**POLITEKNIK UNGKU OMAR**

# THE INNOVATION OF MASTER WORK PROGRAMME TRACKER (WPT) IN CONSTRUCTION REVOLUTION

**MUHAMMAD ZUHAIER BIN ISMAIL**

**(01BCT21F3013)**

**CIVIL ENGINEERING DEPARTMENT**

**SESSION II 2023/2024**

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**A report submitted in partial fulfilment of the requirements for the award of the degree in Bachelor of Civil Engineering Technology with honours.**

## CIVIL ENGINEERING DEPARTMENT

## SESSION II 2023/2024

## DECLARATION OF ORIGINAL AND OWNERSHIP

## THE INNOVATION OF MASTER WORK PROGRAMME TRACKER(WPT) IN CONSTRUCTION

1. I**, MUHAMMAD ZUHAIER BIN ISMAIL (NO KP:991220-11-5089)**, are the students of the final year of **Bachelor Of Civil Engineering Technology,Civil Engineering Department, Politeknik Ungku Omar** at address **Jalan Raja Musa Mahadi, 31400 Ipoh, Perak**

2. I acknowledge that 'The above project' and the intellectual property contained therein are the work of our original work/invention without taking or imitating any intellectual property from any other party.

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Made and truly acknowledged by the said;

a) MUHAMMAD ZUHAIER BIN ISMAIL ) ……..
(IC Num: 991220-11-5089) ) MUHAMMAD ZUHAIER
BIN ISMAIL

In front of me, HJH AZIZAH BINTI
HARON @ HASSAN ) ……
as project supervisor on date: ……. ) HJH AZIZAH BINTI
HARON @ HASSAN

# APPRECIATION

In the name of Allah SWT, most gracious, most merciful, peace and blessing be upon prophet Muhammad SAW, his family and his friend selected. Firstly, I want to offer my deepest gratitude must be towards Allah because of His grace and His guidance, I can enable complete this report “The Innovation Of Master Work Programme Tracker (WPT) In Construction Revolution”

I convey my sincere gratitude to my academic supervisor Hjh Azizah binti Haron @ Hassan, without her kind direction and proper guidance this study would have been a little success. In every phase of the project her supervision and guidance shaped this report to be complete perfectly.

I would like to extend my heartfelt gratitude to Pembinaan Tetap Teguh Sdn.Bhd for providing me with the opportunity to successfully complete my work-based learning session. This award is bestowed upon individuals who have played a direct or indirect role in the production of this project. The successful completion of this project necessitates assistance from multiple individuals, including my colleagues. I have sought assistance from various individuals during the process of preparing this report. Presently, I am making a small endeavor to express my profound appreciation towards that benevolent individual.

# ABSTRAK

A paradigm shift is currently taking place in the construction sector in Malaysia as a result of the adoption of Construction 4.0 technologies. This has prompted an important investigation into the transformative influence of these technologies as well as the implementation of digital track progress practice. The prevailing challenge within the industry's is management in track progress at site, particularly concerning miss communication about the progress at site cause to check and need planning well if work on site not followed based on planning, lack of real-time visibility and accountability in construction projects, particularly those involving main contractor managing various phases of work. Then, the conventional method-based site visit was continued to be used, resulting in inefficiencies, environmental issues, and accessibility limits. This Work Programme Tracker (WPT) as user friendly app to aim difficulties and improve information about tracking progress work on site in the scope study at Kota Elmina was handle by main contractor Pembinaan Tetap Teguh by implementation of digital systems, notably the industry's transition to a enhancing sustainability and fostering effective project management techniques. The methodology with data collection will involve administering standardized questionnaires to gather feedback from industry professionals. The expected outcomes include important insights and responses from participants regarding the app's assimilation. This study provides insight into the practical implementation of Construction 4.0 and digitalization in the construction industry, serving as a model for future projects that aim to use technology to improve sustainability and project efficiency with this approach WPT application, project effectiveness will be more manageable.

# ABSTRACT

Perubahan paradigma sedang berlaku di sektor pembinaan di Malaysia sebagai hasil daripada penerimaan teknologi Pembinaan 4.0. Ini telah mendorong penyelidikan penting mengenai pengaruh transformatif teknologi ini serta pelaksanaan amalan kemajuan laluan digital. Cabaran yang berlaku dalam industri ini ialah pengurusan dalam kemajuan laluan di tapak, terutamanya berkaitan dengan kurang komunikasi tentang kemajuan di tempat menyebabkan untuk memeriksa dan perlu merancang dengan baik jika kerja di tempat tidak diikuti berdasarkan perancangan, kurangnya kelihatan dalam masa nyata dan tanggungjawab dalam projek pembinaan, terutama yang melibatkan kontraktor utama menguruskan pelbagai fasa kerja. Kemudian, lawatan tapak berasaskan kaedah konvensional terus digunakan, yang membawa kepada ketidaksempurnaan, isu alam sekitar, dan had aksesibiliti. Tracker Program Kerja (WPT) ini sebagai aplikasi mesra pengguna untuk menargetkan kesukaran dan meningkatkan maklumat mengenai penjejakan kemajuan kerja di tapak dalam kajian skop di Kota Elmina telah ditangani oleh kontraktor utama Pembinaan Tetap Teguh melalui pelaksanaan sistem digital, terutamanya transisi industri ke arah meningkatkan ketahanan dan mempromosikan teknik pengurusan projek yang berkesan. Kaedah pengumpulan data akan melibatkan pentadbiran soalan standard untuk mengumpul maklum balas daripada profesional industri. Hasil yang dijangka termasuk wawasan dan respons penting daripada peserta mengenai asimilasi aplikasi. Kajian ini memberikan wawasan kepada pelaksanaan praktikal Pembinaan 4.0 dan digitalisasi dalam industri pembinaan, berfungsi sebagai model untuk projek masa depan yang bertujuan menggunakan teknologi untuk meningkatkan kesinambungan dan kecekapan projek dengan pendekatan ini aplikasi WPT, keberkesanan projek akan lebih boleh dikendalikan.

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| | |
|---|---|
| WPT | Work Programme Tracker |
| PTT | Pembinaan Tetap Teguh Sdn Bhd |
| IR 4.0 | Innovation Revolution 4.0 |
| IoT | Internet of Thing |
| iOS | iPhone Operating System |
| CPM | Critical Path Method |
| BIM | Building Information Modeling |
| IBS | Industrialized Building System |
| SDG | Sustainable Development Goal |
| R&D | Research & Development |
| 3D | Three Dimensional |
| 2D | Two Dimensional |

# CHAPTER 1
# INTRODUCTION

## 1.1 INTRODUCTION

The advent of industrial construction 4.0 technologies has ushered in a transformative era in civil technology and construction practices. These advancements, including the Internet of Things (IoT), robotics, human-computer interaction, and cyber-physical systems, present a paradigm shift in how infrastructure is conceived, designed, and built. While the potential for revolutionizing the construction industry is evident, there are challenges hindering the seamless integration of these technologies, often stemming from traditional perceptions of civil engineering. The incorporation of computer-aided design and 3D modeling, coupled with innovations like 3D printing technology and the digitalization of construction site management, is reshaping traditional civil engineering methods. This evolution enhances the scientific precision, efficiency, and cost-effectiveness of construction processes (Edirisinghe, 2018). For the construction industry to progress and remain sustainable, the adoption of information and equipment technology is imperative. The training of civil engineers is identified as a key factor in successfully implementing these new technologies, particularly in the context of erecting complex structures like high-rise buildings (Pryadko & Lebedev, 2018). In the pursuit of quality and sustainable housing, Construction 4.0 technologies have been examined for their impact, with a focus on digitalizing the construction industry through tools such as Radio-Frequency Identification (RFID) and 3D printing (Olatunde et al., 2022; Osunsanmi et al., 2018).

The adoption of IoT technologies has been modeled to improve sustainable construction practices, underscoring their relevance in developing economies (Dosumu & Uwayo, 2023). Addressing the challenges of technology adoption, strategies, and implementation competencies has been a subject of discussion among construction stakeholders (Kissi et al., 2022). Moreover, the integration of big data

and related digital technologies into the construction industry holds promise for current applications and future opportunities, indicating ongoing advancements in big data research (Munawar et al., 2022). Despite these positive trends, hurdles to responsible innovation in technology assessment and adoption processes within the U.S. public highway construction industry have been identified, emphasizing the need to overcome barriers that impede responsible innovation (Kimmel et al., 2016).

The construction industry in Malaysia is a vital sector contributing to the country's economic growth and infrastructure development. However, the complexity of construction projects, involving multiple stakeholders and diverse tasks, necessitates effective project management methodologies. The use of Building Information Modeling (BIM) in construction projects has been shown to reduce project development time, lower construction costs, and enhance project quality. Additionally, the integration of BIM in the Malaysian Industrialized Building System (IBS) has been identified as a means to enhance the construction industry, highlighting the benefits and challenges of increasing BIM implementation rates in Malaysia (Ern et al., 2022). Furthermore, the review of emergency management governance at construction sites in Malaysia has emphasized the impact of construction delays caused by various factors, underscoring the need for efficient project management to address these challenges (Samsudin et al., 2023).

Cost control and quality assurance are critical aspects of construction projects, and project management offers mechanisms for budgeting, cost estimation, and monitoring to prevent cost overruns. It also ensures that construction projects meet or exceed specified standards for safety and sustainability. The generation of construction waste and illegal dumping activities in the Malaysian construction industry underscores the importance of effective project management in waste management and environmental sustainability (Rahim et al., 2017). Moreover, the low implementation level of project management tools and the barriers impeding their utilization in the Malaysian construction industry highlight the need for improved technology awareness and organizational culture to enhance project management practices (Lee et al., 2019).

The role of project management in addressing the challenges faced by migrant workers, communication failures, and risk management in the construction industry is crucial for ensuring the rights and safety of workers, effective communication among stakeholders, and the mitigation of project risks (Uddin et al., 2022) Additionally, the implementation of value management, lean construction tools, and change management in the Malaysian construction industry emphasizes the need for effective project management to optimize value, reduce waste, and manage change effectively (Lew et al., 2020). Furthermore, the integration of BIM and IBS, the absence of smart technology, and the impact of transportation in modular construction underscore the potential benefits of smart technology in enhancing construction efficiency, quality, and sustainability (Yusof et al., 2023).

Project Management takes into consideration specific laws and quality requirements for construction projects in Malaysia, therefore minimizing possibilities of legal disputes and keeping to safety and ecological norms. A proactive approach to risk management has importance in Malaysia, which could pose significant risks for a construction project due to weather conditions, geological issues and regulatory changes. In addition, the need of effective project management in a rapidly urbanizing and developing country especially for large-scale projects such as earthwork, infrastructure, transportations, housing and other industrial undertakings becomes highly inevitable. Integration of technology using project management software such as email or instant messaging helps both internal and external communication of the projects, thus bringing efficiency for the construction industry in Malaysia. It can be summarized as the backbone which ensures that any construction project in Malaysia is implemented within deadline, under budget and acceptable quality standards. This means increased sustainability and growth for the nation's construction sector.

The adoption of digital tracker based on the work programme through software and applications in construction projects in Malaysia represents a transformative shift with multifaceted benefits across environmental sustainability, safety management, and project progress monitoring. The creation of a work

program tracker software promises an extensive list of advantages for both individuals and organizations. The software has the potential to greatly increase overall productivity by integrating automation and streamlining task management processes. Another advantage is that real-time updates and centralized information sharing enhance teamwork, lowering the chance of misunderstandings and delays. The app's ability to provide a clearer understanding of project deadlines, milestones, and job relationships contributes to increased productivity.

Furthermore, the transparency it gives in task ownership and progress fosters an accountability culture inside teams. Additional benefits include effective resource management, adaptability to changes, and the encouragement of remote work, guaranteeing that organizations can optimize their processes independent of external factors. The use of the project management software plays a critical role in facilitating project progress monitoring. These offer centralized points where timelines, milestones and allocation of resources can be monitored. By using digital surveys and inspections, data is collected efficiently and offers environmental implications and safety compliance. Availability of real time data facilitates fast decision making thus enhancing the general efficiency of a construction project. The digital method goes as far as regulatory compliance where digital trackers systems assist in maintaining current progress work at site. The transition to a digital work program tracker approach is in line with world trends to promote green building as well as efficient projects in Malaysia. This provides a basis for an environmentally conscious, safer, and well supervised construction system that ensures success and sustainability in the country’s construction initiatives.

## 1.2 RESEARCH BACKGROUND

This research background has shown how industry 4.0 transforms traditional constructions by identifying the limitations the traditional project management approaches for such complexities brought by digital technologies. Mobile technology has given rise to innovative app-based project management solutions that serve as strategic bridges for plugging in these gaps and making them more efficient, collaborative, and adaptive. The development of smart work programmed tracker software was motivated by the pressing need to solve inefficiencies and communication gaps in modern work contexts. The overarching purpose is to contribute to the achievement of the Sustainable Development Goals (SDGs) of the United Nations. Recognizing the app's importance in encouraging sustainable industrialization and supporting innovation (SDG 9), the study emphasizes its ability to improve overall efficiency and productivity in work programmed. Furthermore, the app's assistance for remote work corresponds with SDG 11, helping to create sustainable and resilient urban environments. The study investigates how the app optimizes resource allocation and enhances productivity, with an emphasis on responsible consumption and production (SDG 12). The software, which addresses climate action (SDG 13), attempts to reduce environmental impact by reducing the need for physical meetings and travel. The study also considers the app's transparent communication and data-driven decision-making to be relevant to SDG 16, since they correspond with the goal of creating a peaceful and inclusive society. Finally, the collaborative aspects contribute to SDG 17, emphasizing the need of collaboration for common goals. The research intends to illuminate the broader socioeconomic and environmental implications of adopting innovative solutions in project management and organizational workflow by investigating the possible impact of the work program tracker app within this SDG framework.

## 1.3 PROBLEM STATEMENT

The main contractor of the Earthwork Infrastructure division in Elmina Business Park is Pembinaan Tetap Teguh. As the main contractor, it will be to oversee all progress-making, with track quantity and progress work on site do it that is to aid in reference and more important to chase the date line. Thus, A common difficulty in organizational contexts, particularly in complicated projects such as building or product development, is a breakdown in communication and inefficiencies when managing work programs. Despite the availability of many project management technologies, team collaboration frequently encounters obstacles, resulting in delays, misunderstandings, and a general lack of clarity regarding project milestones. This problem is exacerbated by the lack of a centralized and user-friendly solution, which restricts real-time insight into project progress and effective communication and collaboration. One of the most important factors impacted by these problems is the ability to track progress in detail in relation to deadlines. Manual tracking is common in traditional systems, which can be error-prone and time-consuming. For example, as a project deadline approaches, team members may struggle to obtain real-time updates on the progress of tasks, dependencies, and potential impediments. Communication breakdown and inefficiencies in work program management can lead to delays, misunderstandings, and a lack of clarity on project milestones (Zidane & Andersen, 2018). This lack of openness contributes to miscommunication and makes it difficult for project managers to make educated decisions to keep the project on schedule. These issues are well-documented in both industry and academia (Kipli et al., 2022). The causes of delays in construction projects include poor communication and coordination between parties, slow decision-making processes, and resource shortages (Zidane & Andersen, 2018; Durdyev & Hosseini, 2019). Additionally, challenges in program design and implementation arise due to communication problems, such as failing to assign reporting duties to specific individuals (Khatib et al., 2021). Furthermore, communication challenges in private finance initiative projects at the facilities management stage are attributed to human error, lack of understanding, and time-consuming processes (Kipli et al., 2022). These findings highlight the critical role of effective communication in mitigating delays and ensuring

successful program management. Regarding issues at organization Pembinaan Tetap Teguh can considerably improve their capacity to track progress with deadlines by solving these communication and efficiency concerns using a work programme tracker software. The software serves as a centralized hub for project milestones, tasks, and deadlines, which are clearly defined and easily accessible. This creates a collaborative environment in which team members can keep informed, anticipate any delays, and take proactive efforts to ensure that the project moves forward smoothly and on time. Finally, the app will be a crucial tool for streamlining communication, promoting effective collaboration, and enabling organizations to traverse complex work programmes with precision and success.

Besides that, the scenario of a construction project such like project managers have considerable hurdles due to a lack of real-time visibility and accountability in construction projects, particularly those involving main contractor managing various phases of work. Current project management techniques do not give rapid progress reports, resulting in the discovery of issues in certain phases being delayed. This failure to intervene in a timely manner has a negative impact on the overall project timeframe, causing delays to accrue and potentially resulting in cost overruns. Real-time visibility and accountability in construction projects are hindered by the lack of information, frequent changes during project scope definition, and limited visibility in the supply chain. (Yeom et al. (2018) highlights the difficulty in computing real-time construction duration due to information gaps and frequent changes during project scope definition (Dharmapalan et al., 2021) further emphasize the limited visibility in the industrial construction project supply chain, especially for owners, designers, and contractors, which worsens as one moves away from the workface (Dharmapalan et al., 2021). The discrepancies in resource allocation exacerbate the problem, with some teams being overworked while others remain underutilized. This not only has an impact on individual team productivity, but it also risks the overall efficiency and cost-effectiveness of the construction project.

Then, complexity in task management and allocation when construction projects meet unforeseen weather circumstances, broken machinery the complexity

of job management and allocation increases. The existing manual and restrictive task management approach makes it difficult to modify job allocations quickly in response to unforeseen circumstances. Task management and allocation in construction projects involve complex patterns due to individual variation, context dependency, and chronological variation (Fujioka et al., 2021). These complexities align with the nature of complex tasks, which can be approached in various ways, requiring efficient allocation solutions. In fog computing systems, decentralized algorithms have been proposed to optimize task allocation and image placement, aiming to minimize task completion time (Josilo & Dan, 2019). Similarly, in distributed agile software development, effective task allocation is identified as a complex management problem, especially under the pressure of achieving project objectives (Ijaz et al., 2022). These references collectively highlight the multifaceted nature of task allocation in various domains, emphasizing the need for comprehensive and efficient solutions to address the complexities involved. This rigidity impedes effective team coordination, resulting in misunderstandings, delays in rescheduling work, and increased project expenses. The inability to respond to unforeseen occurrences, such as bad weather, broken machinery leads to a disorganized response from relevant teams and affects worker efficiency. Furthermore, the system's rigidity puts at risk the project's overall timeframe, causing a domino effect that risks succeeding phases.

## 1.4 OBJECTIVE OF STUDY

The goal of this project is to use a smart app to reveal the tracker from work programmed for supervisory staff at the site office and construction operations. This system is user-friendly in that it can access information anywhere and at any time by utilizing a mobile device or any other gadget. The following are the study's specified objectives:

i. To identify the list of document work details to be used in construction.
ii. To develop WPT using Adalo Software.
iii. To evaluate the effectiveness of WPT in project.

## 1.5 SCOPE OF STUDY

The scope study provides a complete overview of the Pembinaan Tetap Teguh lead as main contractor construction project in Kota Elmina as shown in Figure 1.0. This project is not limited to workers, and it can be access by various positions such as project manager, site engineer, architecture, site supervisor and all workers can use Work Programme Tracker (WPT) to checking the progress on site.


Figure 1.1 Site Location (Kota Elmina, Shah Alam)

This study focuses on ease the user to refer and track the progress by work programme of project such as box culvert and excavation by refer digital track progress for Work Programme Tracker (WPT). Users are required to ensure that products and quantity are tallying as per requested, and the installation work progresses on site. This application is also suitable for various projects to be implemented by the company. Besides, Work Programme Tracker (WPT) is open for all construction company in Malaysia to improve the technologies of country and not only related to civil engineering technology field, but it also can be used for specialist company, manufacturing company, consultant for architecture, civil and structure, mechanical and electrical, student from any institute and can implement for all people.

## 1.6 SIGNIFICANT OF STUDY

Given the importance of work plans in construction work and technology today, the conclusions of this study will benefit the construction industry. A smart approach of keeping track of the progress of the work will result in efficient construction work. As a result, businesses that use the recommended approach based on the findings of this study will be more effective, and their operations will run more smoothly and easily. Aside from that, this programme is user-friendly because it is simple to use and portable.

The innovation of Work Programme Tracker (WPT) is an idea to upgrade the usage of technology in construction projects. Researcher believes with this digitalization work programme tracker were more ease the process in construction. The previous method they use microsoft project to track progress and not so much detail. So, if this work programme tracker has come out it eases all departments and workers to trace any work and quantity for any area. Besides, it also smooths the process of constructing the task and goes through the process of installation. Employees can easily to refer the app to get the info. Project manager also easy to monitoring the the task has done,delay by refers the app tracker with details through phone or computer by online. So, they can plan easily what the next process to keep update.

Resolving conventional method can be seen as not sustainable and effective. It can be seen from the problems that have been stated that a job or task cannot be completed in good way and misunderstanding occurs within process run.

The details of work can get known as fast or can miscommunication. In addition, the

delays also happen on site just because there is no info and real time access can be referred through online. This happens because there is no specific track of progress software and don’t have systematic system.

Therefore, this system has been applied to the project since users are satisfied with this upgrading the technology in construction. This system makes it easier and easier the process if necessary. It also helps to minimize mistakes in planning the work such delay work because lack of machineries, bad weather and reduces time to travel in process of monitoring, trace and track the material, identify the material used and process of work on site. The Work Programme Tracker (WPT) website will improve the productivity of technology for the company.

# CHAPTER 2
# LITERATURE REVIEW

## 2.1 INTRODUCTION

The construction sector is a key component in the development and evolution of nations, shaping economic landscapes, influencing social dynamics, and propelling technical breakthroughs. As Malaysia aims to become a developed nation, the construction sector is an essential factor in this transformational path. Furthermore, a significant amount of research has been inspired by the fact that the economy will grow as a result of the participation of the building sector. In Malaysia, the construction industry's future is influenced by various factors such as sustainable practices, risk mitigation, crisis management, and entrepreneurship. Sustainable construction practices, including rainwater harvesting and ecological considerations, are essential for the industry's future (Abidin, 2009). Additionally, the Master Plan for Construction Industry (CIMP 2006–2015) presents opportunities for future development in the construction sector (Jamalluddin et al., 2022). Furthermore, the development of a resilient crisis management plan is crucial for preparing the industry to respond to potential threats and crises in the future (Mukhtar et al., 2022). Moreover, exploring the role of female entrepreneurs in the construction industry can provide valuable insights for future research and development (Jaafar et al., 2014). Indirectly, the sector that provides socioeconomic infrastructure for industrial growth and production as well as basic amenities such as residential and commercial spaces, parks, playgrounds, and stadiums, health care facilities, roads, highways, rail, ports, airports, dams, power generation and supply stations, communications utilities, and other basic infrastructure required for the country and the development and improvement of society's living standards. Malaysia is growing more evolved than ever before as new developments become more economically significant.

