POLITEKNIK UNGKU OMAR

DEVELOPMENT OF SITE CONSTRUCTION MONITORING SYSTEM USING PREPROCESSOR HYPERTEXT (PHP)

MUHAMMAD HAFIZ BIN SHAHRIL

(01BCT20F3022)

CIVIL ENGINEERING DEPARTMENT

SESSION 2 2022/2023

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A report submitted in partial fulfillment of the requirements for the award of Bachelor in Civil Engineering Technology with Honors

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SESSION 2 2022/2023

DECLARATION OF ORIGINAL AND OWNERSHIP

TITLE: DEVELOPMENT OF SITE CONSTRUCTION MONITORING SYSTEM USING PREPROCESSOR HYPERTEXT (PHP)

1. MUHAMMAD HAFIZ BIN SHAHRIL (01BCT20F3022)

1. We, are students in the final year of our **Degree in Civil Engineering Technology, Civil Engineering Department, Politeknik Ungku Omar**

2. We acknowledge that 'The above project' and the intellectual property contained therein are the work of our original work/invention without taking

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(IC Num: 980521-08-5553) MUHAMMAD HAFIZ BIN SHAHRIL

In front of me, SUPERVISOR NAME

As project supervisor on the date ....

TS. DR RUFAIZAL BIN CHE MAMAT

APPRECIATION

I would like to express my heartfelt gratitude to Allah SWT for His guidance and blessings, enabling me to successfully complete this report titled "Development of Site Construction Monitoring System Using Preprocessor Hypertext (PHP)."

I am deeply thankful to my family and friends for their unwavering support and encouragement throughout this journey. Their belief in me and their sacrifices have been instrumental in my achievements, and I am truly blessed to have such a loving and supportive network.

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ABSTRACT

Construction progress monitoring is a critical task in construction projects, and the adoption of Internet of Things (IoT) technology has significantly enhanced project management and monitoring. This study focuses on developing an application using Hypertext Preprocessor (PHP) and a MySQL database for real-time project monitoring. The application aims to address management issues by providing efficient tracking of tasks and machinery on construction sites. By leveraging IoT, sensors, and real-time data collection, the application offers accurate progress tracking, resource management, issue resolution, communication, and collaboration capabilities. The study investigates the implementation and impact of the PHP and MySQL-based applications in improving project outcomes and stakeholder collaboration. The scope of the study includes the Warehouse Bukit Raja project site in Klang, Selangor. The analysis of the application's performance, compared to existing methods, shows significant improvements in variables such as potential usefulness, perceived ease of use, attitude toward technology, behavioral intent, and general assessment. The study highlights the benefits of utilizing PHP and MySQL for developing construction monitoring applications.

Keywords: construction progress monitoring, Internet of Things (IoT), PHP, MySQL database, application testing, t-tests, ANOVA, project management.

ABSTRAK

Pemantauan kemajuan pembinaan adalah tugas kritikal dalam projek pembinaan, dan penggunaan teknologi Internet of Things (IoT) telah meningkatkan pengurusan dan pemantauan projek dengan ketara. Kajian ini memberi tumpuan kepada pembangunan aplikasi menggunakan Hypertext Preprocessor (PHP) dan pangkalan data MySQL untuk pemantauan projek masa nyata. Aplikasi ini bertujuan untuk menangani isu pengurusan dengan menyediakan pengesanan tugas dan jentera yang cekap di tapak pembinaan. Dengan memanfaatkan IoT, penderia dan pengumpulan data masa nyata, aplikasi ini menawarkan penjejakan kemajuan yang tepat, pengurusan sumber, penyelesaian isu, komunikasi dan keupayaan kerjasama. Kajian ini menyiasat pelaksanaan dan impak aplikasi berasaskan PHP dan MySQL dalam meningkatkan hasil projek dan kerjasama pihak berkepentingan. Skop kajian merangkumi tapak projek Gudang Bukit Raja di Klang, Selangor. Analisis prestasi aplikasi, berbanding kaedah sedia ada, menunjukkan peningkatan yang ketara dalam pembolehubah seperti potensi kegunaan, persepsi kemudahan penggunaan, sikap terhadap teknologi, niat tingkah laku dan penilaian umum. Kajian ini menyerlahkan faedah menggunakan PHP dan MySQL untuk membangunkan aplikasi pemantauan pembinaan.

