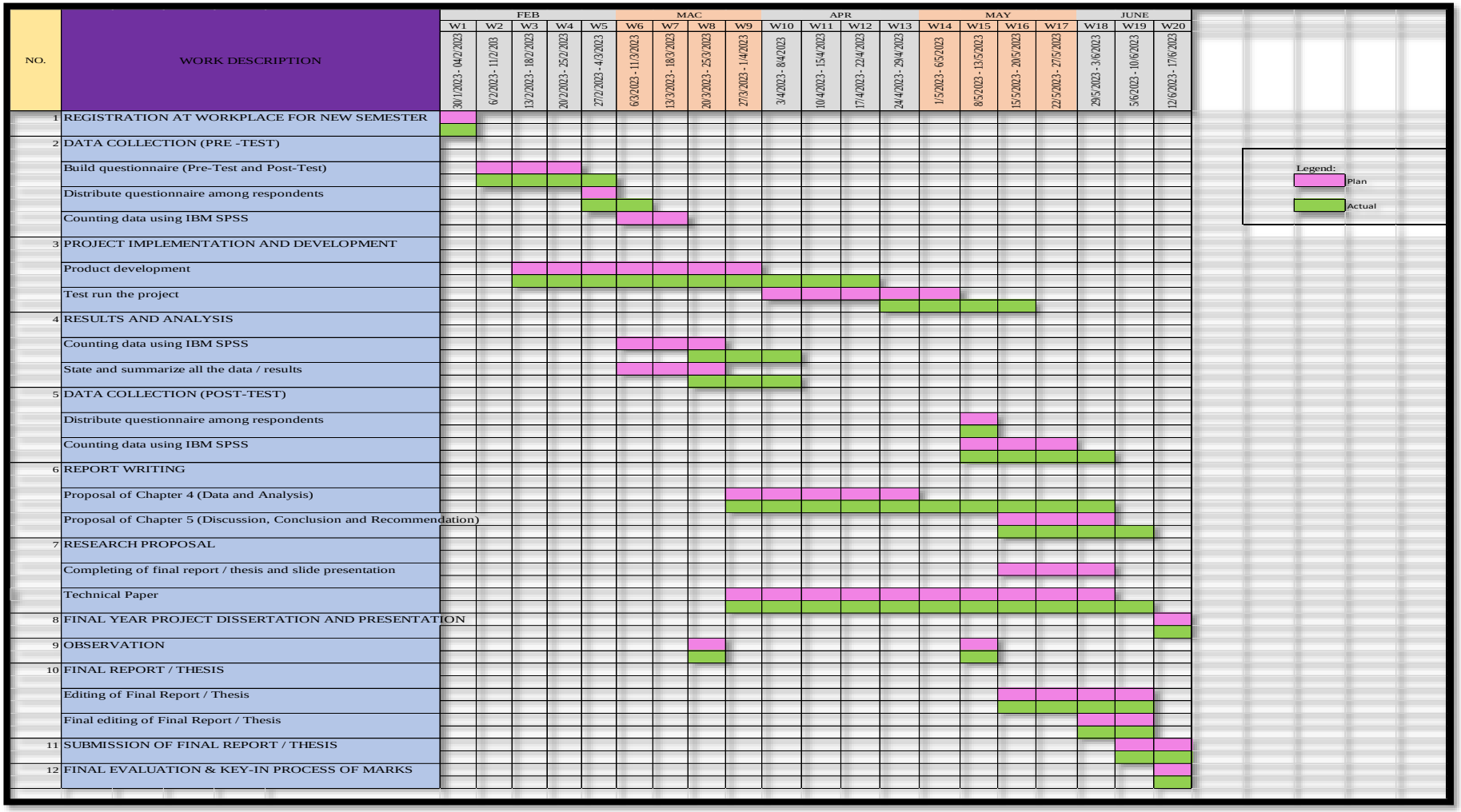
APPENDIX

Gantt Chart Semester 7



Gantt Chat Semester 8



Pre-Test Questionnaire

BACHELOR OF CIVIL ENGINEERING TECHNOLOGY

A part of my study Final Year Project for Bachelor of Civil Engineering Technology (BCT) at Politeknik Ungku Omar (PUO), Ipoh, Perak. I am Nur Azyyati Fari'ah Binti Farizal Haryadi (01BCT20F3030), and I am conducting a survey of pre-test questionnaire. In order to overcome the difficulty of creating a Systematic Tracking Center (e-STC) for Site Requisition Machinery Spare Part Order.