The construction sector contributes significantly to the creation of wealth and the enhancement of the nation's quality of life, both of which are necessary for the

country's development by moving on to the social domain, will reveal the various social dynamics influenced by Malaysian construction operations. The industry's impact on employment, labor conditions, and community well-being are key areas of concern. Beyond the immediate social, dive into the environmental effects of building, evaluating sustainability efforts and the industry's involvement in climate change mitigation. Furthermore, an examination of social responsibility activities in the construction industry, including corporate social responsibility policies, would contribute to a comprehensive knowledge of its societal ramifications. In today's global context, where economic progress has no separation with protecting the environment and social equality, the pursuit of sustainable development has become a necessity. The United Nations' Sustainable Development Goals (SDG), a collection of 17 global objectives created in 2015, provide a comprehensive framework for addressing major global concerns by supporting sustainable practices across diverse sectors. The concept of sustainable development, as defined by the United Nations, emphasizes meeting present needs while ensuring the ability of future generations to meet their own needs (Sonet et al., 2021). The building industry, as an essential component to economic growth and urban development, is critical to fulfilling multiple SDG. The construction industry in Malaysia is pivotal in advancing the Sustainable Development Goals (SDG) by integrating sustainable practices. The country has seen a rise in sustainability services for the built environment, reflecting a global trend towards addressing sustainability in construction (Papargyropoulou et al., 2012). Urban sustainability, a shared goal globally, is also being emphasized in Malaysia's development plans, aligning with the SDGs (Behrang, 2019). This reflects the intricate balance between economic progress and environmental and social responsibility, which is central to the SDG.

Malaysia's building industry is one of the country's earliest industries. During the period of rising economic development in Malaysia, its contribution to the gross domestic product (GDP) fluctuated from 3% to 6% every year. It has consistently contributed to the gross domestic product (GDP) and demonstrated significant growth rates, directly impacting the national economy (Gamil & Alhagar, 2020). However, during the 1998 recession, the construction industry increased by 23% compared to 9.5% in 1997. The transfer value has been reduced by 28% to 34.8%. The comparison of construction industry performance in 1995 and 1998 revealed a close association between construction industry performance and Malaysia's national GDP. The

industry's performance is closely linked to the overall economic stability and conditions, as evidenced by its growth during stable periods and the impact of the 1998 recession (Gamil & Alhagar, 2020). Additionally, the government's role in promoting sustainable construction and green building development is emphasized, highlighting the importance of balancing economic growth with environmental considerations (Razman, 2023). Furthermore, the construction industry is acknowledged as high-risk but vital to economic growth, emphasizing the need for effective risk mitigation strategies (Jamalluddin et al., 2022).

The construction sector has attracted researchers, although the majority of construction industry studies are based on the study of technology as a design analysis. The construction industry in Malaysia stands as a vibrant and dynamic sector, playing a pivotal role in the nation's economic development and urbanization. Over the years, the industry has undergone significant transformations, embracing technological advancements that have reshaped traditional construction practices. This an overview of the construction landscape in Malaysia, highlighting the industry's historical evolution and the role that technology has come to play in shaping its current trajectory. The history of construction in Malaysia is closely linked with the nation's journey towards modernization and economic growth. Rapid urbanization, population expansion, and the need for robust infrastructure have fueled the construction sector's growth. From the iconic Petronas Towers to extensive highway networks and urban developments, Malaysia's construction industry has been instrumental in shaping the physical and economic landscape of the country. However, this growth has not been without its challenges, and the industry has had to adapt to evolving demands and global standards.

Technology has emerged as a catalyst for dramatic change in the construction company, both globally and in Malaysia, in recent decades. The implementation of new technologies has not only increased the efficiency and precision of building tasks, but has also paved the way for management, environmentally sensitive and sustainable practices. The construction industry, both globally and in Malaysia, is experiencing a profound transformation driven by technology. Building Information Modeling (BIM), drones for site monitoring, and advanced construction materials are revolutionizing processes, enhancing efficiency, and promoting sustainability (Merschbrock & Munkvold, 2015). The advent of Industry 4.0 has further accelerated this

transformation, introducing smart construction through the use of Internet of Things (IoT) devices, artificial intelligence, and automation, optimizing project management and improving safety standards (Razi et al., 2023). Malaysia's construction industry is increasingly embracing these technologies to stay competitive, reduce costs, and deliver projects with greater precision and speed.

Nonetheless, new technology has a magnificent impact on a country that is at the forefront of industrialiser countries. Refer to Malaysian development construction technique and simplify all work accomplished in this development. Even in this technological arena, it is possible to reduce conventional construction consumption. As a result, the use of technology in the construction sector will have a positive influence in terms of increasing efficiency and saving time. Furthermore, by utilizing technology such as applications or software systems, it can be opened anywhere and streamlines daily work with the touch of a finger. The researcher will present a summary of the literature on the completion of ongoing study in this chapter to identify existing research knowledge. In addition, it is appropriate to forecast a better solution to the problem. A previous case study involving the other researcher could also help the researcher develop a better answer.

## 2.2 ADOPTION OF TECHNOLOGY IN CONSTRUCTION

Technology adoption in the construction sector has drawn attention from research and development, bringing about revolutionary developments in a number of construction process areas. Building Information Modelling (BIM) is one of the major technologies that has become more popular. The adoption of technology in the construction industry, such as Building Information Modeling (BIM) and prefabricated building systems, is influenced by various factors including leadership, organizational challenges, and the potential benefits it offers (Ameyaw et al., 2023) highlighted its significance in promoting cooperation between construction teams, engineers, and architects. A 3D modelling technology called BIM not only makes communication easier, but it also increases overall efficiency and minimizes errors in project coordination. Its collaborative aspect has played a significant part in changing the way that construction project management is conventionally approached. Empirical evidence from the Chinese construction industry supports the accumulated knowledge of BIM adoption,

highlighting the importance of context in adoption processes (Chen et al., 2019). Additionally, the need to reduce construction project duration and cost, improve quality, and enhance working conditions has driven the growth of prefabricated building systems adoption (Bataglin et al., 2020). Furthermore, the awareness and challenges of BIM implementation in the Yemen construction industry underscore the significance of modern technology adoption in construction (Rahman, 2019).

Another technological advancement that is having a big impact on the building industry is drone mapping and surveying sites. Drones help with site analysis and progress tracking by providing precise topographical data. Drones have become invaluable in the construction sector, particularly in surveying and mapping construction sites, providing accurate topographical data for progress tracking and site analysis. Additionally, drones contribute to improved safety outcomes by minimizing the need for manual inspections in hazardous areas (Otto et al., 2018). Drones are useful for gathering data, but they also improve safety results by reducing the need for human inspections in dangerous places. The integration of cameras, LiDAR, and Kinect as common onboard sensors in construction UAS applications has further enhanced their utility in data collection (Zhou & Gheisari, 2018). Furthermore, drone technology is perceived as a disruptive, game-changing technology with the potential to improve performance across all construction phases (Tjandra et al., 2022). The widespread application of drone technology in the construction sector has been noted, highlighting its prominence in various construction projects (Siju et al., 2022). The adoption of technologies like robotics, augmented reality, virtual reality, and the Internet of Things (IoT) in the construction industry signifies a radical change from conventional methods. Building components can now be precisely and quickly created with 3D printing, which also saves a great deal of time and material waste during construction. This is in perfect harmony with the current focus on environmentally friendly and economical building techniques.

There are software and mobile solutions available today to assist in the management of all aspects of a building project. From preconstruction to scheduling, project management and field reporting to back-office management, there is a software solution to assist you optimise your procedures and increase efficiency. Most software solutions are cloud-based, which allows for real-time modifications and updates to documents, schedules, and other management tools, encouraging greater

communication and cooperation.

Furthermore, mobile technology enables real-time data gathering and transmission between jobsite and back-office project management. On-site workforce can submit timecards, expense reports, job records, and other validated paperwork using cloud-based systems. Mobile technology has indeed transformed data collecting and transmission in a variety of industries. Cloud-based solutions and wireless data transmission technologies enable real-time submission of timecards, expense reports, and other verified documentation from the jobsite to project managers (Perera et al., 2022). This seamless data collection and rapid information sharing have been reported in various studies, highlighting the essential resource that mobile technology provides in different domains such as public health, agriculture, and disease management ( Jiangjun & Wang, 2018). The viability of utilizing phone-based text messages for real-time data capture and reporting has been emphasized, particularly in disease management, where it can significantly contribute to the value chain (Kalinga et al., 2021). Therefore, mobile technology plays a crucial role in enabling real-time data collection and transmission, benefiting various sectors and enhancing efficiency. This can save hundreds of hours per year in data entry and automatically organizes critical files—no more shuffling through files looking for old reports. More and more software providers are forming strategic partnerships to allow people to seamlessly integrate the data with other software solutions, making it easier than ever to run the business.

## 2.3 TECHNOLOGY I.R 4.0

Industry Revolution 4.0 refers to the addition of digital technologies to numerous elements of industrial processes. It represents a shift towards smart manufacturing, as seen by the usage of cyber-physical systems, the Internet of Things (IoT), artificial intelligence (AI), big data analytics, and other modern technology. The construction industry is indeed rapidly embracing digitalization as part of the fourth industrial revolution (IR 4.0) (Qureshi et al., 2022). Technology plays a crucial role in implementing IR 4.0, particularly in improving safety management on construction sites (Kasim et al., 2021). Furthermore, the industry is actively contributing to the Sustainable Development Goals (SDG), with a strong focus on delivering projects for the common good (Fei et al., 2021). Green Building Information Modeling (BIM) has

been identified as a key enabler for enhancing sustainability in the construction sector, with a review highlighting its potential benefits and associated challenges (Ismail et al., 2019). This transformation signifies the creation of a physical cyber system that will impact the construction process's future. The emphasis on the use of technology, as well as the need to improve skills and knowledge, is an essential framework for dealing with these developments.

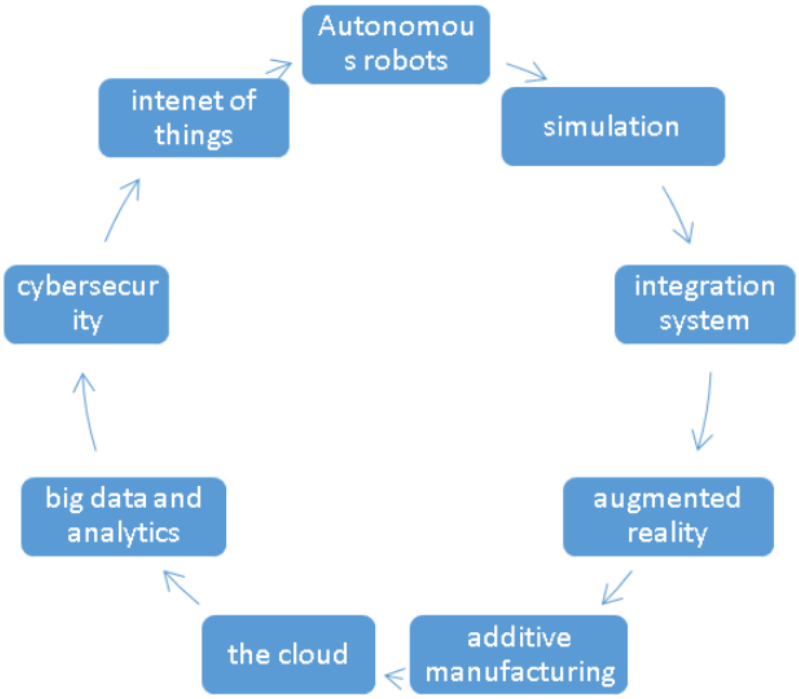



Figure 2.1 The Nine Industrial Revolutionary Elements 4.0 (Muhammad et al., 2018)

Malaysia has taken a proactive approach to the Fourth Industrial Revolution (IR 4.0), as detailed in the Malaysia 4.0 Blueprint, which was released in 2018. Among the initiatives are the creation of IR 4.0 hubs for collaborative research and technology development. The country prioritizes skill development through AI, data analytics, and digital technology training programmers. Malaysia's dedication to innovation is underscored by increased investment in R&D, particularly in IR 4.0 technologies. Specific industries, such as electronics and manufacturing, have been designated for focused IR 4.0 implementation, pushing the adoption of modern technologies. Malaysia's increased investment in research and development (R&D) aligns with the global trend towards innovation in IR 4.0 technologies, such as artificial intelligence and the Internet of Things (IoT). This strategic focus is crucial for advancing technological capabilities and economic development. Research related to IoT and AI

has the potential to drive corporate governance mechanisms, financial performance, and economic growth, as evidenced by empirical mediation analysis (Khan et al., 2022). Additionally, Malaysia's support for mobile payment adoption and electronic payment systems reflects a concerted effort to embrace digital technologies and innovation (Ramli et al., 2022). As Malaysia progresses towards IR 4.0, research on smart city environment design and planning based on IoT becomes increasingly relevant, indicating a holistic approach to integrating digital technologies into urban development (Wang, 2022).The government's emphasis on public-private collaboration and startup ecosystem assistance demonstrates a determined commitment to achieve long-term progress in the IR 4.0 age.

## 2.4 SUSTAIN DEVELOPMENT GOAL (SDG)

The United Nations implemented the Sustainable Development Goals (SDGs) in 2015, which are a collection of 17 global goals. These objectives are intended to solve a variety of interconnected global concerns and promote long-term development in economic, social, and environmental dimensions. Each objective is complemented by detailed targets, and their completion is meant to improve people's and the planet's well-being. Achieving the SDGs requires the involvement of multinational enterprises, as their contributions are essential for the realization of these goals (Zanten & Tulder, 2018). Alternative green livelihood initiatives have been identified as effective means to achieve the SDG, particularly in disaster-prone areas, by addressing poverty, hunger, economic growth, reduced inequalities, and conservation of ecosystems (Chowdhury et al., 2022). Poverty, hunger, health, education, gender equality, clean water, sanitation, affordable and clean energy, economic growth, industry innovation, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice, and strong institutions and partnerships are among the issues addressed by the SDG. The 17 Sustainable Development Goals are as follows:


Figure 2.2 Sustainable Goal Development with 17 Goals (Chong & Gooi, 2022).

The construction of a Zero Waste City (ZWC) in Foshan City highlights the importance of effective partnerships involving various stakeholders, including the government, enterprises, social organizations, and the public, to achieve SDGs (Qin et al., 2022). Businesses, particularly Islamic banks in Malaysia, play a significant role in addressing sustainability issues by providing finance, technology, and innovation, aligning with the SDGs (Muhmad et al., 2022). Furthermore, the impact of Corporate Governance (CG) and SDG practices on the financial market and company performances in Malaysian public sector companies is being examined, emphasizing the relevance of SDGs in Malaysia (Loang et al., 2022). Understanding the concept of SDGs in Malaysia is essential for shedding light on the trend of sustainable development, providing valuable information for the community and policymakers (Mahdi et al., 2023). The SDGs provide a comprehensive framework within which countries, corporations, and communities may collaborate to achieve a more sustainable and equitable future. They emphasise the interdependence of global concerns and the importance of collaborative and integrated solutions to address them. The deadline for achieving the SDGs is 2030, and progress is tracked using indicators and reports to guarantee accountability and transparency in the global pursuit of sustainable development. Sustainable development in Malaysia's construction industry requires the adoption of green building rating tools and the strengthening of enforcement of environmental management practices (Razman, 2023). The relevance of circular

economy practices for achieving sustainable development goals in developing countries is also crucial (Schroeder et al., 2018). However, there is a need for further exploration of the regulatory framework and initiatives for realizing sustainable development goals and sustainable forest management in Malaysia (Nasrullah et al., 2021).

## 2.5 INTEGRATION OF VERDANT PRACTICES

By applying this software at the site, In the ever-evolving landscape of construction project management, the integration of advanced technologies has become paramount in achieving not only operational efficiency but also sustainability goals. Among these transformative solutions stands a software application poised to revolutionize on-site practices and elevate project management to new heights. This application brings with it a myriad of benefits, not only in terms of streamlined operations but also in contributing to broader environmental sustainability objectives.


Figure 2.3 The Sustainability Construction Framework (Price ADF, et al., 2014)

By meticulously tracking progress based on a work programme, it aligns construction timelines with eco-conscious practices, minimizing environmental impact and explores the multifaceted advantages of the software, from reducing travel-related time and costs to providing real-time progress insights, and highlights its user-friendly design, positioning it as a catalyst for increased productivity and efficiency in the complex realm of construction projects and into the intricate features and benefits, it

becomes evident that this software not only propels construction management into a new era but does so with a mindful eye on environmental responsibility and operational excellence.

### 2.5.1. Sustainable Development Features

The app might feature aspects that encourage sustainable growth, such as providing information on environmentally friendly activities, encouraging users to adopt environmentally conscious habits, or providing tools for monitoring and lowering carbon footprints.

### 2.5.2. Time and Cost Management

Another advantage of using this app is that it will aid in time management in order to track quantity and development. This will assist the user in not having to wait as long for confirmation materials and the work process for installation on the site. Most importantly, it is simple to bring along and can be taken anywhere without fear of missing out. Saving paper can also save money on the cost of discarded paper. The researchers believe that this technique will also reduce time and cost waste.

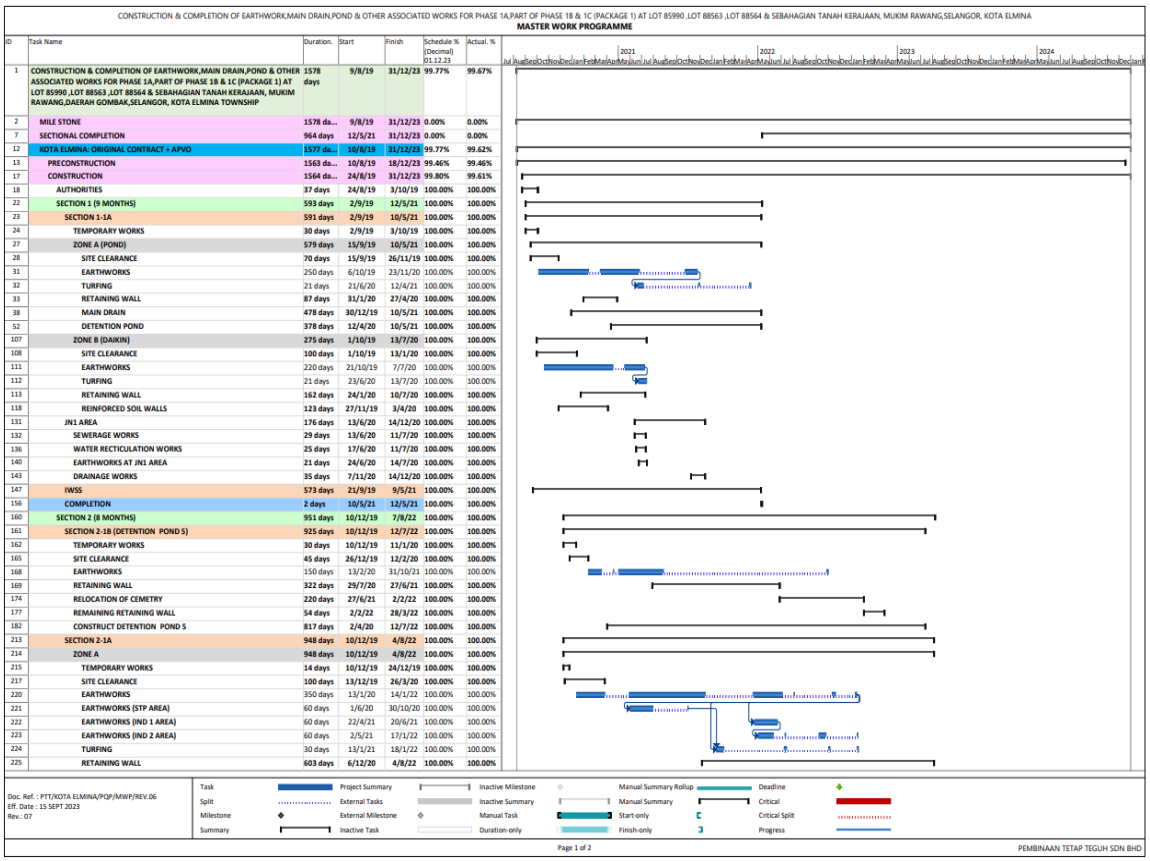
### 2.5.3. Improve Productivity Chain Management

The final advantage of employing this method is that if the app is involved in supply chain or logistics, it may include elements that support green supply chain practices. This system will make the work process more efficient. This is due to the fact that when there is no delay in tracking the progress of a material, the work at the site becomes faster to plan what the next need is to achieve. The meeting can also be used to confirm and refer to the materials that have been delivered and installed by the client and consultant. This is going to guarantee that the job is thoughtfully organized. The workers or users are going to discover it easier to execute their jobs, and productivity or output will grow as well. Work processes can also be more systematic.

## 2.6 INNOVATE PROJECT OVERSIGHT WITH TECHNOLOGY

In construction, a master work programme is a precisely prepared roadmap that intricately specifies the whole spectrum of operations required for the successful execution of a building project. a project schedule outlining precise timelines and critical paths (Moradi et al., 2020), It integrates a robust risk management strategy, quality management standards, and health and safety protocols (Ahn et al., 2020). The program also includes a communication plan, procurement strategies, and monitoring and control plans (Akinlolu et al., 2020). It harmoniously aligns with environmental management and stakeholder engagement plans, ensuring a unified approach and strategic navigation of construction complexities. This comprehensive plan, at its core, acts as the backbone of project management, including a precise Work Breakdown Structure (WBS) that systematically divides the project into manageable tasks and phases. A vital component, the project schedule, delineates specific timetables for each action, defining essential paths that affect the project's total duration. Another key aspect is resource allocation, which ensures the wise deployment of human resources, equipment, and materials in accordance with project needs and limits.