Kata kunci: pemantauan kemajuan pembinaan, Internet of Things (IoT), PHP, pangkalan data MySQL, ujian aplikasi, ujian-t, ANOVA, pengurusan projek.

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LIST OF ABBREVIATION

PHP	Hypertext Preprocessor
IoT	Internet of Things
GPS	Global Positioning System
TAM	Technology Acceptance Model
HTML	Hyper Text Markup Language
SPSS	Statistical Package for the Social Sciences
ANOVA	Analysis of Variance

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Construction progress monitoring can be regarded as an ongoing, key task in construction processes (Golparvar-Fard et al., 2011; Yang et al., 2015). It involves periodic measurement of the actual progress of a project and its comparison with expected progress (Hwang et al., 2013). Accurate and efficient capture, analysis, and visualization of the as-built status of projects are critical tasks of successful project progress monitoring. Progress monitoring is considered as one of the most challenging tasks due to the complexity of goals and the interdependency of activities. Technological revolution is always moving parallel with the latest innovations to make human life easier in terms of managing their work and lifestyle. The adoption of Internet of Things (IoT) technology has provided many benefits to humans and to various industries, including the construction industry (Maskuriy, Selamat, Ali, Maresova, & Krejcar, 2019). By adopting the IoT in the construction industry, project managers and project teams are able to manage and monitor the whole project construction progress more effectively through the digitalisation system (Nagy et al., 2018). The IoT is the network of physical objects supported by embedded technology for data communication and sensors to interact with both internal and external objects states and the environment (Haghi et al. 2017). According to (Hiremath et al. 2014), the concept of IoT provides a solid framework for interconnecting edge computing devices—wearable sensors and smartphones—and cloud computing platforms for seamless interactions. It merges the virtual world and the physical world by bringing different concepts and technical components together: pervasive networks, miniaturization of devices, mobile communication, and new ecosystem (Chen et al. 2014). Existing studies indicate that the

adoption of WSDs based on IoT infrastructure has the potential to enhance worker safety through an efficient data collection, analysis, and provision of real-time information about safety and health risks to personnel (Bonato 2009; Ananthanarayan and Siek 2010; Nath et al., 2017; Awolusi et al. 2018).

Theoretically, IOT comprises four different layers, which are application layer, perception layer, network layer and physical layer. The application layer refers to common practices such as smart cities, smart transport, and intelligent homes; however, the perception layer refers to technologies such as sensors and devices, which communicate with other objects. The network layer refers to the network communication and the component of network coverage. The physical layer refers to the hardware including smart appliances and other devices (Kumar et al., 2016) There are many advantages for using IoT in the construction sector. These consist of a better execution monitoring, effective controlling, better quality, cost and timesaving. It has also been expanded to be used in making fast decision making because of the availability of real-time data analytics (Ning and Xu, 2010; Gubbi et al., 2013; Dave et al., 2016). In addition, it improves the crisis management and emergency responses by introducing efficient monitoring of the structure (Zhao et al., 2013). The IoT technology can be used in environmental-related aspects such as waste management, pond pollution and flood concentration analysis (Wei and Li, 2011). The introduction of the new technology is associated with multiple challenges, which are categorized into three main parts such as the method of introduction, lack of acceptance and lack of knowledge and expertise (Bari et al., 2013; Matharu et al., 2014).

The report contains five chapters, chapter 1, for introduction that will explain or describe the beginning of the chapter, such as the problem statement, objective, scope of the study, significance of the study, expected outcome, and conclusion. Besides, chapter 2 is a literature review that will explain the study that has a connection with this project. Meanwhile, chapter 3 is a methodology that contains the method used when ongoing this study. Chapter 4 will describe the result of this project, and Chapter 5 will explain the discussion, conclusion, and suggestion. Chapter 1 will be focusing on solving the problem or issues in the construction site, especially regarding the management issues in the area.