There are **3** section ; **Section A : Demography, Section B : Constraint elements of Existing Method for Site Requisition Machinery Spare Part Order at PTTJ and Section C : The Need Of electronic systematic tracking center (e-STC) for Site Requisition Machinery Spare Part Order**

* Indicates required question

Skip to question 1Skip to question 1

SECTION A : DEMOGRAPHY

Thick (√)

1. **1.Gender:** *

Check all that apply.

- [ ] Male
- [ ] Female

2. **2. Age:** *

Check all that apply.

- [ ] 18-24 years old
- [ ] 25-34 years old
- [ ] 35-44 years old
- [ ] 45-54 years old
- [ ] 55-64 years old
- [ ] 65 years or older

3. **3. Position:** *

Check all that apply.

- [ ] Workshop Manager
- [ ] Assistant Workshop Manager
- [ ] Foreman
- [ ] Admin Junior Executive
- [ ] Admin Executive
- [ ] Admin Assistant
- [ ] Engineer
- [ ] Quantity Surveyor
- [ ] Project Manager
- [ ] Other: _____

4. **4. Work Experience :** *

Check all that apply.

- [ ] < 2 years
- [ ] 2-5 years
- [ ] 6-10 years
- [ ] >10 years

Skip to question 5

SECTION B: There are the constraint elements of existing tracking method and issues related by Existing Method for site requisition machinery spare part orders at PTTJ

Thick (√)

1. Minimize Delay payment

a)

Perceived ease of use

5. i) Easy to minimize delay payment and blocking order from suppliers *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

6. ii) Improve performance in managing documents *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

7. iii) Increase work productivity in arranging invoices for machinery spare parts order in HQ *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

8. iv) Very helpful to avoid delay payment to suppliers *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

2. Easy to Track Order

b) Perceived usefulness

9. i) Easy to follow up status spare parts order *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

10. ii) Easy to track documents for machinery spare parts order in HQ *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

11. iii) Easy to trace machinery service status *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

12. iv) Faster to update machine condition on site *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

3. Systematic tracking medium

c)
Attitude towards using
technology

13. i) Easy to update machinery condition on site *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

14. ii) Systematic tracking medium to avoid missing information for spare parts orders *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

15. iii) Able to control the miss recording in spare part orders *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

16. iv) Able to control overlook information in spare part orders *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

4. Effective communication

d)
Behavioural intention to use

17. i) Avoid duplicate order in spare part orders *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

18. ii) Avoid missing order in spare part orders *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

19. iii) Easy to communicate among workshop department and procurement department *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

20. iv) Faster to update inspection of machinery on site *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

Skip to question 21

Section C : The Need Of electronic Systematic Tracking Center (e-STC) for Site Requisition Machinery Spare Part Order

21. a) Systematic tracking center is need to develop to manage the job of machinery repairing and services. *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

22. b) Systematic tracking center need to develop to minimize delay payment *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

23. c) Systematic tracking center need to develop for easy to track spare part order using online order form *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

24. d) Systematic tracking center need to develop for faster systematic tracking medium by online machine condition form *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

25. e) Systematic tracking center need to develop to avoid miss recording in spare part order. *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

26. f) Systematic tracking center need to develop to avoid duplicate order in spare part orders *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

27. f) Systematic tracking center need to develop to avoid missing order in spare part orders *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

28. g) Systematic tracking center need to develop for effective communication *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