The construction project is broken down into distinct tasks and activities, with specific attention given to the phases. Each phase is then further divided into measurable components, providing a structured framework for tracking progress. Right present, every phase described does not have as when the work progresses such as scenario on site work of installation box culvert required 67 days to finish and reach dateline. So the specific work must be recorded and tracked, such as when it arrived, the quantity of box culvert, and whether or not the installation that day met the target. If not, describe why the task is pending. Now, the system can only follow the general contours of that information The detail tracking of progress in construction projects offers an extensive and benefit, serving as a keystone in the strategic management of large-scale projects. The significant of these benefits is the early identification of issues and challenges, allowing for proactive intervention and limiting any project timeline interruptions. Furthermore, progress monitoring allows for more efficient resource allocation, ensuring that labor, materials, and equipment efficiently to avoid bottlenecks, delays.



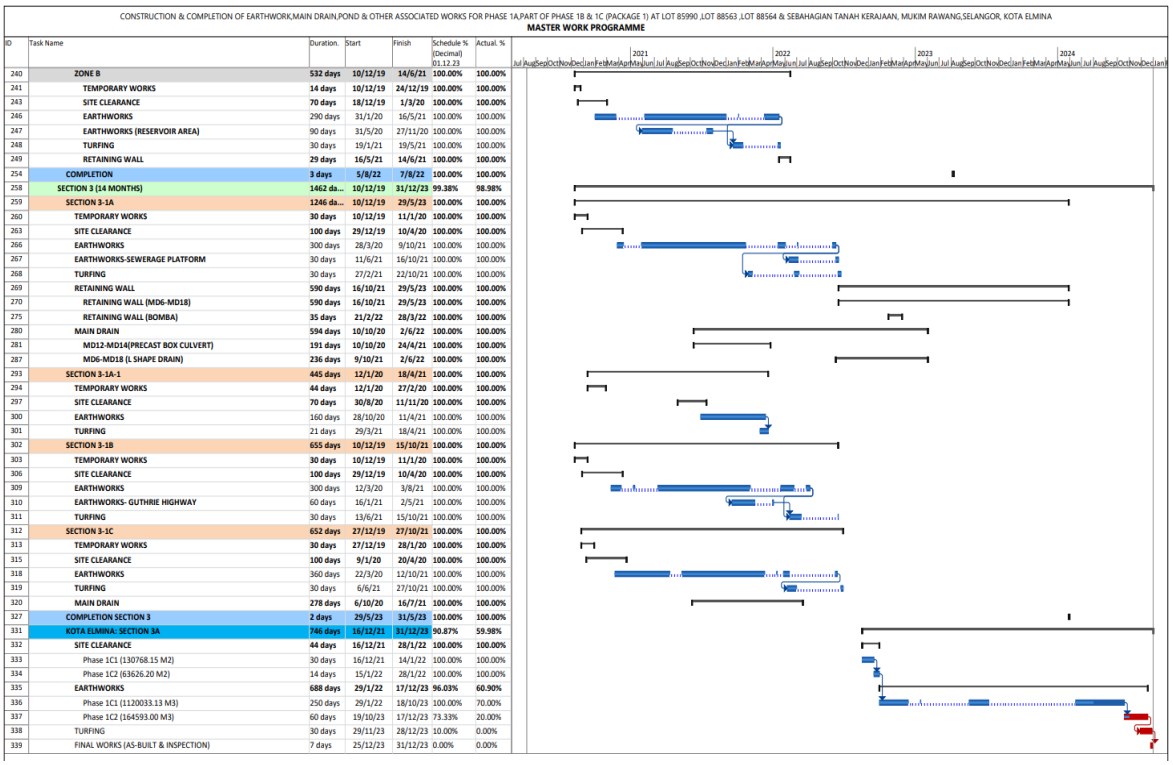




Figure 2.4 Master Work Programme at Kota Elmina by PTT Sdn Bhd

In construction processes, depends on the supply chain of raw materials which in turn obviously determines project workflow. When have details, progress tracking in project management is crucial for early issue identification and proactive problem-solving (Bathallath et al., 2022). By gathering data across key project management areas, challenges can be identified, enabling proactive problem-solving and preventing the escalation of issues (Khalid et al., 2018). Additionally, early detection is crucial in addressing potential issues, as demonstrated by the use of biomarkers for predicting disease progression (Jabbari et al., 2017). Furthermore, understanding existing challenges and future research directions is essential for proactive problem-solving and minimizing the impact of issues on project schedules (Liu et al., 2019). Time is a valuable commodity and owners ordinarily require projects to be completed within a stipulated time frame, or by a specified date. Having successful planning processes is hard work that requires dedicated input from all functional and contractor representatives. There are generally three types of important detail that need to be tracked on construction projects which can be categorized and described, in actual practice tracking processes and suggested by management staff to coordinate. The first one is the quantity material, the rostering manpower, and the progress work at site.

To begin, precise quantity material tracking provides a continuous supply chain, preventing shortages or excesses that could impede progress. This entails monitoring material usage, procurement schedules, and inventory levels in real time in order to optimize resource utilization. The implementation of green supply chain management practices has gained significant attention in the last decade, with a focus on sustainable supply chain management and its impact on financial and operational performance (Feng et al., 2018).

At the same time, intelligent labor rostering is critical for sustaining an efficient staff. Project managers may guarantee that competent labor is allocated where it is most needed by monitoring the availability, skills, and allocation of staff. This prevents obstacles and improves overall productivity. Furthermore, by coordinating staff deployment with project demands, this technique enables labor cost optimization. The strategic rostering of manpower is crucial for maintaining an efficient workforce by ensuring skilled labor is deployed where most needed, preventing bottlenecks, and

optimizing labor costs (Smet et al., 2020). This process involves assigning shifts and tasks to employees to create an effective schedule (Smet et al., 2020). Additionally, changes in the allocation of workplace "tasks" between capital and labor have altered labor demand, leading to employment polarization (Autor, 2013). Furthermore, addressing the integrated staffing and rostering problem is essential for organizations facing demand variability, requiring a framework to elect a hiring strategy (García-Sabater et al., 2020).

The third element involves continuous monitoring of on-site progress. This includes regular inspections, project deadline adherence, and completion of milestones. Project managers obtain insights into the overall project health by closely following progress on the building site, spotting possible issues early on and applying adjustments as needed to stay on track. Continuous monitoring of on-site progress in construction projects is crucial for ensuring project health and timely completion. propose an automated photogrammetry-based approach for continuous monitoring, enabling real-time progress status determination throughout the construction lifecycle (Omar et al., 2018). This aligns with the need for regular inspections and progress tracking. Additionally, Smith emphasizes the importance of on-site monitoring in the review of approved studies, highlighting the significance of monitoring progress and protocol deviations (Davis, 2018). These references support the need for continuous on-site monitoring to ensure project adherence and timely completion.

From the previous review of the from aspect project oversight of the tracking progress is not really give more input. Researchers have thought if this work based on work programme can be change into more detail which unlimited to all workers and user, so its help and support sustainable goal development in construction industries. The innovation of tracking progress technology in term of digitalizes all input progress which can be access for all.

Training and user interaction are required for the successful implementation of new technology. The involvement of top management executives in new technology speeds up the adoption process. Organizations' technology must be simple to use, compatible, dependable, and guarantee information security. When selecting and implementing technologies, project kind, cost, length, specifications, and location must all be taken into consideration. The environment has an indirect impact on the adoption of mobile devices. Government rules, competitive forces, market demand, vendor

strategies, professional conventions, current technological status, and socioeconomic conditions, for example, can all influence organizational behavior when it comes to picking and implementing new software technologies.

Therefore, building and facility sectors are facing drastic change today as owners desire better project visibility, lower costs, improved risk management, and increased usage of these developing technologies in projects The integration of innovative project oversight technologies in the building and facility sectors is expected to bring about significant benefits, including improved project visibility, cost reduction, and enhanced risk management. Research has shown that project visibility, driven by factors such as transformational leadership and project flexibility, is positively related to multi-dimensional project success (Zaman et al., 2019) due to the innovative project oversight based on work programme technology. Additionally, the use of such technologies can lead to less waste and more efficient energy utilization, contributing to lower costs throughout the plant's life cycle. Stakeholders' perspectives on success criteria, such as meeting output specifications, are also crucial in ensuring the success of projects in these sectors (Osei-Kyei & Chan, 2018). Therefore, the adoption of advanced technologies and the consideration of stakeholders' viewpoints are essential for achieving the desired improvements in the building and facility sectors.

## 2.7 CONSTRUCTION PROJECT MANAGEMENT

Construction project management is a multidimensional profession that controls a construction project's whole lifecycle, ensuring it moves smoothly from conception to completion. At the start of a project, detailed planning entails defining scope, breaking down activities, generating timelines, and allocating resources. This planning phase establishes the foundation for following project elements. Risk management is essential, as it entails identifying prospective issues and implementing solutions to limit or resolve these risks when they develop. Project managers in construction must possess a diverse set of competencies to effectively navigate the challenges in the industry. These competencies include green construction knowledge and skills (Hwang & Ng, 2013), core competencies for collaborative construction projects (Moradi et al., 2020), leadership skills in sustainable construction projects (Zulkiffli & Latiffi, 2019), and client project manager competencies (Negara et al., 2019). Factors affecting construction project

performance, such as manpower skills, supervision, site management, leadership, and equipment availability, also play a crucial role (Enshassi et al., 2009). By integrating these competencies and addressing performance-affecting factors, project managers can enhance their ability to successfully manage construction projects. A significant aspect of project management in construction revolves around budgeting and cost control. Accurate cost estimation, budget creation, and ongoing financial monitoring are essential to prevent overruns and maintain financial viability. Effective communication management is another critical component, ensuring that information flows seamlessly among all stakeholders, preventing misunderstandings, and addressing concerns promptly. Quality management is critical in construction, as it entails establishing and enforcing stringent quality standards throughout the project. From procurement to contract management, maintaining contractual agreements and controlling the acquisition of materials and services are critical duties. Workers and people are protected by safety measures that are in accordance with local and national legislation, and frequent inspections help to maintain a safe working environment.

Project monitoring and control involve tracking progress against timelines and budgets, making adjustments as necessary. Stakeholder management requires identification and engagement with all relevant parties, maintaining relationships to align with project goals and addressing concerns proactively. As the project nears completion, the focus shifts to closeout and handover, encompassing final inspections, approvals, and the seamless transition of the completed project to the client. Overall, construction project management is a dynamic and intricate process that demands a combination of technical expertise, organizational acumen, and effective communication to ensure the successful and timely delivery of construction projects across diverse sectors. In principle, every project has a conventional life cycle, regardless of its specific qualities. below show is the structure might be characterized in five main stages:

a) Project Start-up

During the preliminary phase, the project's purpose and viability are determined. This is an important step in the process because it will determine whether or not the project is a good investment. If a feasibility study is required, it is conducted, and the research findings are

used to develop a recommended solution or plan. After all decisions have been taken, a project initiation document (PID) is created. This document, which serves as the building plan's basis, is one of the most significant 28 documents in project management since it establishes the groundwork for the entire project.

b) Project Planning

The project planning stage is when the team identifies and prioritizes all the work that needs to be completed. It is a continuous activity that will probably certainly continue till the completion of the project. Planning the project's time, money, and resources are the top priorities at this phase of the project's lifecycle. The plan that will be implemented is being developed by the team in accordance with these specifications. This is referred to as scope management in certain circles. In addition to the work breakdown structure (WBS), which is a checklist that breaks all of the required labor into smaller, more functional categories, another key document that must be completed is the project schedule (you can do that in our construction scheduling software). As soon as the budget, timetable, and scope of work have been established, the project is virtually ready to get started on its implementation. The risk management procedure is the next phase in this very essential process. A strong solution should be developed by the team once they have thoroughly investigated all possible hazards to the project. In addition, a communication strategy is required since it will ensure that information is transferred efficiently between the project's many stakeholders.

c) Project Execution

The construction project management plan is put into action, this is known as the execution phase. As a rule, this phase is separated into two primary processes: the execution and the monitoring and regulating. The project team is in charge of ensuring that all of the needed tasks are completed. At the same time, progress is being watched, and improvements are being implemented as needed. A project manager spends the majority of his or her time in the monitoring phase, and then, based on the information he or she receives, he or she redirects the tasks and maintains control over the project's progress.

d) Project Monitoring and Control

The final step of the project represents its formal end. The project manager is going over what went well and any potential failures. Finally, the team completes a project report, calculates the final budget, and offers information on any unfinished operations. The project report, along with the examination of potential failures, will provide valuable information for future construction projects.

e) Concluding

The final stage of the project management life cycle, known as the closing phase, is not as simple as simply delivering the result. During the project closing phase, project managers must track all deliverables, consolidate paperwork in a single location, and hand over the project to the customer or the team entrusted with overseeing its operations.

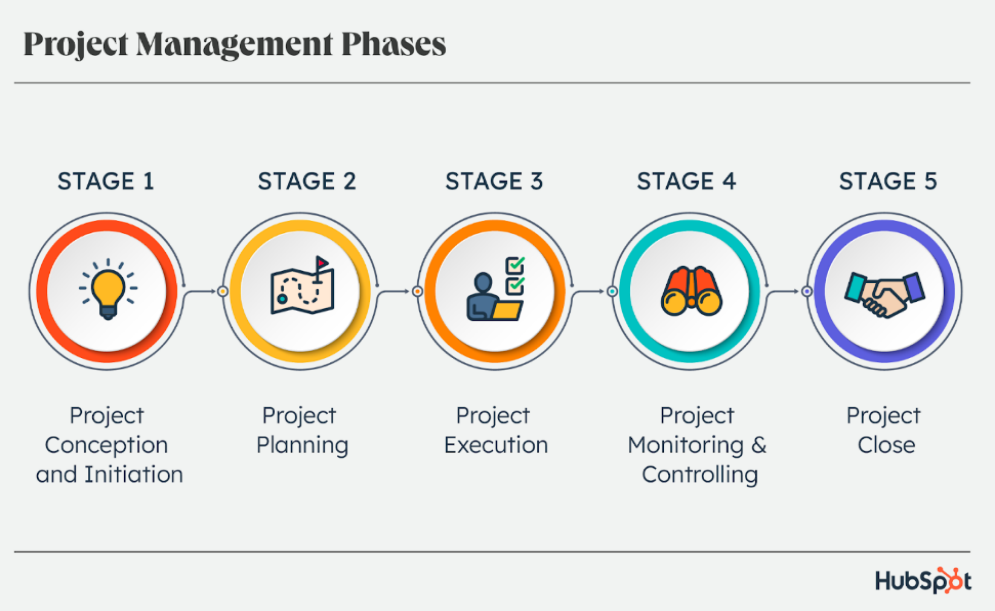



Figure 2.5 Phases of Project Management (R. & Jalali,2014)

## 2.8 CRITICAL PATH METHOD

The Critical Path Method (CPM) is a comprehensive project management technique for planning, scheduling, and controlling complicated projects. The Critical Path

Method (CPM) is a mathematical tool used for planning and scheduling complex projects. It is employed to estimate the minimum project duration and determine scheduling flexibility on logical network paths in the schedule model. Recent research has focused on improving the efficiency of critical path computation, with algorithms utilizing ant colony optimization and fuzzy number ranking methods. Additionally, there have been developments in applying fuzzy critical path methods to analyze project networks with activity times represented as fuzzy numbers (Han et al., 2021). Project managers use it to identify a thorough list of tasks, each with specific durations and dependencies on other tasks. These jobs are then organized into a network diagram, which shows the sequential order and interdependencies visually. Calculating the earliest start and finish timings for each activity yields the critical route, which is the longest continuous series of dependent tasks. This critical path specifies the shortest amount of time required to complete the project. Importantly, CPM provides for the designation of non-critical jobs with float or slack, indicating the temporal flexibility they provide without affecting the overall timing of the project. Project managers can focus on key tasks, ensuring timely completion, while keeping flexibility for non-critical parts, thanks to continuous monitoring. The Critical Path Method is a strategic approach to schedule optimization, resource allocation, and proactive management that contributes to the successful completion of complex projects.

## 2.9 CONCLUSION

In conclusion, the imperative integration of green criteria in construction projects goes beyond the mere erection of buildings; it encompasses a holistic approach that, when diligently followed, intricately shapes the trajectory of construction management. The embodiment of sustainability principles within the entire project not only ensures methodical and smooth execution but also positions the building site as an opportune ground for the inception of a new era in sustainable construction practices. In this context, the introduction of the "Work Programme Tracker" as a digital application heralds a pivotal shift towards a technologically driven construction sector. This system, adept at tracking progress both in the office and on-site, becomes the cornerstone for achieving sustainability objectives by fostering transparency, accountability, and

efficiency. The importance of sustainability extends to research methods, where the methodical processes of creating and conducting a project are critical to its success. The use of design thinking as the research process, which includes empathizing, defining, ideating, prototyping, and testing, demonstrates a dedication to a rigorous and goal-oriented approach. This process, which is used from the beginning to the end of the project, ensures that the Work Programme Tracker is more than just a solution, but a thoughtfully built answer to identified difficulties. Furthermore, the continuous use of technical developments in the construction sector is transforming the landscape of productivity, collaboration, and project completion. Refusing to innovate is no longer an option for construction firms seeking to stay competitive. The inevitability of digital transformation in the construction industry not only opens up opportunities for achieving a competitive advantage, but also promises improved working conditions and a lower carbon impact. The convergence of construction technology and digital transformation is not a choice; it is a requirement for the survival and development of Malaysian and global construction firms.

In anticipation of the future, it is evident that the construction industry will reach a point where digitalization technology is not a discretionary investment but an essential mandate for all companies. The trajectory toward a more sustainable, technologically advanced, and environmentally conscious construction sector is not just a progression but a paradigm shift that will define the success and longevity of construction companies in the evolving landscape of the industry. As the digital revolution continues to unfold, those companies that embrace innovation and strategic technology adoption will thrive, while those resistant to change risk becoming obsolete. The transformative potential of digitalization in construction is not just an opportunity; it is a necessity for ushering in a new era of efficiency, competitiveness, and sustainability.

# CHAPTER 3
# METHODOLOGY

## 3.1 INTRODUCTION

This chapter will outline the methodology and process for designing the system. Furthermore, this chapter will outline the strategies utilized to solve the problem, as well as the system that will be employed in this project from start to finish. This strategy is utilized to meet the project's objectives and achieve a great result. It will discuss the methodology used in this study. Furthermore, this chapter will discuss every aspect of performing this research, including the population, population frame, and interview sample methodologies. This chapter describes in detail the chosen mode of analysis and data collection method.

The observation would be made through installation while working on a job to measure the usefulness of the website. This chapter also includes examples of design modelling. Studies were conducted using both primary and secondary sources to bring value to the project. The original source, observations and collect data have all been completed. The secondary source is data collecting and analysis. A process route that will be implemented for this project and applied to the work environment on site will be appended to this chapter. The observation will be carried out while working on the mission by implementing the applications to determine their feasibility. Concept simulation is also seen in this chapter. The use of primary and secondary sources has the potential to provide value to the project. The source had completed studies.

Furthermore, the techniques to be implemented will be completely described depending on the difficulties at hand as well as the selection of appropriate systems when employed and when chosen suited inside the platform to apply. The observation would be made via implementation while working on a task that would allow the efficacy of the innovation to be assessed and determined. This chapter also includes a demonstration of design modelling. To add value to the project, research was carried out utilizing both primary and secondary sources, which were then combined. There

have been interviews with original sources, as well as surveys and field observations. The secondary source is derived from the data collection and processing processes. An attachment to this chapter will include a process route that will be adopted for this project and will be applied to the work environment on the project's site. When working on the mission, the observation will be carried out by the implementation team to determine the viability of the applications. The idea simulation technique is also shown in this chapter. The feasibility of utilizing primary and secondary sources is to bring value to the project's overall value proposition. The source had concluded his research. In addition to being able to login and logout with the primary contractor from any location, this program may also be browsed from a smartphone to see how the work progresses on-site at any given moment. This application contains all the task's progress information. This program also saves time when it comes to data processing and reporting. To detect problems with the work inspection system and its efficiency in comparison to the traditional technique, which may be utilized to address problems on the construction site and fulfil project objectives. The questionnaire will be distributed to PTT workers involved in the development of the task for them to receive feedback or comments on the database's usefulness in resolving the monitoring working progress issue at the construction site.

## 3.2 DESIGN RESEARCH

The framework of research methods and techniques chosen by a researcher is known as design research. The design enables researchers to focus on research methodologies that are appropriate for the topic matter and to set up research investigations for success. This strategy is essential for arranging any observation. Implementation steps should be monitored to identify problems that may develop during implementation. If there is a critical issue that is a primary cause of failure in the work's implementation, changes must be addressed. Following that, control mechanisms must be implemented to ensure a constant flow.

In general, design research refers to a framework for planning and carrying out a specific study project. Design research is the most important aspect of the study because it contains all four components. Important considerations include the

conceptual framework, determining who and what to study, and determining the methods and procedures to be used for data collection and analysis. The goal of the design research is to discuss and explain the method employed by the researcher to give a plan of study that allows for accurate assessment of usability using the "WP Tracking".


Figure 3.1 The flow chart method illustrates to make WP Trackers.

## 3.3 DEVELOPMENT OF RESEARCH

This study demonstrated research development as a research framework. Figure 3.1 illustrates the study's scientific evolution. The figure shows the sequence of research development from literature review to problem statement identification, innovation ideation, system or product creation, testing, and evaluating product effectiveness.