This study will focus on installing the mast in railways construction due to the issues detected in the company. The issues that had been seen are the inefficient way to monitor the site in terms of tasks and machinery. The issues will be solved by creating an application to key in task information and machinery location to fully mobilize the machine, by using this application, it will make the engineer, and supervisor's work easier.

1.2 PROBLEM STATEMENT

Project Management, in project management, the primary key indicators for project success are time, cost, quality and the scope of the project (Ilies, Crisan, & Muresan, 2010; Project Management Institute, 2017). Previously, most of the projects are facing problems with those key indicators in completing a project within the time provided with a limited budget because they do not have efficient management at that time (Ahmad Latiffi, Fathi, & Brahim, 2014). However, with the IoT application, project management becomes more manageable by monitoring the whole project progress digitally using the visualization of the 3D model (Barati, Charehzehi, & Preece, 2013). The digitalization of 3D model assists the project management to utilise the project resources, monitor the vehicle equipment, tracking the project progress, earlier detecting the error and clash, real-time reporting, manage the project scheduling and the cost in an efficient way (Enegbuma, Aliagha, & Ali, 2014; Moreno, Olbina, & Issa, 2019; Boje et al., 2020). Failure to manage issues, which transmit crucial observations, may result in delays, quality difficulties, or even the total loss of the software project. Various project stakeholders, such as project managers, developers, and even end-users, utilise issue trackers jointly (Mikko, 2021). The integration of IoT applications in project management has the potential to enhance the key indicators of project success, namely time, cost, quality, and scope. Traditional project management approaches often struggle to meet project deadlines and budgets due to inefficient management practices. However, with the digitalization of 3D models and the utilization of IoT technologies, project managers can effectively monitor project progress, optimize resource allocation, track equipment, detect errors and clashes in real-time, generate comprehensive reports, and efficiently manage project scheduling and costs. Failure to effectively manage project issues and observations can lead to delays, quality issues, and even project failure. Therefore, it is crucial to investigate the implementation and impact of

IoT-based project management systems, specifically the utilization of issue trackers, on improving project outcomes and stakeholder collaboration.

Effective site monitoring is a critical aspect of construction projects, ensuring smooth project development and maintaining a well-regulated construction site environment. According to (Ibrahim et al., 2021), site monitoring is an important aspect of the construction process to ensure that the project development and the construction site environment are both smooth and on track at all times. The tracking of human (track worker) and machine (track machinery) activity on a construction site is divided into two components (Boje, et al., 2020). The 7 usages of IoT for monitoring is to aid the project team in remaining on track and automatically recording the vast volume and variety of data that cannot be handled manually by the project team during the whole project lifecycle. Additionally, data from human tracking and machines is recorded via IoT employing GPS, RFID, sensors, and drones. The project team may access the data from these devices via mobile, tablet, and computer, which is helpful in managing the project's time and cost at each step of development, as well as refining the monitoring system to be more effective and efficient (Boje, et al., 2020). Monitoring machine tracking and work progress is a critical aspect of construction projects, enabling effective project management and ensuring timely completion. Traditional methods of tracking machine activities and monitoring work progress often rely on manual processes, which can be time-consuming and prone to errors. However, the integration of Internet of Things (IoT) technologies offers the potential to automate and enhance machine tracking and work progress monitoring through the utilization of sensors, GPS, and real-time data collection. By leveraging IoT solutions, project managers can have real-time visibility into machine operations, track work progress accurately, and make data-driven decisions to optimize resource allocation and project timelines. However, there is a need to investigate the implementation and impact of IoT-based machine tracking and work progress monitoring systems in construction projects, specifically focusing on their effectiveness, efficiency, and contribution to overall project success.

1.3 OBJECTIVE

This study aims to develop an application regarding monitoring that can solve the stated in the problem statement:

i. To identify need assessments for monitoring projects in real-time.
ii. To measure the effectiveness of the application by using T-test and ANOVA one-way.

By implementing a comprehensive and efficient construction monitoring system, construction professionals can improve the overall performance and success of their projects.