29. h) Systematic tracking center need to develop for more efficient of purchase by online Delivery Orders (DO) form *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

30. i) Systematic tracking center need to develop for more efficient payments to suppliers *

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

Skip to section 5 ()

Thank you for your contributing your valuable time, your honest information, and your thoughtful suggestions

Post-Test Questionnaire

BACHELOR OF CIVIL ENGINEERING TECHNOLOGY

A part of my study Final Year Project for Bachelor of Civil Engineering Technology (BCT) at Politeknik Ungku Omar (PUO), Ipoh, Perak. I am Nur Azyyati Fari'ah Binti Farizal Haryadi (01BCT20F3030), and I am conducting a survey of post-test questionnaire. In order to know the effectiveness a Systematic Tracking Center (e-STC) for Site Requisition Machinery Spare Part Order.

There are **2** section ; **Section A : Demography, Section B : electronic Systematic Tracking Center (e-STC) as a new method in ordering machinery spare parts at PTTJ to resolve issues related to the Existing Method for Site requisition Machinery Spare part order in the Procurement Department for the Invoice and DO.**

* Indicates required question

KEMENTERIAN PENGAJIAN TINGGI

POLITEKNIK MALAYSIA
UNGKU OMAR

SECTION A : DEMOGRAPHY

Thick (√)

1. **1.Gender: ***

Check all that apply.

- [ ] Male
- [ ] Female
- [ ] Other: _____

2. **2. Age:**

Check all that apply.

- [ ] 18-24 years old
- [ ] 25-34 years old
- [ ] 35-44 years old
- [ ] 45-54 years old
- [ ] 55-64 years old
- [ ] 65 years or older

3. **3. Position:** *

Check all that apply.

- [ ] Workshop Manager
- [ ] Assistant Workshop Manager
- [ ] Foreman
- [ ] Admin Junior Executive
- [ ] Admin Executive
- [ ] Admin Assistant
- [ ] Engineer
- [ ] Quantity Surveyor
- [ ] Project Manager
- [ ] Other: _____

4. **4. Work Experience :**

Check all that apply.

- [ ] < 2 years
- [ ] 2-5 years
- [ ] 6-10 years
- [ ] >10 years

SECTION B: electronic Systematic Tracking Center (e-STC) as a new method in ordering machinery spare parts at PTTJ to resolve issues related to the Existing tracking method for site requisition machinery spare part orders at PTTJ

Minimize Delay Payment

a) Perceived ease of use

5. i) Easy to minimize delay payment and blocking order from suppliers

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

6. ii) Improve performance in managing documents

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

7. iii) Increase work productivity in arranging invoices for machinery spare parts order in HQ

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

8. iv) Very helpful to avoid delay payment to suppliers

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

Easy to Track Order

b) Perceived usefulness

9. i) Easy to follow up status spare parts order

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

10. ii) Easy to track documents for machinery spare parts order in HQ

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

11. iii) Easy to trace machinery service status

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

12. iv) Faster to update machine condition on site

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

Systematic tracking medium

c) Attitude towards using technology

13. i) Easy to update machinery condition on site

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

14. ii) Systematic tracking medium to avoid missing information for spare parts orders

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

15. iii) Able to control the miss recording in spare part orders

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

16. iv) Able to control overlook information in spare part orders

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

Effective Communication

d) Behavioural intention to use

17. i) Avoid duplicate order in spare part orders

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

18. ii) Avoid missing order in spare part orders

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

19. iii) Easy to communicate among workshop department and procurement department

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

20. iv) Faster to update inspection of machinery on site

Check all that apply.

- [ ] Strongly Agree
- [ ] Agree
- [ ] Slightly Agree
- [ ] Disagree
- [ ] Strongly Disagree

21. Please give us some feedback/improvement regarding e-STC for Site Requisition Machinery Spare Parts Order

Skip to section 4 (Untitled Section)

Untitled Section

Thank you for your contributing your valuable time, your honest information, and your thoughtful suggestions