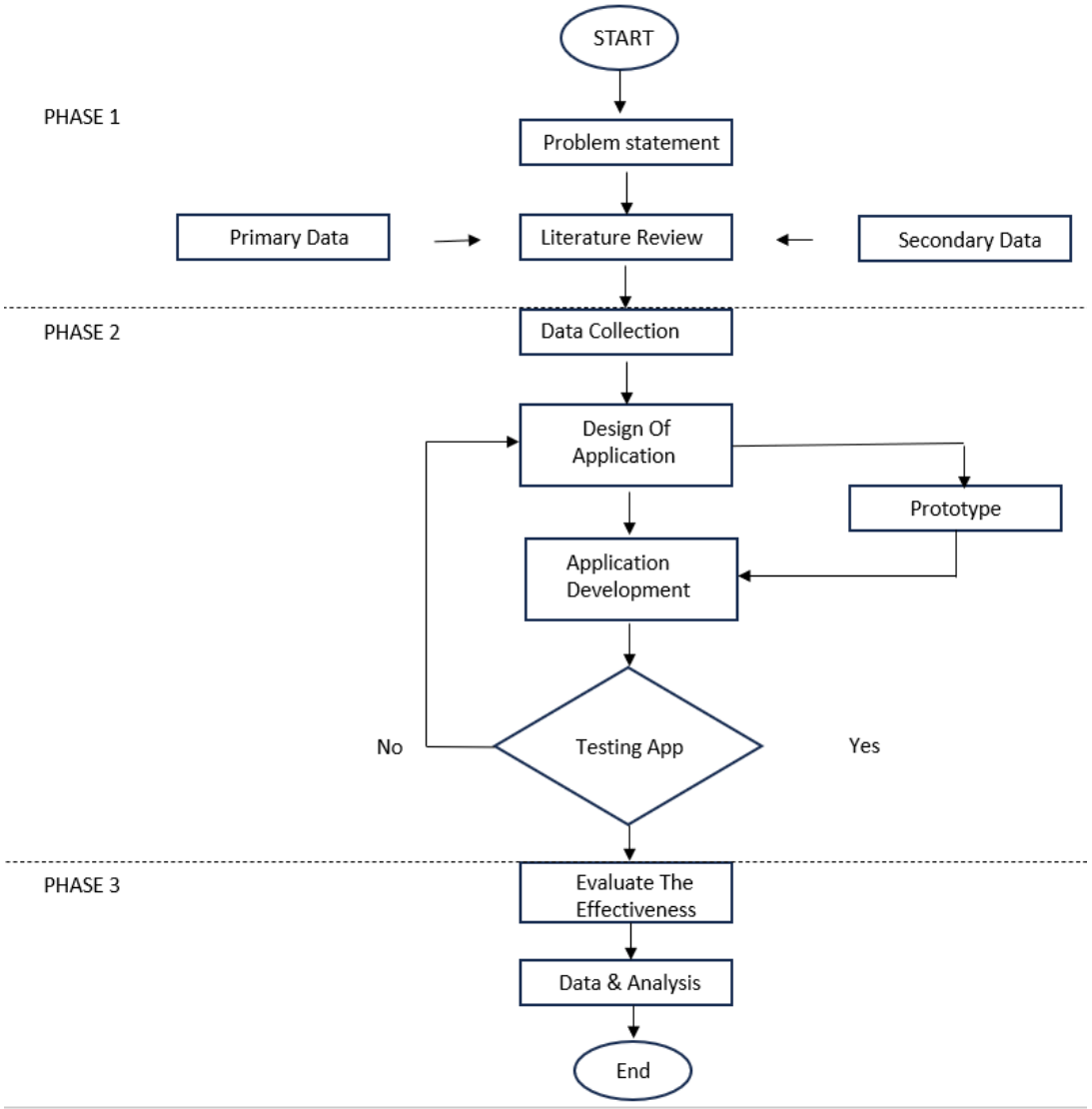



Figure 3.2 The Flowchart Of Research Development

The method is split into several phases in this analysis and will be discussed in detail. In addition, there are other approaches used for questioning, reading the findings of the literature review of study reports, questionnaires and previewing the progress achieved during this project. Throughout the phases of completion of this project, there are 3 phases of methodology that will be involved:

Phase 1 – Problem discovery and literature reviews

The most important component of this phase is planning the design and analysis of the project that will be built. This phase focuses on acquiring information for the project's

growth as well as meeting with the supervisor and mentor. This stage should take at least two weeks to complete.

Phase 2 – Product Development & Data Collection

The primary goal of this phase is to compare and contrast previous and current market applications. The analysis employs fact-finding procedures, questionnaires, and interviews. The information received will be used to build the model, prototype, and go on to the next steps. a First Source To acquire difficult facts, the interview and observation were conducted using a questionnaire. Based on survey responses, this interview method is required to get assurance and thorough information about the researched elements. This information was obtained through direct interaction with those involved in construction projects involving contractors and professionals. Secondary Sources Secondary data collected from various sources. This information highlights the significance of this study. Furthermore, these data are required in order to gather further information for this project. Received further information as part of the project's content. This study's sources included journals, the Internet, and data gathered by the company. At this stage, the interface sketch, as well as the creation of other features in the mobile applications, are necessary. Use sketches of mobile app output and input as a reference to design a prototype that will be given to the mentor and supervisor throughout this phase. The system is then built as a programme capable of implementing all of the programmes indicated during the implementation phase, using technologies such as Microsoft Studio and others.

Phase 3 – (Testing Of Data, Analysis, And Interpretation Of Data)

Following the completion of the whole mobile application development process, a number of actions will be carried out to ensure that the system is tested to ensure that the application's execution is free of faults or problems due to compilation or runtime defects. Finally, the performance of the workforce integration tracking system will be evaluated in contrast to previously employed approaches. This development study is a process that starts at the start and ends at the end. To create a flow chart for this system to ensure that the project proceeds smoothly and as planned.

## 3.4 SYSTEM DESIGN AND DEVELOPMENT

The process of designing and developing the system an online system is crucial to ensure the continuous creation and operation of the process. To construct a app, it is necessary to have a well-structured system that provides guidance for all stages of the work process. During the initial launch of the application, everyone was instructed in this area, which included instructions on how to register and how the application operated. All the engineers and consultants who were users were divided into two groups, as was the controller, who was the quantity site supervisor and project manager who gave approval for the requisition of the machines.

### 3.4.1 System Design

The system design provides an explanation of the programme and its overall functionality. This section is crucial for both users and researchers to comprehend the functionality of the application. Furthermore, the text provides an explanation of each individual function associated with the buttons contained within. The application can be designed to be user-friendly for workers to utilize in the future. Systems design involves the precise definition of various elements of a system, such as modules, architecture, components, interfaces, and data. This is done in accordance with the defined requirements for the system. Systems engineering is the systematic approach of establishing, constructing, and shaping systems that effectively meet the unique objectives and demands of a business or organization.

A precise selection regarding the software to be utilised for this prototype has not yet been made, however several alternatives have been taken into consideration. The software employed is cost-effective and user-friendly. Adalo is a web-based platform that instructs users in computational thinking principles by means of mobile application creation. Researchers generate programming by utilising a design window to drag and drop components, and employ a visual block language to programme the functionality of the application. Individuals in today's world utilise their mobile devices not only for interpersonal communication, but also for acquiring knowledge and streamlining their professional tasks.

Adalo was a user-friendly visual programming environment that enabled

individuals to construct fully functional Android and iOS applications. The use of the blocks-based tool significantly streamlined the process of creating intricate and influential programmes, reducing the time required by a considerable margin.

within conventional programming environments. The Adalo project aimed to democratise software development by enabling individuals, especially young people, to transition from being consumers of technology to becoming producers. The draft showcases the login/registration procedure, wherein new users are required to register prior to accessing the sign-in feature. Users have the ability to access the application by utilising their pre-existing login credentials.


Figure 3.3 The ADALO Software To Design WP Tracker

### 3.4.2 System Development

For numerous reasons, building a prototype is critical. It enables stakeholders to appreciate the proposed concept visually and interactively by offering a concrete depiction of the envisioned solution. This interpersonal meeting frequently reveals intricacies not seen in theoretical phases, allowing for essential advice. The prototype serves as a testing ground for examining functionality and feasibility, assisting in the early detection and resolution of any difficulties prior to the final implementation stage.

Furthermore, it allows for iterative improvements, ensuring that the result matches perfectly with the initially anticipated objectives. Aside from testing, the prototype functions as a dynamic presentation tool, successfully displaying project progress and capabilities in a variety of scenarios. Figure 3.3 represents the Work Programme Tracker app prototype. It displays the main page that the user will be greeted with before they begin using it. To obtain access to the site, users must provide their ID and password.

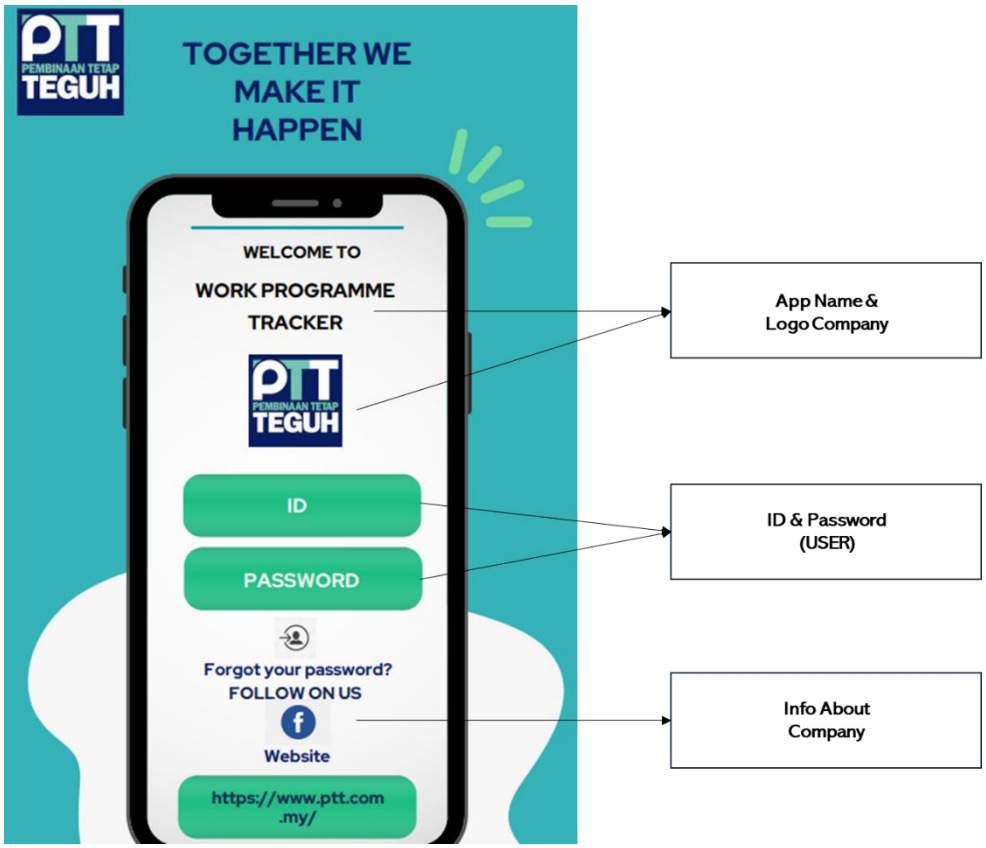



Figure 3.4 The Main Page WPT

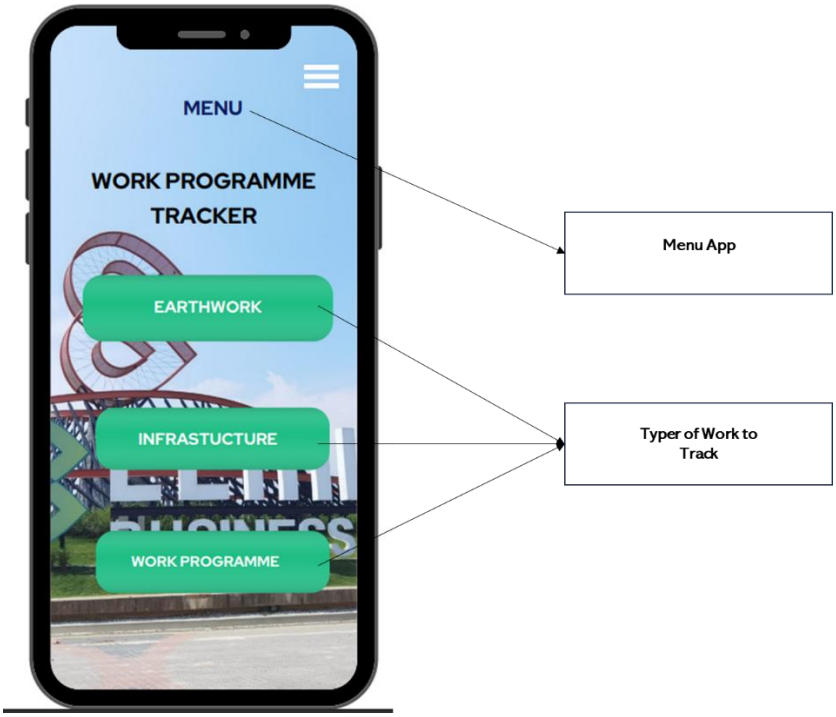



Figure 3.5 The Second Page WPT

Secondly, users will be faced with another icon interface after gaining access to the app, where they may submit the daily site report and any checklists, as well as request work inspection on the site.For figure 3.4, the user can select the type of task scope to work track wish is earthwork and infrastructure. In Malaysia, the building sector is separated into two categories: general construction and specialist trade activity. PTT SB is an earthwork and infrastructure project specialist.

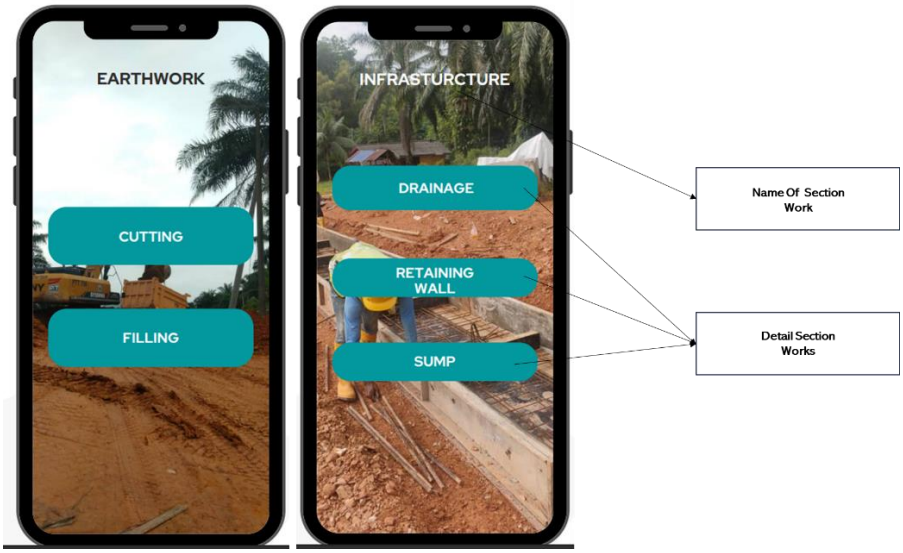
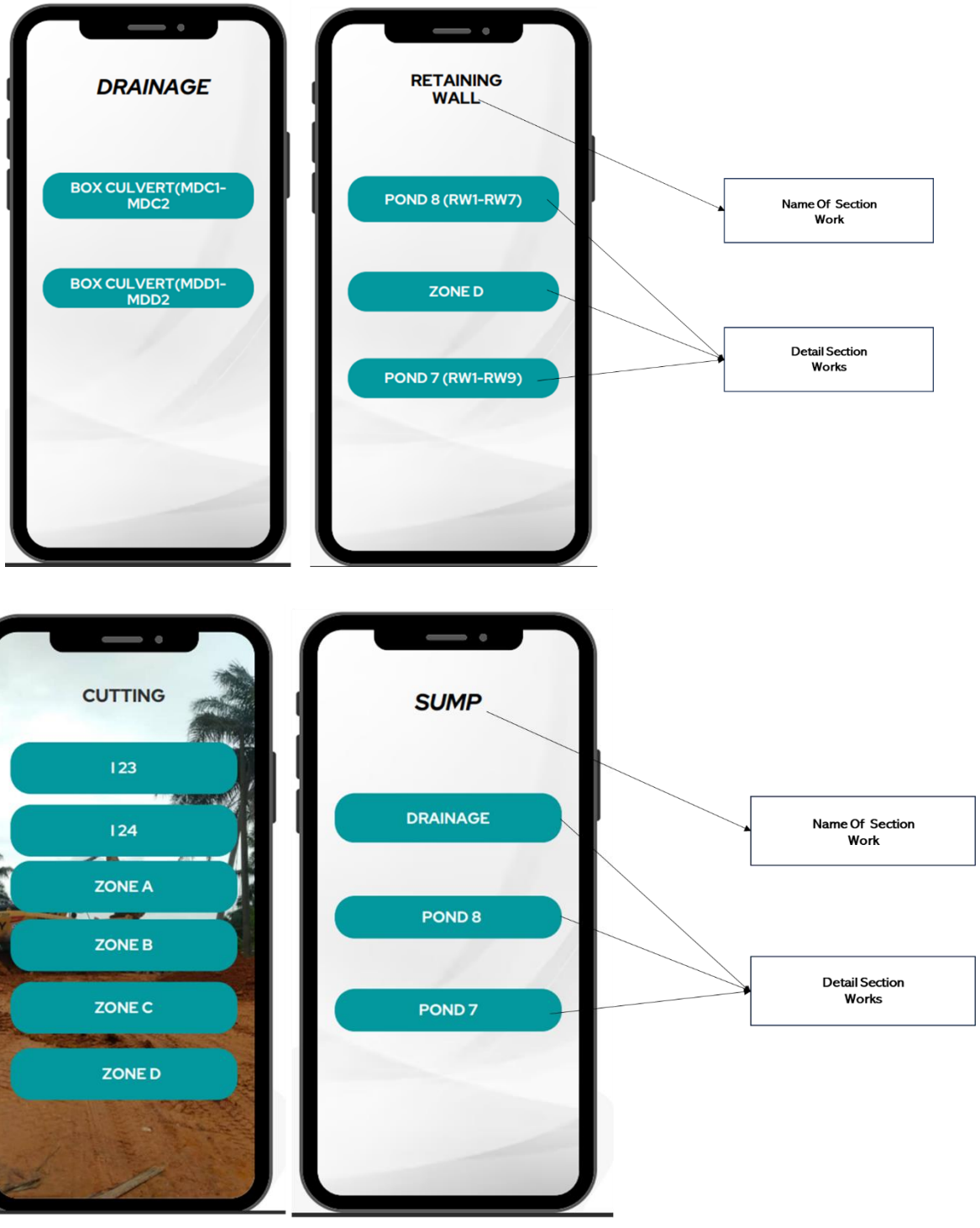



Figure 3.6 The Detail Section Works

The earthworks that are shown in Figure 3.5 are in the form button of cuts and fills that were created by the work traces. In terms of the work that is being done on the infrastructure, the work identifies drainage, sump, and retaining walls. Site engineers are required to make daily updates to monitor the status of the work being done on the site. The Detail Work In Infrastructure



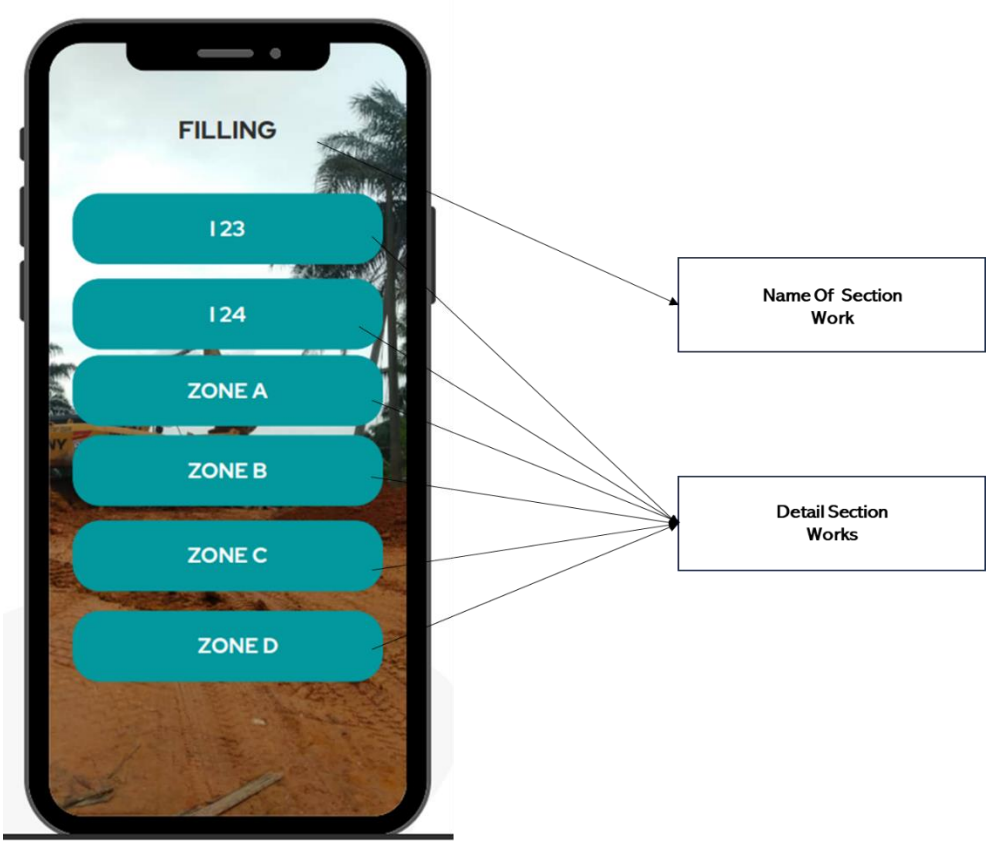



Figure 3.7 The Detail Work In Infrastructure & Earthwork

Besides that, regarding earthworks, the fraction is split into two (2) sections, which are referred to as cutting and filling. Because of this, earthwork was divided into zones 23, 24, zone A, zone B, zone C, and zone D. It is the process of excavating earth material from a work area in order to create the desired topography. Cutting and filling has a total of six (6) sections and filling also has six (6) sections. Filling is the process of moving the earth material that has been excavated or extra earth material to a workplace. For infrastructure work, the breakdown is divided into three (3) parts namely retaining wall, sump and drainage refer by figure 3.6. One of the primary functions of retaining walls is to manage the soil on sloped sites. This is the primary function of retaining walls. In situations where there is excessive rain or a lack of trees or other vegetation to hold the soil in place, it acts as a barrier that stops the soil from shifting or sliding down the hill. This is especially important given the circumstances. Depending on the setting, the function sump in construction can carry out a few different functions. In basements, a sump pit is a common location for the installation of a sump pump, which is a popular application that is designed to remove water that has accumulated in the pit. By doing so, water-related issues and the possibility of

flooding are avoided. In addition, the term "sump" can be used to refer to a particular area within an excavation site where water collects to assist with the management of groundwater during the construction process. Sump pumps facilitate the controlled removal of water from a building site, so creating a more secure and drier working environment for those engaged in construction activities. In general, the concept of a sump plays a significant role in water management in the construction industry. This is true whether it is used as a sump pump in basements or as a collection point in excavation sites. The function of precast box culverts is also that they are perfect for use in drainage projects. This is because they enable stormwater drainage routes to flow successfully and prevent flooding. Because of the convenience with which they may be installed, precast box culvert units are frequently used in the construction industry for the purpose of retaining walls, storage walls, and open drains. This facilitates an improvement in the amount of time required to execute the project.