1.4 HYPOTHESIS

the hypothesis for the one-way ANOVA analysis can be summarized as follows: The null hypothesis (H_0) states that there is no significant difference among the means of the groups being compared, while the alternative hypothesis (H_1) suggests that there is a significant difference among the means of the groups. This hypothesis serves as the basis for the ANOVA analysis, which aims to investigate whether there are notable variations in the effectiveness of different groups. By testing this hypothesis, the analysis will provide insights into whether the PHP Application and the Existing Method significantly differ in terms of their effectiveness, helping to determine the superiority or inferiority of the PHP Application in comparison to the existing approach.

1.5 SCOPE OF STUDY

The scope of the study for this project is in the project site Warehouse Bukit Raja, Klang, Selangor as shown in Figure 1. It focuses on monitoring the work and finally reports the work progress. Besides, the application is designed to be used on mobile devices such as smartphones or tablets. These apps are typically used by construction managers, supervisors, or other personnel to track and monitor a construction project, such as project progress.

Figure 1.1 3D Module by BIM.

1.6 SIGNIFICANCE OF STUDY

The findings of this study will give benefit site management. This application is an excellent way for monitoring site construction. It will make it easier to track the progress. Consequently, the company that uses the recommended method based on the findings of this study will be successful, and its operations will be smooth and straightforward. Apart from that, this application is user-friendly because it is simple to operate and transport. The concept of daily site monitoring was born out of a desire to improve technological applications in building projects. The technology utilized by the firm already makes it easier for the user. Still, the researcher believes that using the application of digitalization tools listed in software makes the management process much more manageable. The application is produced to make work much easier for all departments and users.

1.7 EXPECTED OUTCOME

At the end of this study are expected to develop an application that makes tasks or jobs easier for site engineers, site supervisors, and planner engineers. The application will function to monitor the progress of the site project. This application serves as a data-gathering tool. It is used by users such as site engineers and contractors to enter data. Application systems can help to streamline many of the processes involved in construction, from project planning and scheduling to machinery controlling. This can lead to significant

time and cost savings. Also, can help to improve productivity in a construction project, from the owner and architect to the general contractor and subcontractors. This can help to avoid delays and misunderstandings, and ultimately lead to a better finished product.

In addition to these specific outcomes, the use of application systems in construction can also lead to a number of other benefits, such as improved quality, increased productivity, and enhanced customer satisfaction.

1.8 SUMMARY

In conclusion, this chapter explains about introduction including the problem statement, the objective, the scope of the study, the significance of the research, and the expected outcome. The prior of this chapter was discuss the survey which introduces the early stage of the study. From this chapter, it is clear that the problem or issues detected are regarding site monitoring. The point is about the construction monitoring system which is difficult and not efficient. From the issue, this study has three aims: to identify problems in monitoring projects in real-time, and validate the effectiveness of the application by using ANOVA one-way, and T-test. The scope of the research is at the area of the construction site of Orangebeam Construction Sdn Bhd located at Bandar Bukit Raja, Klang, Selangor. This project is about the development of an application. This application is an excellent way to distribute and share information on progress in detail for monitoring purposes. It is expected to develop an application that makes tasks or jobs easier for site engineers, and site supervisors Besides, to avoid any miscommunication of information regarding site information. This application is not only sustainable, but it also continues to introduce IR 4.0 to companies and allows them to practice utilizing the Internet of Things.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will cover regarding the Internet of Things, management, construction, sustainable development goals, sustainable construction, technology, industrial revolution 4.0, environmental issues, and green material implementation which are all of these related to the project. All of these parts have their own sub-content that is more specific to the studies.

2.2 INTERNET OF THINGS (IoT)

Over the past two decades, the general practice in the building industry has seen a significant shift from manual to computer-supported techniques for knowledge processing. This chapter will focus on the ideas and theories of ongoing learning. In addition, this chapter will include background information on project monitoring technologies. The collection of pertinent information is crucial for producing high-quality writing. Both print and electronic mediums are available for getting the information. Print media sources include books, journals, articles, reports, and news on current events; electronic media sources include websites on the internet.