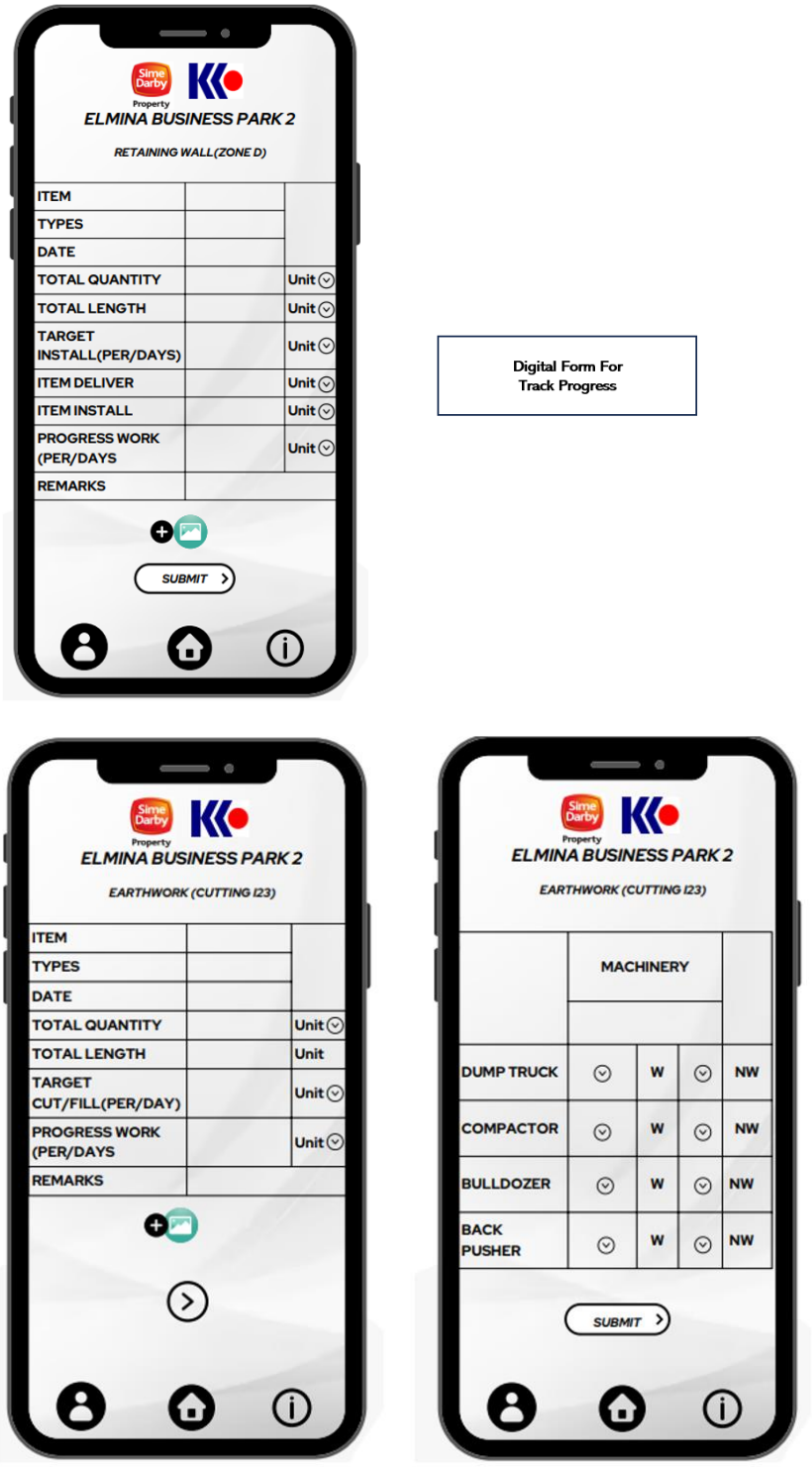



Figure 3.8 The Digital Form To Track Progress

Once you have completed the job on the detail area of the select button, each work will generate a digital form to log your progress. A slightly different approach is taken with infrastructures for the earthwork section. After you have finished filling out the form

at the bottom of the form, you may also submit a photo of your progress as evidence that the work linked to your progress has been completed.

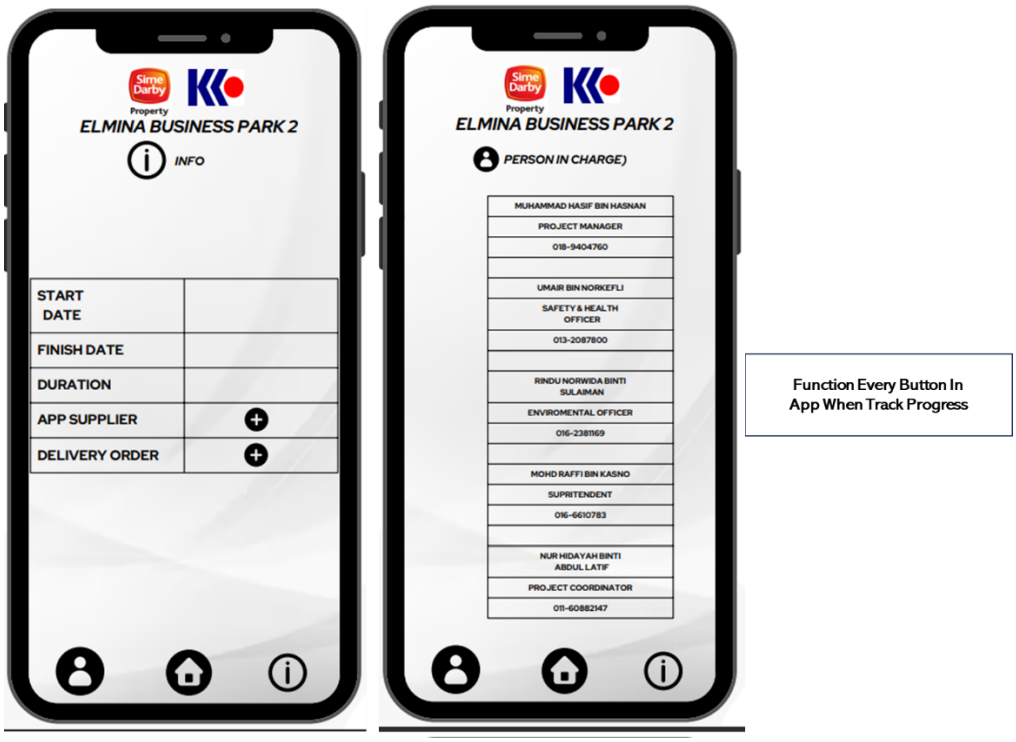



Figure 3.9 The Function Button In Digital Form

The app will provide detailed information for each section when selected, including the start and end dates and the duration, based on the master work programme by Pembinaan Tetap Teguh. The app's supplier function allows for the uploading of detailed company work, such as G-Cast as a supplier for box culverts, and the ability to upload delivery orders when materials arrive on site, serving as a reference. If there are any questions or need assistance with regard to the task, the person in charge of the section will offer the person who is responsible for this work with a phone number to call.

## 3.5 MATERIAL USED

This project calls for the exploitation of a few different materials. Materials utilized for the purpose of storing data or recording data to monitor the progress of a task. WPT makes use of the following resources, which are listed in Table 3.1.

Table 3.1: The list of materials used to develop (WPT)for construction.

| Material | Function & Description |
|---|---|
|  Computer and Laptop | To develop an application and to store information |
|  Smartphone | For the purpose to evaluate the application functionality |
|  Adalo Software | To make available a software for the development of applications |

| | |
|---|---|
|  <br>Internet/Wifi | To establish a connection between the computer and the internet in order to develop a application |
|  <br>Gmail & Email | To sign up & login for software |
|  <br>Data & Document | For the purpose of recording and analysis data for development app |

## 3.6 TESTING

The entire product undergoes thorough testing by designers or assessors, employing the most effective solutions identified during the prototype phase. The data gathered during the testing phase is typically used to redefine one or more problems and to enhance the user's comprehension, usage circumstances, cognitive processes, behaviours, emotions, and empathy throughout the iterative process. Even at this point, adjustments and modifications are implemented to mitigate potential problems and get a comprehensive comprehension of the product and its consumers.

The questionnaire should be distributed to construction workers, specifically targeting engineers and supervisors. The implementation would carry out the observation and effectiveness while working on the project to assess the efficacy of the app. This chapter additionally encompasses design modelling. The surveys have been distributed with the aim of gathering insights and understanding individuals' perceptions and knowledge regarding our effort. In addition, the purpose is to collect input that can be utilized for the purpose of software development. The purpose of this survey is to gather feedback from specific users regarding their agreement or disagreement with our application concept. Finally, prior to distributing questionnaires for the application, we held an interview with firm managers, specifically the Project Manager and Site Engineer. The purpose of the interview is to obtain input on the effectiveness the WPT app of implementing this application as a construction management system for tracking progress.

## 3.7 DATA COLLECTION AND ANALYSIS

The end product was tested using an online questionnaire using SPSS, or Statistical Package for the Social Sciences, is a software package designed for the statistical analysis of data. Despite its name's association with the social sciences, SPSS has now extended its application to various other data sectors. Statistical Package for the Social Sciences (SPSS) is widely used in various fields such as health care, social science research, and environmental health (Kimberlin & Winterstein, 2008; Pereira et al., 2019; Dharini et al., 2018). It has been utilized for analyzing data related to child sexual abuse, pharmacovigilance, and cyberbullying among students (Pereira et al., 2019; Dharini et al., 2018; Ghazali et al., 2022). The tool has been employed for tasks such as analyzing Likert scale responses and conducting multidimensional analyses of texts and questionnaires (Dada, 2017). SPSS is valuable for its ability to handle statistical analysis and data collection in diverse research areas, making it an essential tool for researchers in different domains.The sample of the questionnaire was shown in table 3.5.

Table 3.2: Example of questionnaire

| No | Effectiveness Categories | Issues Related to Existing Method and MPL system6353 | Level of Agreement | | | | |
|---|---|---|---|---|---|---|---|
| | | | Strongly Disagree | Disagree | Slightly Agree | Agree | Strongly Agree |
| | | | 1 | 2 | 3 | 4 | 5 |
| 1. | Work Progress | Current methods occasionally restrict my progress tracking. | | | | | |
| | | The application of the WPT system provides valuable updates on the status of my task. | | | | | |

To evaluate the effectiveness of the product, a paired t-test was used. All the data collected has been analyzed by Social Science Statistics website. The paired t-test is a method used to test whether the mean difference between pairs of measurements is zero or not. The paired t-test is a commonly used statistical method for comparing the

means of two related groups. It is widely used in various fields such as biology, psychology, nursing, and language studies. For instance, in a study on the effects of educational-supportive interventions on distress tolerance of parents of premature infants, the collected data were analyzed using SPSS 24 with a paired t-test (Mahmoodi et al., 2022). Similarly, in a study on the effects of metalinguistic written corrective feedback on language preparatory school students' TOEFL independent writing section score, IBM SPSS 23 was employed to analyze quantitative data through a paired samples t-test ("The Effects of Metalinguistic Written Corrective Feedback (WCF) on Language Preparatory School Students` TOEFL Independent Writing Section Score", 2022). These examples demonstrate the versatility and applicability of the paired t-test in different research domains.

In situations where the data values are paired measurements, the test can be utilised by the researcher. As an illustration, a researcher might have measurements taken of a group of people both before and after the intervention. An additional requirement is that the distribution of differences between the paired measurements should be of a normal distribution. The paired t-test is synonymous with the dependent samples t-test, the paired-difference t-test, the matched pair t-test, and the repeated-samples t-test. These are all names for the same statistical analysis. There is a possibility that researchers will not be able to test for normalcy if the sample sizes are extremely tiny. It's possible that the researcher will have to rely on someone's knowledge of the data. Alternately, you might carry out a nonparametric test that does not presume that the data is normal. In this section, we will discuss the requirements for carrying out the test, as well as the process of checking our data, carrying out the test, and the statistical particulars. Researchers need to have two variables in order to conduct the paired t-test. A single variable is responsible for defining the pairs of observations. A measurement is the second variable in the equation. However, there are situations when it already possesses the paired differences for the measurement variable.

## 3.8 CONCLUSION

This chapter describes the procedures for data collecting and information in the study, which is the conclusion that can be derived from the material being presented in this chapter. The results will be determined by doing an analysis on the data that was obtained. In addition, this chapter focuses on the location, the respondents, the research method, the interpretation of the data, and the work that was done during the process of reviewing the data.Eventually, this will become an advantage for all departments, as it will allow them to refer to it in order to track progress in an expedient manner without having to ask the other departments to locate the information.

In addition, the procedures that are going to be utilised will be discussed in detail based on the problems that are currently being encountered, as well as the selection of acceptable systems that are going to be utilised and suited for application inside the site. Taking into account all of the work that is accessible, this is based on references that are already available, such as articles, interviews, experiences, and other elements. In the following section of this chapter, you will find an attachment that contains the process path that will be implemented for this project and will be applied to the working environment when it exists on site.

# CHAPTER 4

# DATA AND ANALYSIS

## 4.1 INTRODUCTION

Detailed explanations of the outcomes that were anticipated from the project that was carried out are provided in this chapter. In accordance with the following objectives, the findings of the project were presented.

i. To identify the list of document work details to be used in construction.
ii. To develop WP Tracker using Adalo Software.
iii. To evaluate the effectiveness of WP Trackers in project.

Within this chapter, it is imperative for the researcher to possess a clear understanding of the anticipated outcome of the project. Additionally, it is considered one of the preliminary duties in project planning, when researchers do a thorough analysis of the data that will be generated throughout the project's implementation. The researchers seek assurance that the information they gather will facilitate the attainment of their aims. Furthermore, this chapter provides further details regarding the demographic statistics of the survey respondents. The feedback was obtained by employing a quantitative approach, wherein a questionnaire was distributed to over 42 respondents. The data was then processed using Excel. The analysis of the results was conducted using Statistical Package for the Social Sciences (SPSS) version 26. The primary aim and objectives of the Work Programme Tracker are to create the WPT Adalo Software and conduct thorough testing to ensure its efficiency.

## 4.2 THE LIST OF DOCUMENT WORK DETAILS TO BE USED IN CONSTRUCTION

Through the use of a mobile device, the Work Programme Tracker (WPT) application aims to streamline human tasks by transitioning from traditional methods to real-time feedback. Consequently, following the completion of the interview and subsequent discussion with the engineers, supervisors, and managers, the document outlines information in daily planning and progress in construction activities that will be used. Previously, they were able to be updated or recorded while following the progress of work at the site using Site Daily Monitor by WhatsApp as shown figure 4.1. It is difficult to obtain data on the progress of the work to track the work at the site. In addition to that, there would be a lack of communication on the reporting of progress updates for the project, and this already existing approach would be less systematic than other means of documenting or acquiring data regarding work progress at areas. This activity was a delay in obtaining information regarding tracking work at the location. When these variables were taken into consideration, the traditional procedure that had been used in the past was neither methodical nor suited for being prolonged. In order to monitor the progress of the work being done at the site, all of the staff members and departments would need to communicate with one another.

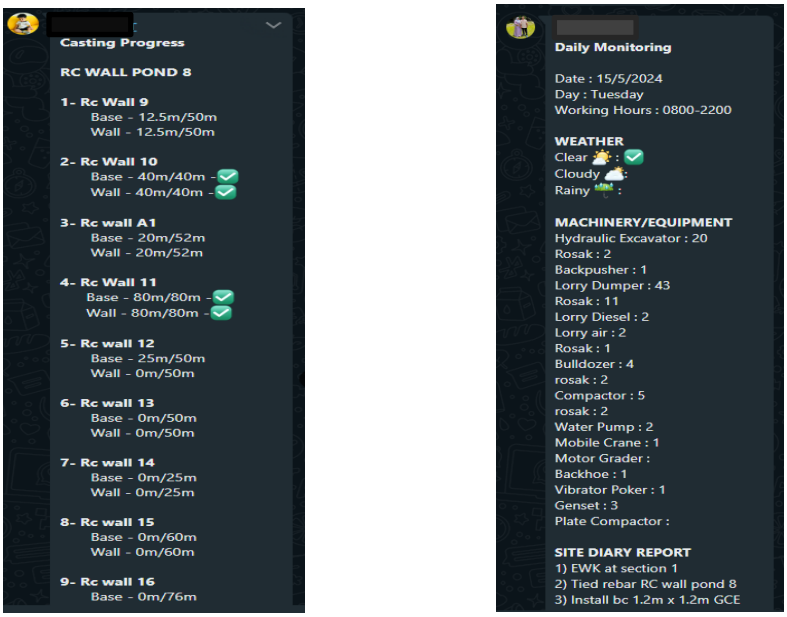
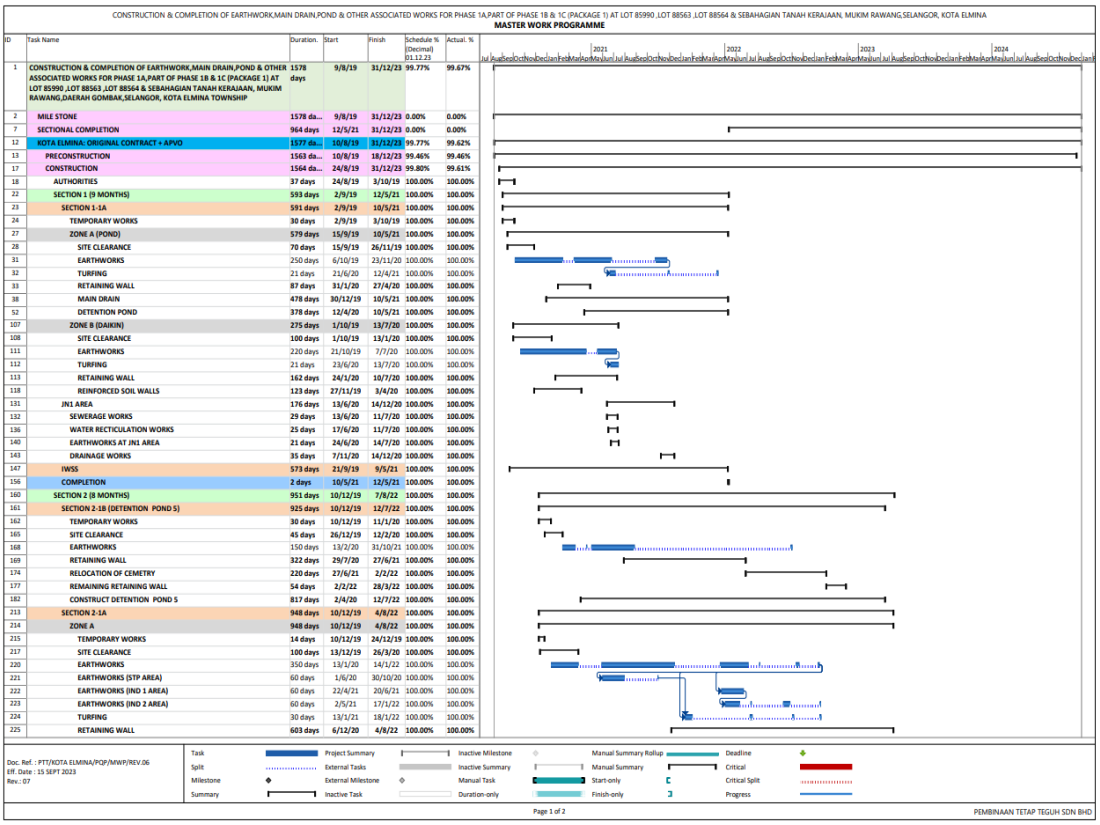



Figure 4.1 The Work progress and daily monitoring update on WhatsApp



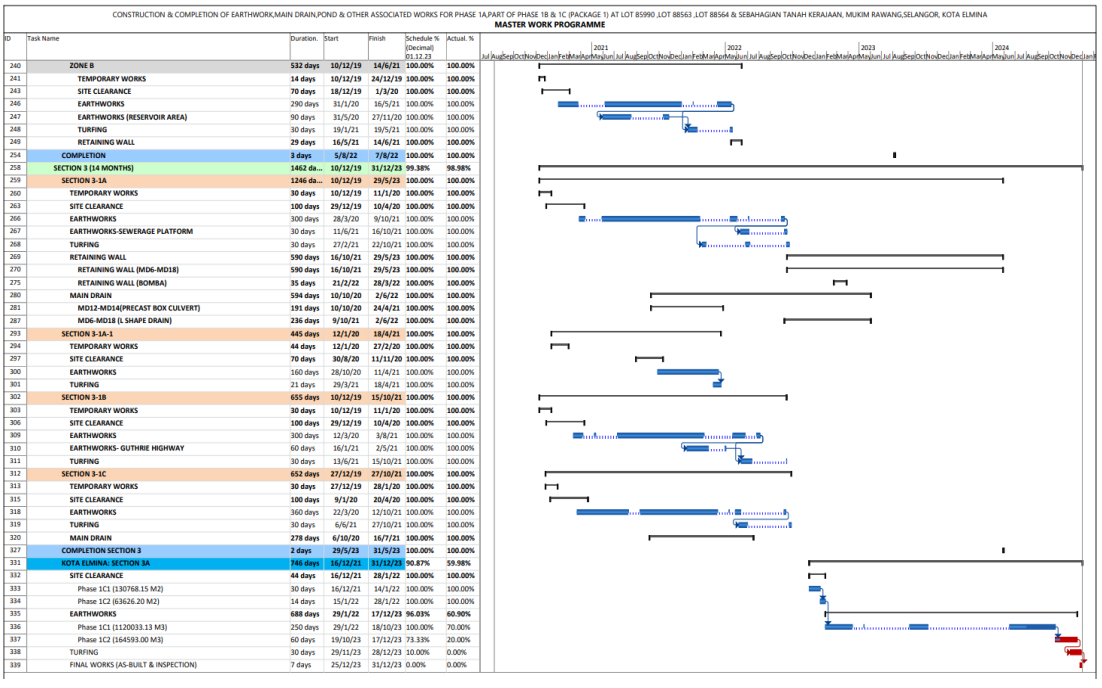




Figure 4.2 The Master Work Programme

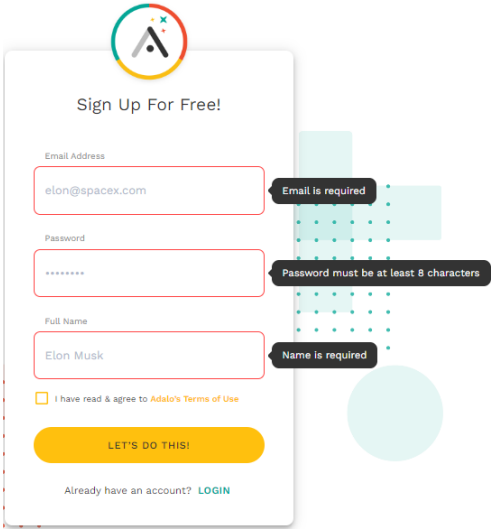
The WPT is going to track the work site using the Master Work Programme, as seen in figure 4.2. This will involve tracking the progress and material delivery for each subtask, from beginning to completion, within the specified deadline.

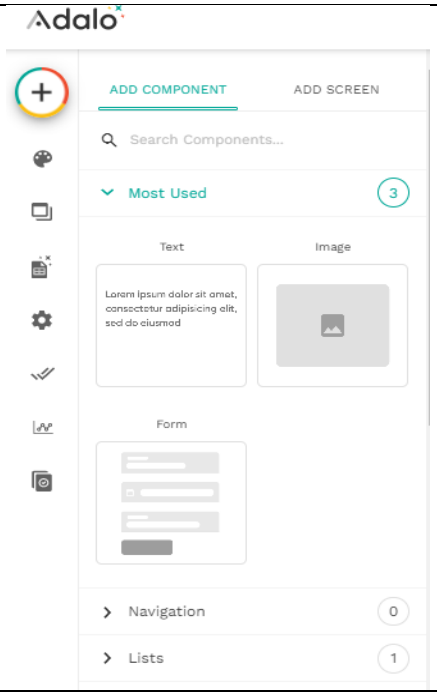
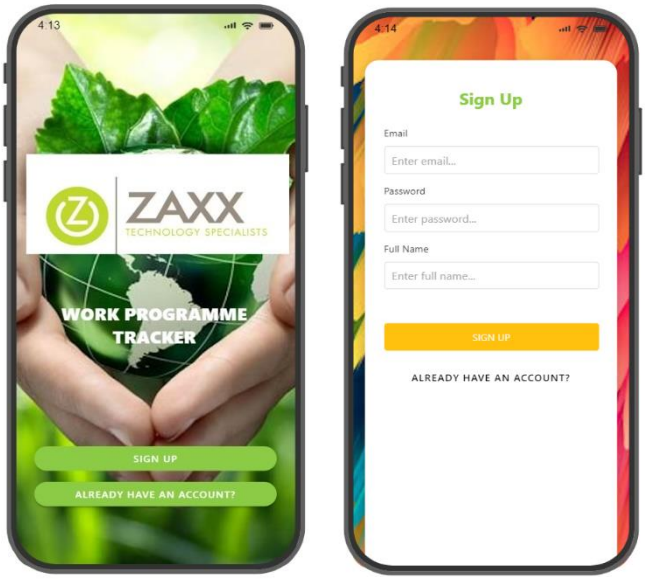
## 4.3 DEVELOP WPT USING ADALO SOFTWARE

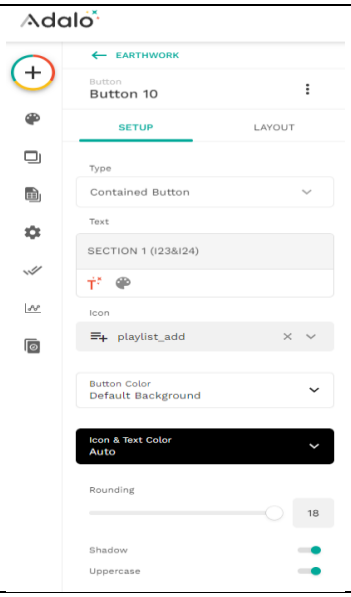
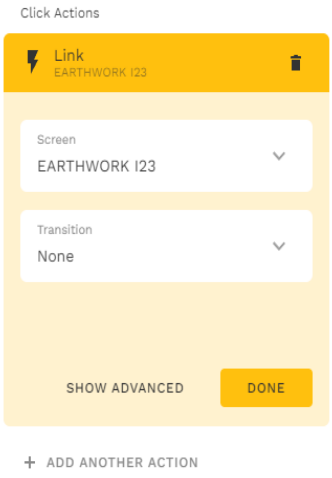
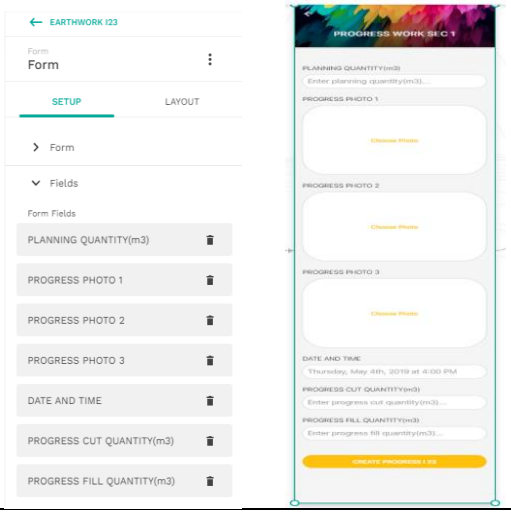
### 4.3.1 WORKS OF DEVELOPMENT WPT IN ADALO SOFTWARE

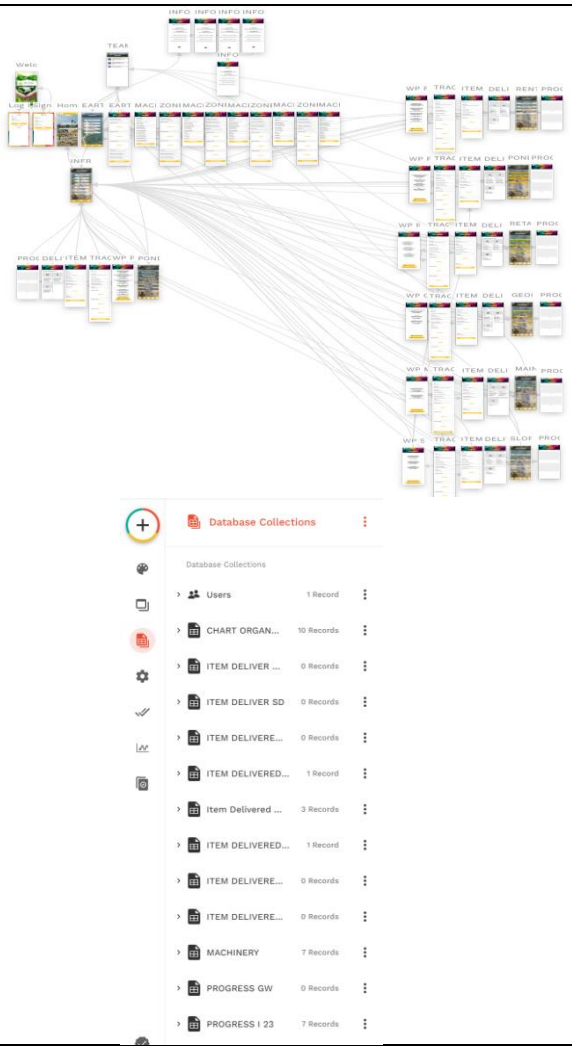
The Adalo App developer software was chosen for the development process of the Work Programme Tracker (WPT) for construction application. Researchers and developers utilized the Adalo App Developer to construct android applications through a web browser, utilizing either a connected phone or an emulator. The Adalo App Developer servers track work progress to provide users with information about development at the site. The Adalo App Developer was a tool that allowed users to design as shown at table 4.1 their own mobile apps using a block-based programming language.

Table 4.1 Progress work of development WPT in Adalo

| Progress Picture | Work Description |
|---|---|
|  | The software chosen to develop the Work Programme Tracker (WPT) application is "Adalo". To initiate the application development process, the initial step entails registering and logging into an account. This ensures the preservation of data and the storage of all information on the website platform. |

| | |
|---|---|
|  | Explore numerous choices to design an application utilizing elements that are already on the platform to see whether it is acceptable for constructing the application. |
|  | This app is used for signing up for the Work Programme Tracker (WPT). The signup page is the platform where users establish system accounts. The Login page employs the use of email and password to streamline the login process. The system database will store the following data. |

| | |
|---|---|
|  | The toggle button will be utilized to create different types of works in WPT. Proceeding with the setup process will involve specifying the desired characteristics of the toggle button, including its form, color, and label. |
|  | To be able to move any slide, it is necessary to establish a link with a button, toggle, image, or any other element. The purpose of this method is to provide operator details on a separate screen immediately after the toggle button is pushed in the application. |
|  | The form will be used to track job progress and maintain a record of data.The WPT will monitor the progress of the track, the delivery of items, and the operation of machines. |

| | |
|---|---|
|  | The database created to keep progress any record. All information relevant to the operation of this app will be recorded in the database that is established, including, but not limited to, the type of works progress, item deliveries, and user information. |

### 4.3.2 THE FINAL DEVELOPMENT OF WPT

Through the utilization of Adalo Software, this product was effectively developed. In light of the fact that the overall purpose of the project is the development of WPT. In order to accomplish a workflow that is more organized, this application has been designed in accordance with the table 4.2 below. Figure 4.3 will illustrate how the WPT application tracks the progress of work at the site, in accordance with subtasks and tasks outlined in master work programme. The design of the application ensures that users find it user-friendly, easy to understand, and enjoyable to use.

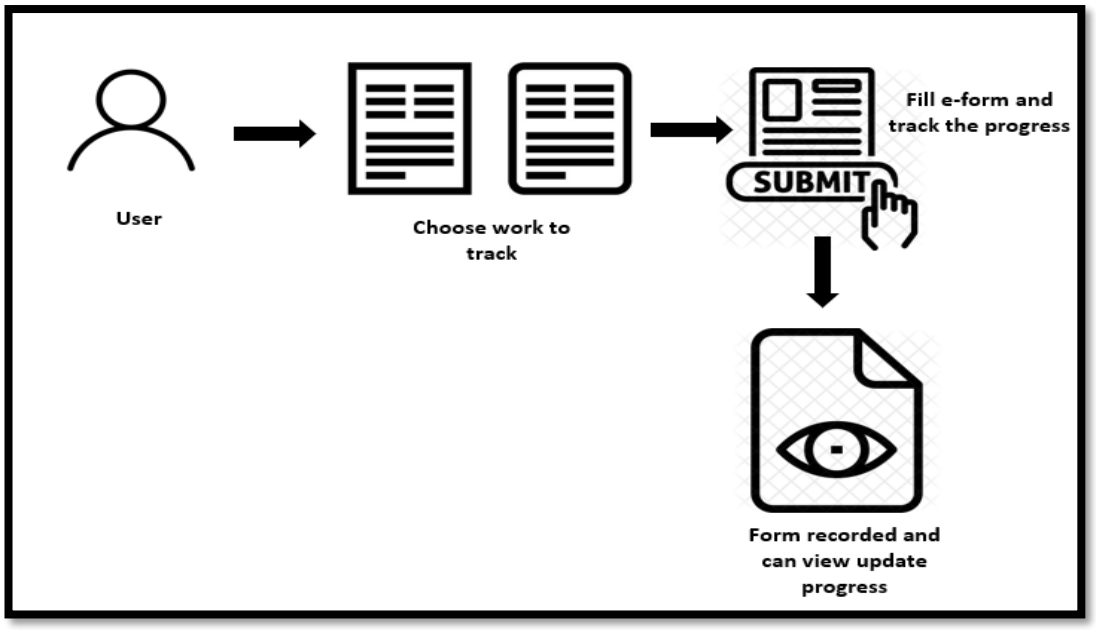
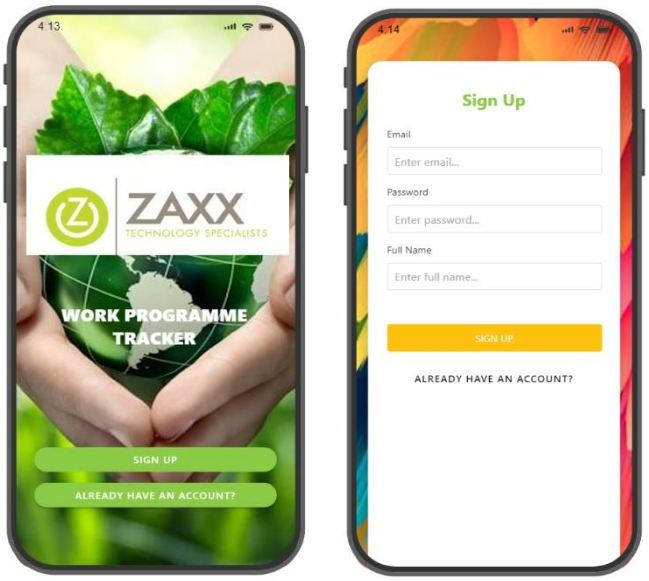
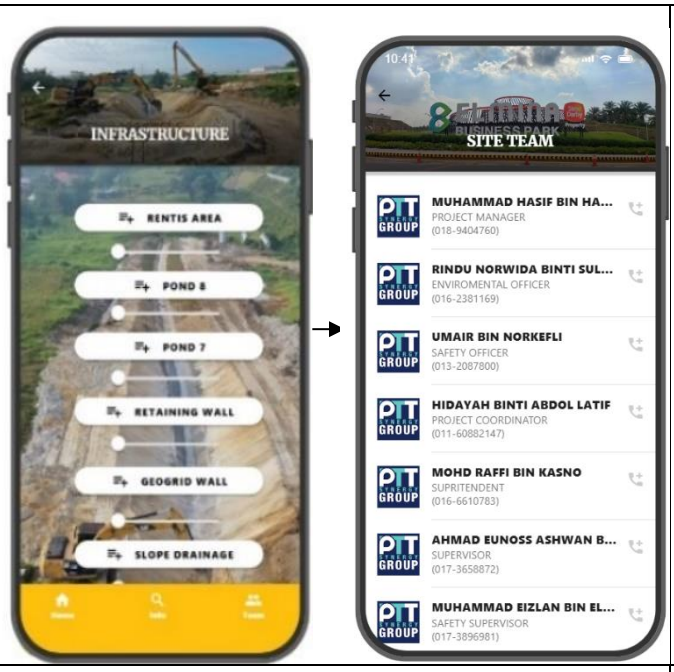
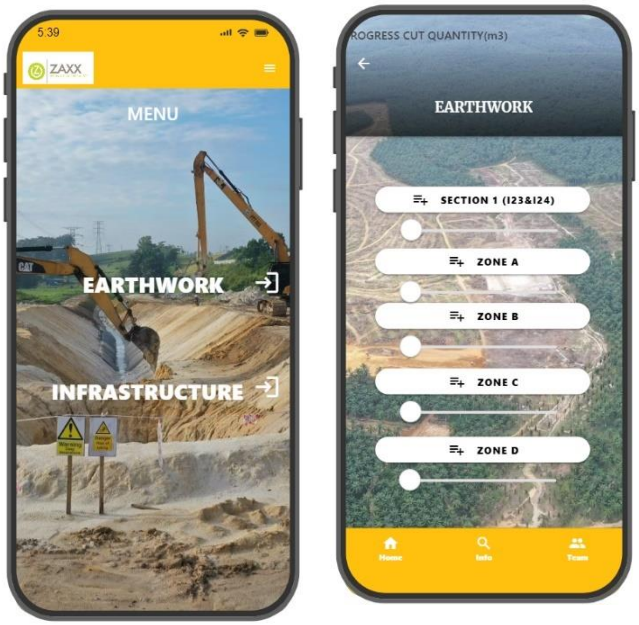
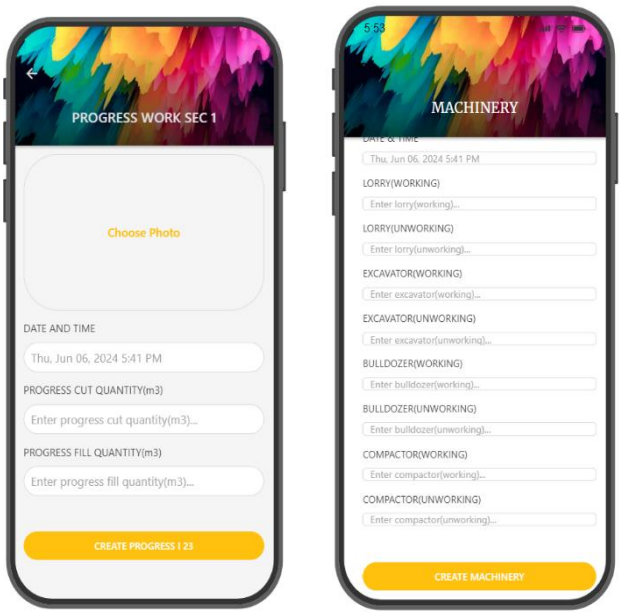
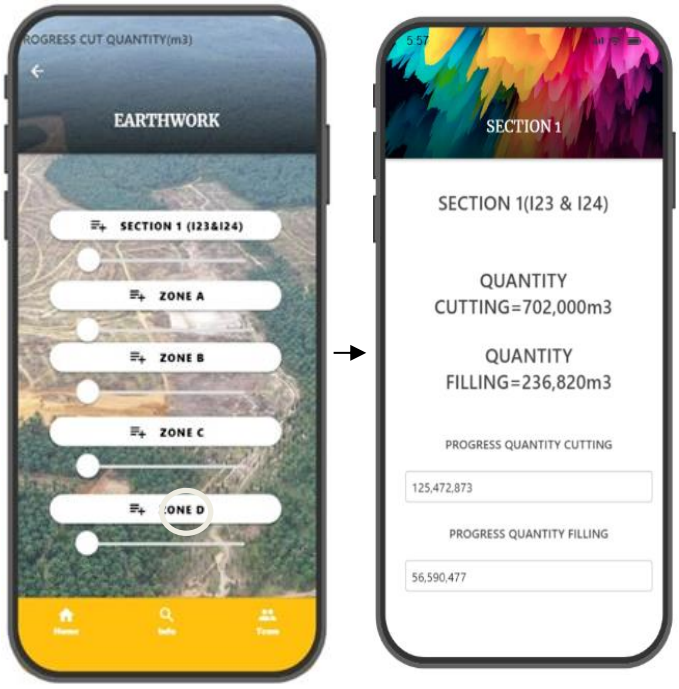


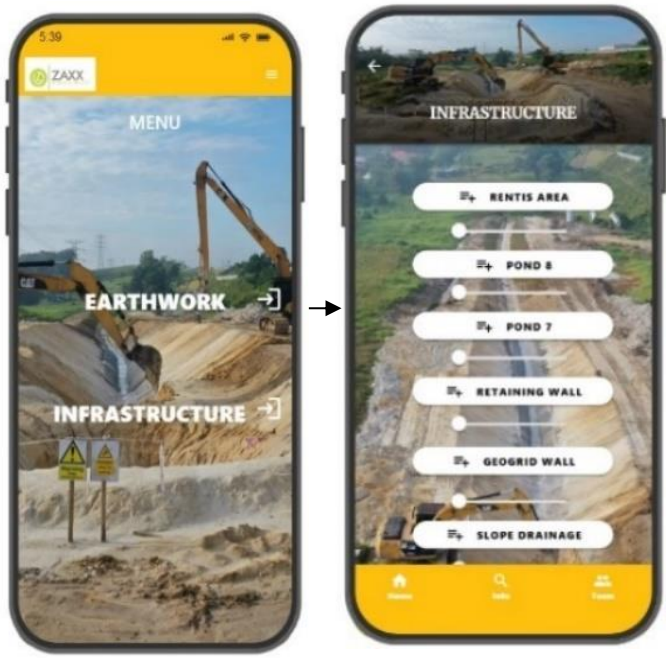
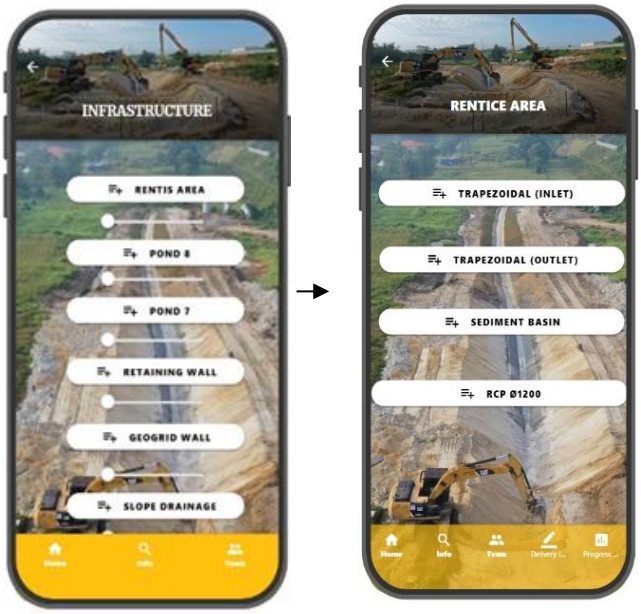

Figure 4.3 Workflow for overall the app

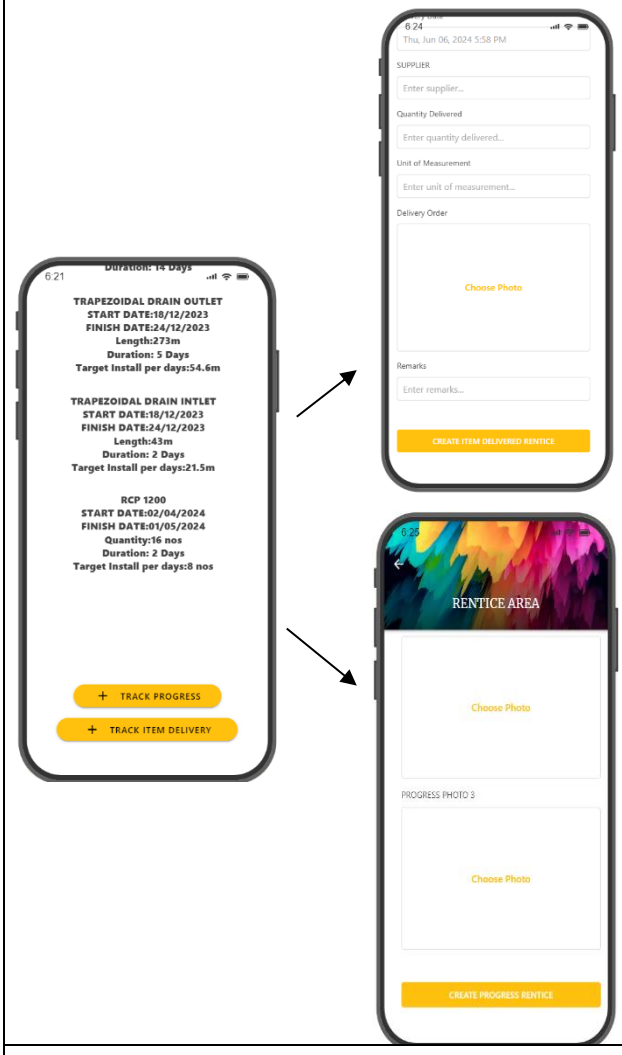
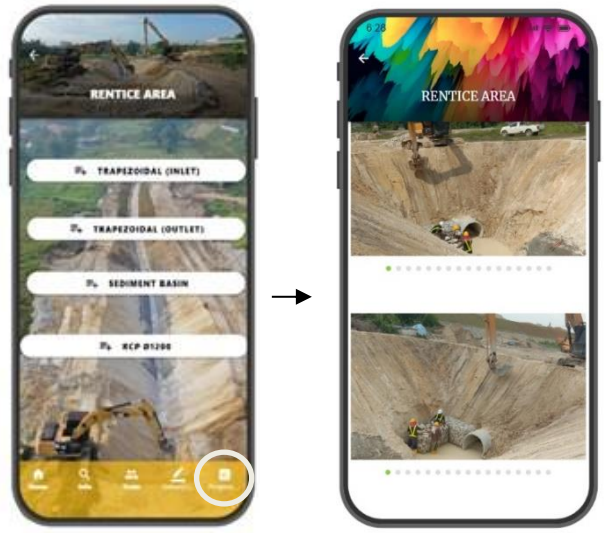
Table 4.2 The finalize design and workflow WPT after development

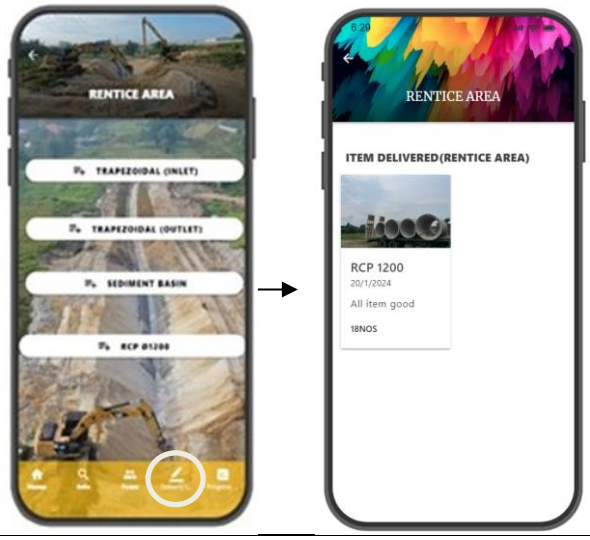
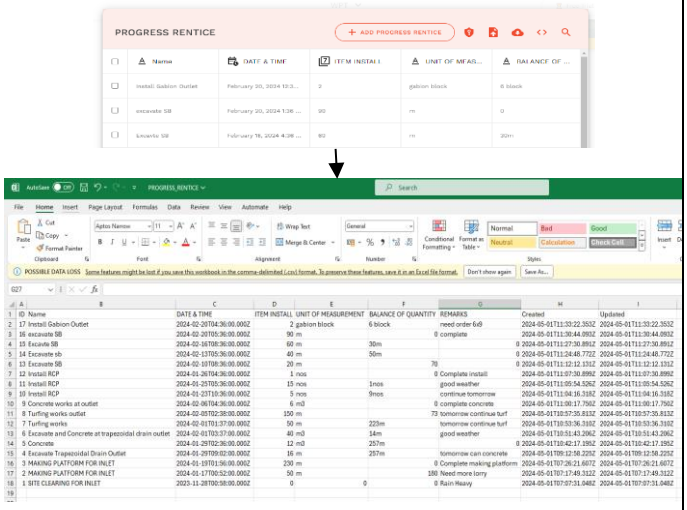
| Design | Description |
|---|---|
|  | The software chosen to develop the Work Programme Tracker (WPT) application is "Adalo". To initiate the application development process, the initial step entails registering and logging into an account. This ensures the preservation of data and the storage of all information on the website platform. |

| | |
|---|---|
|  | If have any issue at site button team as referred at picture in app. All the following details person in charge to refer which includes name, position, and phone number to contact. |
|  | • EARTHWORK<br>The categories of work in the menu are divided into two sections: Earthwork and Infrastructure. The earthwork will be divided into five subzones I23 & I24, Zone A, Zone B, Zone C, and Zone D which more detailed when track. |

| | |
|---|---|
|  | • EARTHWORK<br>After choosing one of the subzones. The e-form will be displayed to track progress. The earthwork will involve two e-forms one for tracking progress work and the other for recording machinery data. The collected data will be stored in the app's storage. |
|  | • EARTHWORK<br>Once the user has completed the e-form, they may examine the status of the earthwork by clicking on info button at the app as the highlighted "info" button in the photo. This will allow them to review the quantity of cut and fill, as well as the overall value from the Bill of Quantity. Based on that information, we can determine the workload distribution for each subzone's earthwork. |

| | |
|---|---|
|  | • INFRASTRUCTURE<br>For menu in category of Infrastructure will be subdivided into seven types of works.The mentioned areas include Rentis area, Pond 8, Pond 7, Retaining Wall, Geogrid Wall, Slope Drainage, and Main Drainage. |
|  | • INFRASTRUCTURE<br>Upon selecting a work from the infrastructure menu, the corresponding subtasks will be displayed, allowing for the tracking of work progress at the site. |

| | |
|---|---|
|  | • INFRASTRUCTURE<br>This part will provide information on the dateline and the status of planning on a daily basis to ensure that the work is completed according to the specified deadline outlined in the work programme. The e-form will be utilised to monitor the work progress and the item of delivery. All the record will be saved in storage app |
|  | • INFRASTRUCTURE<br>To view the progress picture press the button on app as shown in the highlighted picture to view the recorded progress. So that user may instantly get updates and know what's happening at the site. |

| | |
|---|---|
|  | • INFRASTRUCTURE<br>To view the item delivered press the button on app as shown in the highlighted picture to view the recorded item. So that user may instantly get info about the quantity has arrived at site. |
|  | To obtain full details on all infrastructure and earthwork tasks, users can download a summary in the Adalo software. This summary allows users to observe the entire process of the work, as well as the data recorded by the user from the beginning to the completion of the project. |

## 4.4 TO EVALUATE THE EFFECTIVENESS OF WORK PROGRAMME TRACKER IN PROJECT.

### 4.4.1 DATA COLLECTION

This study gives the results of a pre-test and post-questionnaire using a quantitative method. The questionnaire was conducted using Google Forms and targeted respondents such as project managers, engineers, site supervisors, and others. The purpose was to evaluate the effectiveness of the Work Programme Tracker (WPT) in the project. The questionnaire is categorized into three distinct sections: Section A, Section B, and Section C. Section A comprises data related to the characteristics of a population. Section B contains a constraint element that is relevant to the existing approach. Section C pertains to the post-questionnaire, allowing us to compare the data from section B and

section C in order to assess their effectiveness. G-Form has distributed this questionnaire to 42 responders via links.

### 4.4.2 DEMOGRAPHIC DATA

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

a) Gender
b) Age
c) Working Experience
d) Position

#### 4.4.2.1 GENDER

This research included 28 (66.67%) male respondents and 14 (33.3%) 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 Sdn Bhd site office. The number of respondents by gender is shown in Table 4.3 below.

Table 4.3 The number of percentage respondents by gender

| No. | Gender | No. of Respondent | Percentage (%) |
|---|---|---|---|
| **1** | Male | 28 | 66.67 |
| **2** | Female | 14 | 33.3 |
| | **Total** | 42 | 100 |

#### 4.4.2.2 AGE

Table 4.4 below shows the number and percentage of respondents in the age category divided into seven categories. This section was formed to assist with data processing and identifying respondents at the site office. In the survey, showing the age group of 21 - 34 years old is the largest number of respondents with 32 people (76.2%),

the age group of 35 - 50 years old is the second largest number of respondents which is a total of 9 respondents (21.4%), the third largest number of respondents is the age group of 51 - 64 years old which is as many as 1 respondents (2.4%). Meanwhile for the 13-20 years and 65 years old and above old age group, there were no respondents.

Table 4.4 The number of percentage respondents by age group

| No. | Age | No. of Respondent | Percentage (%) |
|---|---|---|---|
| **1** | 13-20 years old | 0 | 0.0 |
| **2** | 21-34 years old | 32 | 76.2 |
| **3** | 35 - 50 years old | 9 | 21.4 |
| **4** | 51 - 64 years old | 1 | 2.4 |
| **5** | 65 years old and above | 0 | 0.0 |
| | **Total** | 42 | 100 |

#### 4.4.2.3 WORKING EXPERIENCE

Table 4.5 below shows the working experience of the respondents. A total of twenty-four respondents (57.1%) has work experience < 2 years. A total of eleven respondents (29.2%) has two to five years of work experience. A total of four respondents (9.52%) has 6 to 10 years of work experience. Meanwhile a total of 3 respondents (7.1%) have more than ten years of work experience.

Table 4.5 The number of percentage respondents by working experience

| No. | Work Experience | No. of Respondent | Percentage (%) |
|---|---|---|---|
| **1** | < 2 years | 24 | 57.1 |
| **2** | 2 - 5 years | 11 | 26.2 |
| **3** | 6 - 10 years | 4 | 9.52 |
| **4** | > 10 years | 3 | 7.1 |
| | **Total** | 42 | 100 |

#### 4.4.2.3 POSITION

Positions in the Pembinaan Tetap Teguh site office, which comprises Project Manager, Manager, Engineer, Supervisor, and Others. Table 4.6 shows that other the most respondents which are 19 respondents (45.2%). The second largest respondent is the Site Engineer with a total of 9 respondents (21.4%). The third largest respondent is the site supervisor with a total of 8 respondents (19%). For Project Coordinator, Project Manager and Superintendent with 1 respondent (2.4%). In addition, Planner has a total of 3 respondents (7.1%).

Table 4.6 The number of percentage respondents by position

| **No.** | **Position** | **No. of Respondent** | **Percentage (%)** |
|---|---|---|---|
| **1** | Project Manager | 1 | 2.4 |
| **2** | Site Engineer | 9 | 21.4 |
| **3** | Project Coordinator | 1 | 2.4 |
| **4** | Superintendent | 1 | 2.4 |
| **5** | Site Supervisor | 8 | 19 |
| **6** | Planner | 3 | 7.1 |
| **7** | Others | 19 | 45.2 |
| | **Total** | 42 | 100 |

### 4.4.3 RESPONDENT PERSPECTIVE

Table 4.8 describes about data respondent on the issues with the previous conventional method. Respondents were asked to mark down the appropriate ratings on a scale from 1 to 5 for each question. The scoring scale is provided in Table 4.7 below.

Table 4.7 Level of agreement

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

Table 4.8 Existing method survey data

| No | Constraint elements of the current method for the budget approval forms submission system. | Survey to identify effectiveness of Existing method on tracking work progress at a construction site. | Level of Agreement | | | | |
|---|---|---|---|---|---|---|---|
| | | | Strongly Disagree | Disagree | Fair | Agree | Strongly Agree |
| | | | 1 | 2 | 3 | 4 | 5 |
| 1 | Efficient process | Existing method sometime burden my work progress | 1 (2.4%) | 1 (2.4%) | 9 (21.4%) | 18 (42.9%) | 13 (31%) |
| | | Existing method slow down the process for my thank | 1 (2.4%) | 2 (4.8%) | 8 (19%) | 18 (42.9%) | 13 (31%) |
| 2 | Systematic management | Existing method hard to find information about track record work progress. | 0 (0%) | 4 (9.5%) | 9 (21.4%) | 16 (38.1%) | 13 (31%) |
| | | Existing method is very disorderly and confused to find the information about record item delivery | 0 (0%) | 3 (7.1%) | 14 (33.3%) | 17 (40.5%) | 8 (19%) |
| 3 | User Friendly | Existing method produce less productivity to complete the tasks. | 0 (0%) | 2 (4.8%) | 16 (38.1%) | 13 (31%) | 11 (26.2%) |
| | | Existing method not suitable anymore nowadays | 1 (2.4%) | 1 (2.4%) | 10 (23.8%) | 19 (45.2%) | 11 (26.2%) |
| | | Existing method not friendly-user and inconvenient for users | 2 (4.8%) | 3 (7.1%) | 9 (21.4%) | 15 (35.7%) | 13 (31%) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **4** | Tracking information | Existing method is difficult and slow to preview required work progress immediately. | 2 (4.8%) | 3 (7.1%) | 9 (21.4%) | 15 (35.7%) | 13 (31%) |
| | | Existing method is not easily accessible for urgent request to search for required tracked work progress data | 2 (4.8%) | 3 (7.1%) | 9 (21.4%) | 15 (35.7%) | 13 (31%) |
| | | Existing method give low skills working performance | 0 (0%) | 1 (2.4%) | 12 (28.6%) | 13 (31%) | 16 (38.1%) |

Table 4.8 displays the responses from the respondents' concerning issues associated with existing method of tracking progress work at site. More than half of the respondents (>50%) agree on scales 3 and above. Then, respondents' opinions on the effectiveness of Work Programme Tracker (WPT) in the construction industry are displayed in table 4.9 More than half of the respondents (>50%) agree on scales 3 and above.

Table 4.9 Feedback after using Work Programme tracker (WPT) for construction

| **No** | **Constraint elements of the current method for the budget approval forms submission system.** | **Survey to identify effectiveness of Work Programme Tracker on tracking work progress at a construction site.** | **Level of Agreement** | | | | |
|---|---|---|---|---|---|---|---|
| | | | **Strongly Disagree** | **Disagree** | **Fair** | **Agree** | **Strongly Agree** |
| | | | **1** | **2** | **3** | **4** | **5** |
| **1** | Efficient process | WPT system give useful progress to my task | 1 (2.4%) | 1 (2.4%) | 9 (21.4%) | 18 (42.9%) | 13 (31%) |
| | | WPT system enables me to accomplish task more quickly | 1 (2.4%) | 2 (4.8%) | 8 (19%) | 18 (42.9%) | 13 (31%) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **2** | Systematic management | WPT system ease to get the information | 0 (0%) | 4 (9.5%) | 9 (21.4%) | 16 (38.1%) | 13 (31%) |
| | | WPT system systematic and well organized to find the information | 0 (0%) | 3 (7.1%) | 14 (33.3%) | 17 (40.5%) | 8 (19%) |
| **3** | User Friendly | WPT system enhance the effectiveness of working performance | 0 (0%) | 2 (4.8%) | 16 (38.1%) | 13 (31%) | 11 (26.2%) |
| | | WPT system is good idea for increasing the technology usage | 1 (2.4%) | 1 (2.4%) | 10 (23.8%) | 19 (45.2%) | 11 (26.2%) |
| | | WPT system is friendly-user and facilitate the users | 2 (4.8%) | 3 (7.1%) | 9 (21.4%) | 15 (35.7%) | 13 (31%) |
| **4** | Tracking information | WPT system saving my working time to getting the information | 2 (4.8%) | 3 (7.1%) | 9 (21.4%) | 15 (35.7%) | 13 (31%) |
| | | WPT system can get real time visibility information track work progress when request to review | 2 (4.8%) | 3 (7.1%) | 9 (21.4%) | 15 (35.7%) | 13 (31%) |
| | | Indicate your level of support for the integration of advanced technology like WPT system in tracking construction progress | 0 (0%) | 1 (2.4%) | 12 (28.6%) | 13 (31%) | 16 (38.1%) |

## 4.5 DATA ANALYSIS

Scholars from many fields use SPSS, which stands for "Statistical Package for the Social Sciences," to look at large amounts of complicated statistical data. SPSS will be used to look at the data in this study. the organized use of mathematical and statistical methods to clarify, prove, and summarize. The data should be summed up and judged. Researchers use data analysis to turn large amounts of data into stories that can be looked at from different points of view. Data analysis is a way to break up huge amounts of data into smaller, easier-to-use pieces.

### 4.5.1 REALIBILITY TEST

A researcher developed four categories in the questionnaire, to test the effectiveness of using Work Programme Tracker (WPT). In addition, the questions were on the 5- point Likert Scale with responses ranging from “Strongly disagree” to “Strongly agree”. To determine if the questionnaire could “reliably” measure the latent variable for questionnaire for the effectiveness of WPT. Cronbach alpha test was conducted. The acceptable reliability value is 0.888. Therefore, if the questionnaire’s reliability result is more than 0.80 then the questionnaire is considered good.

Table 4.10 Range of reliability and its coefficient of Cronbach's Alpha

| No | Coefficient of Cronbach's Alpha | Reliability Level |
|---|---|---|
| **1** | > 0.90 | Excellent |
| **2** | 0.80 - 0.89 | Good |
| **3** | 0.70 - 0.79 | Acceptable |
| **4** | 0.60 - 0.69 | Questionable |
| **5** | 0.50 - 0.59 | Poor |
| **6** | < 0.50 | Unacceptable |

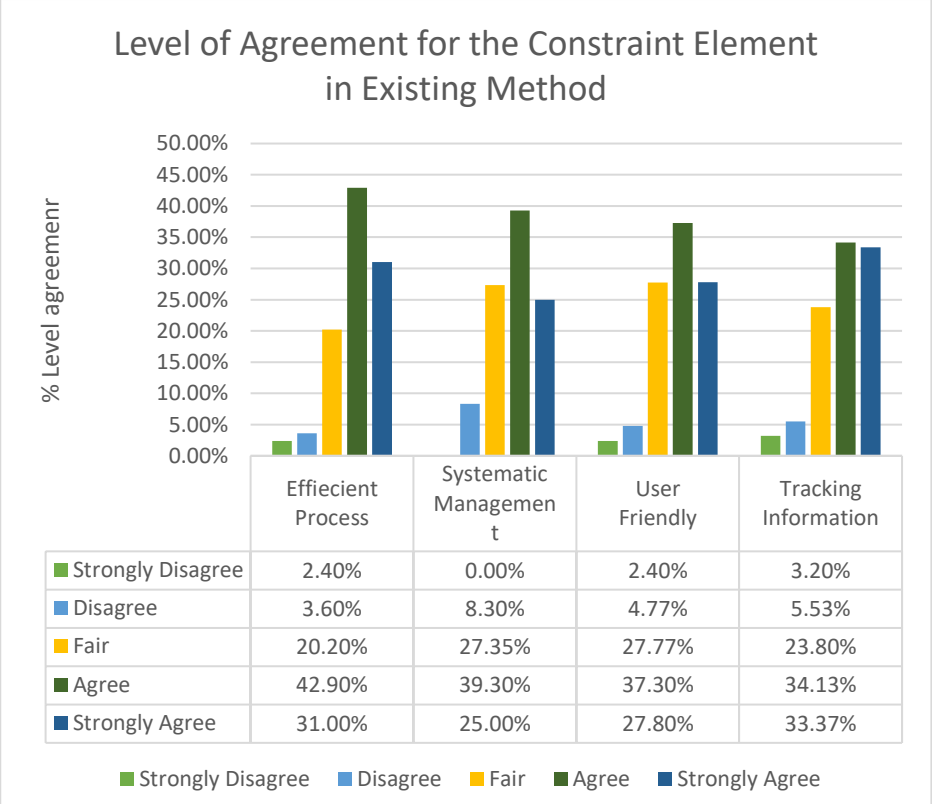
Table 4.11 Reliability test for WPT

| Cronbach’s Alpha | Cronbach’s Alpha Based on Standardized Items | N of Items |
|---|---|---|
| 0.888 | 0.898 | 20 |

### 4.5.2 FREQUENCY ANALYSIS

Frequency analysis is a general analysis method used not just in social measurement research but also in many other scientific domains. Besides, it is a branch of statistics that studies the number of occurrences (frequency) and evaluates metrics such as central tendency, dispersion, percentiles, etc. By using SPSS to get the frequency data. Below is a table of issues related to the existing method and Work Programme Tracker (WPT).

Figure 4.4 and figure 4.5 illustrate the percentage of respondents who used the existing method and implemented the WPT app. According to the percentage, the results indicate that the effectiveness of WPT is more straightforward than the existing method. Frequency analysis is a generic approach to analysis that is used in many scientific disciplines, not just social measurement research. Moreover, it is a statistical branch that investigates the number of occurrences (frequency) and assesses metrics such as central tendency, dispersion, percentiles, and so on. Using Excel Solution to obtain the analysis frequency date. The result as show in Table 4.22 below




| | Effiecient Process | Systematic Management | User Friendly | Tracking Information |
|---|---|---|---|---|
| Strongly Disagree | 2.40% | 0.00% | 2.40% | 3.20% |
| Disagree | 3.60% | 8.30% | 4.77% | 5.53% |
| Fair | 20.20% | 27.35% | 27.77% | 23.80% |
| Agree | 42.90% | 39.30% | 37.30% | 34.13% |
| Strongly Agree | 31.00% | 25.00% | 27.80% | 33.37% |

Figure 4.4: Level Agreement For The Constrain Element Existing Method.

Figure 4.4 and Figure 4.5 illustrate the percentage of respondents who used the existing method and implemented the WPT app. The input from the respondents regarding the concerns connected to the existing method of tracking work progress at the building site, as shown in Figure 3, indicates that 31% strongly agree and 42.9% agree with the efficient process section. For the section on systematic management, 25% strongly agree and 39.3% strongly agree. The user satisfaction with the user-friendly interface is 27.8% strongly agree and 37.3% agree. In the tracking information part, 33.37% strongly agree and 34.13% agree. Based on the respondent's statistics, it may be concluded that the existing method is not very effective. In Figure 4, the input from respondents evaluating the effectiveness of the work programme tracker is displayed. The data shows that 66.70% of respondents highly agree and 31% agree with the efficient process section. The percentage of respondents that strongly agree with the systematic management part is 67.85%, while 28.60% of respondents strongly disagree. The customer satisfaction rate for the user-friendly feature is 65.07% for highly agree, 31.77% for agree. In the tracking information area, 72.20% strongly agree and 25.40% agree. Based on the respondent's statistics, it may be concluded that the current strategy is not very effective. Based on the percentage, the results demonstrate that the efficiency of WPT is more direct compared to the existing method.

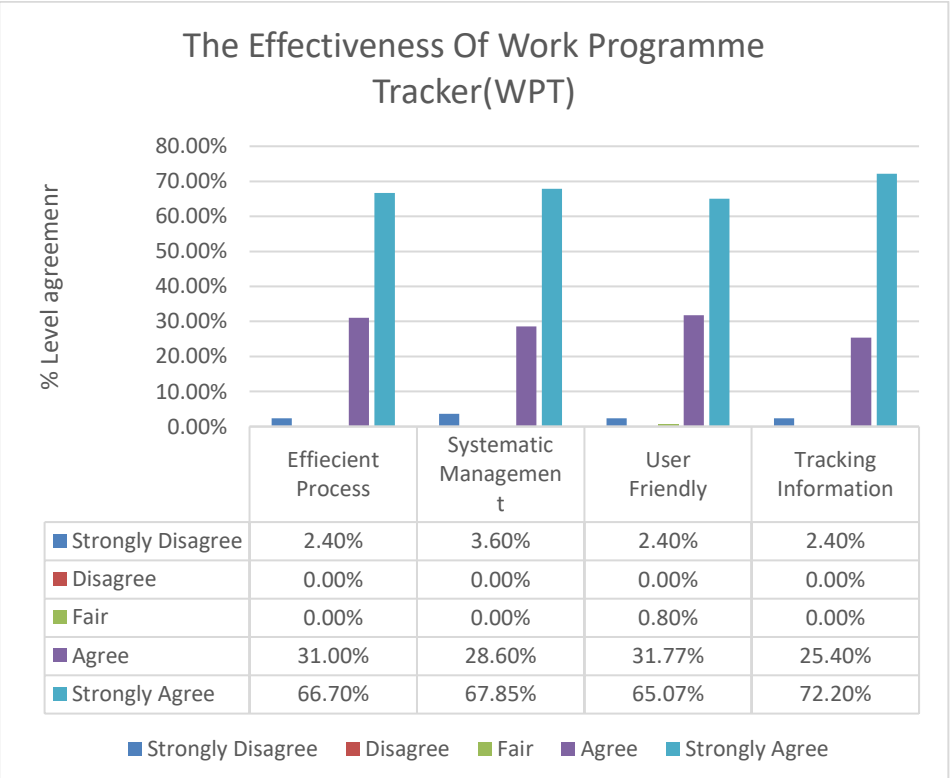



Figure 4.5: The Effectiveness Of Work Programme Tracker (WPT)

### 4.5.3 PAIR SAMPLE T-TEST

A paired sample t test was conducted to assess the effectiveness of WPT in the project. The results displayed in Table 4.12 indicate that respondents showed a preference for using WPT, with a mean score of 4.60 and a standard deviation of 0.71, compared to the existing method which had a mean score of 2.93 and a standard deviation of 0.73. The paired sample t-test revealed a statistically significant difference, with a t-value of 4.06 and a p-value of 0.0003, indicating that the difference is significant at a significance level of $p < 0.05$. Overall, this indicates that applying WPT was significantly more practical and effective in comparison to existing method. This indicates that WPT was more efficient in comparison to the existing method. . The data was generated by using SPSS Software. Based on figure below show that the bar chart of the mean value issues relatedto tracking system on by existing method.as a result showed that majority of respondents not agreed that tracking system on by existing method are effectiveness for all categories above, it was proved due of lower average value.

Table 4.12: Existing Method vs Work Tracking System (WTS) for construction

| Pair | Paired Differences Mean | t | Sig. (2-tailed) |
|---|---|---|---|
| 1.Existing method sometime burden my work progress - 1. WPT system give useful progress to my task | -0.619 | - 3.712 | <.001 |
| 2.Existing method slows down the process for my task - 2. WPT system enables me to accomplish task more quickly | -0.643 | -3.865 | <.001 |
| 3.Existing method hard to find the information about track record work progress - 3. WPT system ease to get the information | -0.738 | - 4.089 | <.001 |
| 4.Existing method is very disorderly and confused to find the information about record item delivery - 4.WPT system systematic and well organized to find the information | -0.786 | -4.042 | <.001 |
| 5.Existing methods produce less productivity to complete the task - 5. WPT system enhance the effectiveness of working performance | -0.762 | -4.239 | <.001 |

| | | | |
|---|---|---|---|
| 6. Existing method not suitable anymore nowadays - 6. WPT system is good idea for increasing the technology usage | -0.595 | - 3.637 | <.001 |
| 7. Existing method not friendly-user and inconvenient for users - 7. WPT system is friendly-user and facilitate the users | -0.857 | -4.341 | <.001 |
| 8.Existing method is difficult and slow to preview required work progress immediately. - 8. WPT system saving my working time to getting the information | -0.833 | -4.547 | <.001 |
| 9. Existing method is easily accessible for urgent requests to search for required tracked work progress data. - 9.WPT system can get real time visibility information track work progress when request to review | -0.833 | -4.547 | <.001 |
| 10. Existing method give low skills working performance - 10. Indicate your level of support for the integration of advanced technology like WPT system in tracking construction progress | -0.619 | - 3.566 | <.001 |

A paired sample t test was carried out in order to determine whether or not the Work Programme Tracker was effective for the project they were working on. According to the findings presented in Table 4.7, respondents recommended the implementation of WPT (mean = 4.60, standard deviation = 0.752) in comparison to the existing approach (mean = 3.871, standard deviation = 0.972). Using a paired sample t-test, it was determined that this difference is statistically significant, with a t-value of -0.729, a p-value of 0.0003, and a p-value of less than 0.05. All of this points to the fact that implementing WPT was much more straightforward and effective than the method that was previously done. This indicates that WPT was more effective in comparison to the method that was previously used.

Table 4.13: Paired samples t-test for dimensions of Existing Method – Work Programme Tracker (WPT) for construction

| **Pair** | **Paired Differences Mean** | **t** | **Sig. (2-tailed)** |
|---|---|---|---|
| **Existing Method – Work Programme Tracker (WPT)** | **-0.729** | **-4.058** | **<.000** |

## 4.6 CONCLUSION

Based on the data analysis, over 50% of the participants expressed agreement with every question. The Work Progress Tracker (WPT) is highly useful for monitoring work progress on site and effectively mitigating communication gaps. It is user-friendly, facilitating easy comprehension and serves as a valuable tool for daily progress updates. According to the study's findings, the deployment of the Work Programme Tracker (WPT) in construction can effectively contribute to the achievement of the third goal. By overseeing the daily operations of a technological system designed to simplify everyday tasks, it enables individuals to allocate their time towards personal development. Moreover, this technology has the potential to be applied across other sectors, with a specific emphasis on the construction industry. Undoubtedly, this particular domain necessitates the utilisation of technology to enhance efficiency, minimise time consumption, and ensure precise data retrieval

# CHAPTER 5

# CONCLUSION AND RECOMMENDATION

## 5.1 INTRODUCTION

This section provides a summary of the findings, conclusions, and suggestions that were derived from the data analysis that was presented in the preceding chapter. At the Kota Elmina construction site, the development of this Work Programme Tracker (WPT) for construction was reviewed and measured to determine the extent of effectiveness. This was accomplished by assessing the way a portion of the research objectives were accomplished. At this point in the chapter, the researcher has to have a suggestion to update the system so that it is significantly more advanced and functional than the project that is going to be carried out. It is also one of the stages that takes place after the project has been completed, and it is during this step that the researcher gives serious consideration to the proposals that will be used during the project. The production of this project is intended to make it easier and more systematic for users to monitor the progress of their job. Work Programme Tracker (WPT) functions as a centralised hub for project milestones, tasks, and deadlines, offering real-time visibility into progress and enabling efficient communication and cooperation among team members. The statement implies that implementing this technology can result in enhanced project management, optimised communication, and heightened overall efficiency.

## 5.2 RECOMMENDATION

As a result of the findings presented above, the researcher would like to make a few recommendations that can serve as a guide or as a follow-up action for the purpose of enhancing the Work Programme Tracker (WPT) for construction. Through the

implementation of the enhancements that have been suggested, WPT will be able to be utilised even when there is no internet connection (offline). It is common knowledge that in order for users to access the programme, they must be connected to the internet.

In addition, this mobile application comes with the capability of downloading and printing documents using a smartphone. According to the feedback provided by users, this programme has the capability of providing files as well as summary works that may be printed using a mobile device. As an additional option, users recommend publishing through Google Play (Android) in order to make it simpler for you to obtain more recent updates. It acts as a guide and can be used as a guideline for initiatives in the future.

Last but not least, additional research for this study can be carried out in the future to enhance WPT throughout time in order to bring content information up to current. Users have expressed their serious desire for this programme to be enhanced in terms of its WPT capability and to be able to continue to be used. The fact that this Work Programme Tracker (WPT) for construction application is able to launch the daily work of users in tracking daily progress on the site is demonstrated by this.

## 5.3 CONCLUSION

Ultimately, the primary objective of the research is to facilitate the monitoring of building progress using a master work programme. Additionally, it aims to mitigate the issues that result from insufficient communication. Based on the findings of the analytical survey, most participants face difficulties in monitoring their job progress, particularly when relying on conventional methods such as tracking work progress using social media platforms like WhatsApp. Employees express dissatisfaction with this approach due to its lack of suitability and lack of organization. The initial objective, which was to establish the list of document job details to be employed in construction, has been successfully accomplished. Once the problem has been clearly defined, the study's second purpose is to create and develop a Work Programme Tracker (WPT) specifically designed for the construction industry. To evaluate

feedback on the efficiency of the system in tracking tasks, anticipate the delivery of validation surveys as part of the final goal. The findings indicate that respondents strongly believe that the monitoring progress of Kota Elmina may be effectively controlled by the utilization of the Work Programme Tracker (WPT) for construction. WPT facilitates on-site progress monitoring for daily updates and can mitigate communication disruptions. Due to user satisfaction with its user-friendly interface for work tracking, the usage of WPT has been recommended for implementation at the Kota Elmina location.

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# APPENDIX-A

## GANTT CHART

| NO | WORK DESCRIPTION | SEPTEMBER | | | OCTOBER | | | | | NOVEMBER | | | | DECEMBER | | | | JANUARY | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11 | W12 | W13 | W14 | W15 | W16 | W17 | W18 | W19 | W20 |
| | | 11/09/2023 - 16/09/2023 | 18/09/2023 – 23/09/2023 | 25/09/2023 – 30/09/2023 | 02/10/2023 – 07/10/2023 | 09/10/2023 – 14/10/2023 | 16/10/2023 – 21/10/2023 | 23/10/2023 – 28/10/2023 | 30/10/2023 – 04/11/2023 | 06/11/2023 – 11/11/2023 | 13/11/2023 – 18/11/2023 | 20/11/2022 – 25/11/2023 | 27/11/2023 – 02/12/2023 | 04/12/2023 – 09/12/2023 | 11/12/2023 – 16/12/202 | 18/12/2023 – 23/12/2023 | 25/12/2023 – 30/12/2023 | 01/01/2024 – 06/01/2024 | 08/01/2024 – 13/01/2024 | 15/01/2024 – 20/01/2024 | 22/01/2024 – 27/01/2024 |
| 1 | **WBL REGISTRATION AND RESEARCH AT WORK PLACE (INDUSTRY)** | | | | | | | | | | | | | | | | | | | | |
| 2 | **RESEARCH INTRODUCTION** | | | | | | | | | | | | | | | | | | | | |
| 2.1 | Definition of Research | | | | | | | | | | | | | | | | | | | | |
| 2.2 | Epistemology from various perspective. | | | | | | | | | | | | | | | | | | | | |
| 2.2 | Get an idea from the Department Workkplace | | | | | | | | | | | | | | | | | | | | |
| 3 | **RESEARCH TOPIC** | | | | | | | | | | | | | | | | | | | | |
| 3.1 | Investigate and Observe the issues | | | | | | | | | | | | | | | | | | | | |
| 3.2 | Identify the Topic and discuss with Supervisor | | | | | | | | | | | | | | | | | | | | |
| 4 | **RESEARCH FRAME WORK** | | | | | | | | | | | | | | | | | | | | |
| 4.1 | Identify the problem statement arise in exsiting method | | | | | | | | | | | | | | | | | | | | |
| 4.2 | Set the objectives and the aim | | | | | | | | | | | | | | | | | | | | |
| 4.3 | Literature Review | | | | | | | | | | | | | | | | | | | | |
| 4.4 | Research Methodology | | | | | | | | | | | | | | | | | | | | |
| 4.5 | Research Design | | | | | | | | | | | | | | | | | | | | |
| 5 | **OBSERVATION 1** | | | | | | | | | | | | | | | | | | | | |
| 6 | **RESEARCH PROPOSAL** | | | | | | | | | | | | | | | | | | | | |
| 6.1 | Draft of Chapter 1: Introduction | | | | | | | | | | | | | | | | | | | | |
| 6.2 | Draft Chapter 2: Literature Review | | | | | | | | | | | | | | | | | | | | |
| 6.3 | Draft of Chapter 3 : Methodology | | | | | | | | | | | | | | | | | | | | |
| 6.4 | Submission of Chapter 1,2 & 3 Draft | | | | | | | | | | | | | | | | | | | | |
| 6.5 | Editing of Proposal | | | | | | | | | | | | | | | | | | | | |
| 7 | **PROPOSAL PRESENTATION (Slide preparation for proposal Presentation)** | | | | | | | | | | | | | | | | | | | | |
| 8 | **PROPOSAL PRESENTATION** | | | | | | | | | | | | | | | | | | | | |
| 9 | **PROPOSAL FINAL EDITING (Final editing of Proposal)** | | | | | | | | | | | | | | | | | | | | |
| 10 | **OBSERVATION 2** | | | | | | | | | | | | | | | | | | | | |
| 11 | **SUBMISSION OF FINAL PROPOSAL** | | | | | | | | | | | | | | | | | | | | |
| 12 | **FINAL EVALUATION & KEY IN PROCESS OF MARKS** | | | | | | | | | | | | | | | | | | | | |

Legend:
Progress of Work
Actual Progress

| NO | WORK DESCRIPTION | FEBRUARY | | | MARCH | | | | | APRIL | | | | MAY | | | | JUNE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11 | W12 | W13 | W14 | W15 | W16 | W17 | W18 | W19 | W20 |
| | | 29/01/2024 - 03/02/2024 | 05/02/2024 – 10/02/2024 | 12/02/2024 – 17/02/2024 | 19/02/2024 – 24/02/2024 | 26/02/2024 – 02/03/2024 | 04/03/2024 – 09/03/2024 | 11/03/2024 – 16/03/2024 | 18/03/2024 – 23/03/2024 | 25/03/2024 – 30/03/2024 | 01/04/2024 – 06/04/2024 | 08/04/2024 – 13/04/2024 | 15/04/2024 – 20/04/2024 | 22/04/2024 – 27/04/2024 | 29/04/2024 – 04/05/2024 | 06/05/2024 – 11/05/2024 | 13/05/2024 – 18/05/2024 | 20/05/2024 – 25/05/2024 | 27/05/2024 – 01/06/2024 | 03/06/2024 – 08/06/2024 | 10/06/2024 – 15/06/2024 |
| 1 | **WBL REGISTRATION AND RESEARCH AT WORK PLACE (INDUSTRY)** | | | | | | | | | | | | | | | | | | | | |
| 1.1 | Submission Appendix B1 and B2 to PUO | | | | | | | | | | | | | | | | | | | | |
| 1.2 | Preparation of Data Collection. | | | | | | | | | | | | | | | | | | | | |
| 2 | **PREPARATION FOR DATA COLLECTION** | | | | | | | | | | | | | | | | | | | | |
| 2.1 | Resources identification and selection. | | | | | | | | | | | | | | | | | | | | |
| 3 | **PROJECT IMPLEMENTATION AND DEVELOPMENT** | | | | | | | | | | | | | | | | | | | | |
| 3.1 | Data Collection | | | | | | | | | | | | | | | | | | | | |
| 3.2 | Product Development | | | | | | | | | | | | | | | | | | | | |
| 3.3 | Test run the project | | | | | | | | | | | | | | | | | | | | |
| 4 | **RESULTS AND ANALYSIS** | | | | | | | | | | | | | | | | | | | | |
| 4.1 | Interpret the results | | | | | | | | | | | | | | | | | | | | |
| 4.2 | State and summarize all the results | | | | | | | | | | | | | | | | | | | | |
| 5 | **REPORT WRITING** | | | | | | | | | | | | | | | | | | | | |
| 5.1 | Continuation on the writing of final report. | | | | | | | | | | | | | | | | | | | | |
| 5.2 | Preparation For Final Year Project Dissertation | | | | | | | | | | | | | | | | | | | | |
| 5.3 | Presentation at industry | | | | | | | | | | | | | | | | | | | | |
| 6 | **PREPARATION FOR FINAL YEAR PROJECT DISSERTATION AND PRESENTATION AT PUO** | | | | | | | | | | | | | | | | | | | | |
| 8 | **FYP PRESENTATION** | | | | | | | | | | | | | | | | | | | | |
| 9 | **PRESENTATION WITH INSUDTRIAL PANELS** | | | | | | | | | | | | | | | | | | | | |
| 10 | **FINAL REPORT SUBMISSION** | | | | | | | | | | | | | | | | | | | | |

Legend:

- Progress of Work
- Actual Progress

# APPENDIX-B

PRE-QUESTIONAIRE

**CIVIL ENGINEERING DEPARTMENT**
**UNGKU OMAR POLYTECHNIC**
**SURVEY FOR FOR FINAL YEAR PROJECT**
**BCT 80318- FINAL YEAR PROJECT**
**THE INNOVATION OF MASTER WORK PROGRAMME TRACKER (WPT) IN CONSTRUCTION REVOLUTION**

**Questionnaire Research: The Respondent Point of View Regarding the Issues Related to Master Work Programme tracking at the construction site**

A part of my study of Final Yer Project for Bachelor of Cil Engineering Technology (BCT) Polytehchnic Ungku Omar (PUO),Ipoh,Perak, I am Muhammad Zuhaier Bin Ismail (01BCT21F3013) conducting a survey to determine the effectiveness of the current approach for tracking work at a construction site

**SECTION A : BACKGROUND AND GENERAL INFORMATION**

**Instructions: Please fill ( / ) in the box**

1. Gender:
   [ ] Male [ ] Female
2. Age :
   [ ] 13 -20 year
   [ ] 21 – 34 year [ ] 35 - 50 year and above
   [ ] 51 – 64 year [ ] 65 year and above
3. Race : Malay [ ] Chinese [ ] Indian [ ] Others (please state)[4]: .....
4. Working Experience
   [ ] < 2 years [ ] >10 years
   [ ] 2 – 5 years
   [ ] 6 – 10 years
5. Position :

| NO. | POSITION | ( / ) |
|---|---|---|
| 1. | Project Manager | |
| 2. | Project Coordinator | |
| 3. | Engineer/Architecture | |
| 4. | Site Supervisor | |
| 5. | Planner | |
| 6. | Superintendent | |
| 7. | Others | |

## SECTION B

**Instructions: Please fill ( / ) in the box**

| No. | Survey To Identify Effectiveness Of Existing Method On Tracking Work Progress At A Construction Site. | Strongly Disagree | Disagree | Fair | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1. | Existing method sometime burden my work progress | | | | | |
| 2. | Existing method slows down the process for my task | | | | | |
| 3. | Existing method hard to find the information about track record work progress | | | | | |
| 4. | Existing method is very disorderly and confused to find the information about record item delivery | | | | | |
| 5. | Existing method produce less productivity to complete the task | | | | | |
| 6. | Existing method not suitable anymore nowadays | | | | | |
| 7. | Existing method not friendly-user and inconvenient for users | | | | | |
| 8. | Existing method is difficult and slow to preview required work progress immediately. | | | | | |
| 9. | Existing method is easily accessible for urgent requests to search for required tracked work progress data. | | | | | |
| 10. | Existing method give low skills working performance | | | | | |

***END QUESTIONS / THANK YOU***

POST-QUESTIONAIRE

**CIVIL ENGINEERING DEPARTMENT**
**UNGKU OMAR POLYTECHNIC**
**SURVEY FOR FOR FINAL YEAR PROJECT**
**BCT 80318- FINAL YEAR PROJECT**
**THE INNOVATION OF MASTER WORK PROGRAMME TRACKER (WPT) IN CONSTRUCTION REVOLUTION**

**Questionnaire Research: The Respondent Point of View Regarding the Issues Related to Master Work Programme tracking at the construction site**

A part of my study of Final Yer Project for Bachelor of Cil Engineering Technology (BCT) Polytehchnic Ungku Omar (PUO),Ipoh,Perak, I am Muhammad Zuhaier Bin Ismail (01BCT21F3013) conducting a survey to determine the effectiveness of the current approach for tracking work at a construction site

**SECTION A : BACKGROUND AND GENERAL INFORMATION**

**Instructions: Please fill ( / ) in the box**

1. Gender:
   [ ] Male [ ] Female
2. Age :
   [ ] 13 -20 year
   [ ] 21 – 34 year [ ] 35 - 50 year and above
   [ ] 51 – 64 year [ ] 65 year and above
3. Race : Malay [ ] Chinese [ ] Indian [ ] Others (please state)[4]: .....
4. Working Experience
   [ ] < 2 years [ ] >10 years
   [ ] 2 – 5 years
   [ ] 6 – 10 years
5. Position :

| NO. | POSITION | ( / ) |
|---|---|---|
| 1. | Project Manager | |
| 2. | Project Coordinator | |
| 3. | Engineer/Architecture | |
| 4. | Site Supervisor | |
| 5. | Planner | |
| 6. | Superintendent | |
| 7. | Others | |

## SECTION B

**Instructions: Please fill ( / ) in the box**

| No. | Effectiveness of using the Work Programme Tracker system (WPT)) for Construction | Strongly Disagree | Disagree | Fair | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1. | WPT system give useful progress to my task | | | | | |
| 2. | WPT system enables me to accomplish task more quickly | | | | | |
| 3. | WPT system ease to get the information | | | | | |
| 4. | WPT system systematic and well organized to find the information | | | | | |
| 5. | WPT system enhance the effectiveness of working performance | | | | | |
| 6. | WPT system is good idea for increasing the technology usage | | | | | |
| 7. | WPT system is friendly-user and facilitate the users | | | | | |
| 8. | WPT system saving my working time to getting the information | | | | | |
| 9. | WPT system can get real time visibility information track work progress when request to review | | | | | |
| 10. | Indicate your level of support for the integration of advanced technology like WPT system in tracking construction progress | | | | | |

***END QUESTIONS / THANK YOU***