IOT has been extensively applied in different fields such as consumers, commercial and infrastructure (Yan-lin, 2010; Perera et al., 2015). In the construction sector, it is difficult to adopt and embrace new technology because of the complexity of construction projects and the high risks of failure, which constrains the application. Despite all these

difficulties, IOT has been used in the construction industry, and one of the leading applications are JEDT monitoring and controlling of project executions in a different type of projects such as bridges, railways, tunnels, onshore and offshore facilities (Zhong et al., 2017).

Further, it has been used to monitor building performance during disasters, real-time safety warnings and risk detections (Ding et al., 2013). (Chandanshive et al., 2017) investigated the wide range of IOT applications in construction, which includes the design of smart cities, smart dwelling and smart transportation. The BIM Engineering US (2018) highlighted the most widespread applications of IoT in the construction industry as follows:

Table 2.1 Widespread Applications of IoT in the construction industry

Preventive Maintenance	This is important machinery on site where any breakdown is monitored by the embedded system and sensor in the machine to report any need for a fix that requires maintenance.
Reduction of Admin Expenditure	By offering a data-driven choice that helps to produce accurate forecasts whereby the data are used to make fast and precise decisions.
Real-Time Monitoring and Observation	The information attained from sensors and embedded systems can be used to monitor the process of construction and that also helps to produce an accurate decision.
Construction Management	IOT helps to avoid downtime and helps to provide advanced communication with all things such as materials and trucks by helping decision makers to cut back the

	cost overrun that incurred because of the excessive use of materials and machinery.
Human Resource Monitoring	IOT helps to track the labor hours estimated for any particular assignment.
Safety on Site	IOT helps to track labor on site and monitor their mobility which helps to detect any hazard that might occur

2.3 MANAGEMENT

Workplaces rely on the leadership abilities of persons in positions of authority. Managers must interact with more senior professionals in their firm in addition to guiding personnel to guarantee that the team fulfils objectives and advances the company's purpose (Colquhoun, 2019). Although managers' tasks vary depending on their business and workplace, they always have the same core obligations. The organisation and administration of tasks to attain a goal is referred to as management (Senior & Halpin, 2018). Setting the organization's strategy and organising employee efforts to achieve these goals via the use of available resources are examples of administrative activities. The seniority structure of employees inside a company is sometimes referred to as management. Management is really importance in company to make sure the productivity of the works increases. There is many importance of managements in company such as: -

i. Helps in achieving group goals

ii. Optimum utilization of resources

iii. Reduces costs

iv. Establishes sound organization

There are lots of advantages if the company perform a good performance in management work. That is why the important role in management is project management.

2.3.1 Project Management

Project management is the use of procedures, techniques, skills, knowledge, and experience to meet particular project goals within agreed-upon boundaries while adhering to project acceptance criteria (Valence, 2020). Final outputs are bound by a certain timeframe and budget in project management. The fact that project management has a final outcome and a fixed timeframe, as opposed to management, which is a continuous activity, is a significant aspect that separates it from just ‘management.' As a result, a project manager needs a diverse set of abilities, including technical expertise, as well as people management and commercial acumen. A project manager (PM) who is worth his or her weight in gold is at the heart of each successful project. While some individuals believe 15 that a project manager's main responsibility is to remind everyone of deadlines and schedule status meetings, this is simply not true. The five stages of project management, as defined by the Project Management Institute (PMI), are conception and initiation, planning, execution, performance/monitoring, and project closure. PMI is the world's biggest nonprofit membership group for project managers, having been founded in 1969. It has established project, programme, and portfolio management standards, as well as providing training and certifications. The Project Management Professional (PMP) certification is the association's gold level of certification. For various forms of project management, there are seven more qualifications available. "Project management is the application of knowledge, skills, tools, and procedures to a wide variety of activities in order to achieve the needs of a specific project," according to PMI. Project management is divided into five stages, and although the lifespan gives a high-level overview of the project, the phases serve as a plan for completing it. Figure 2.3 below shows 5 phases of project management.

Figure 2.1 5 Phases of Project Management (Source: smartsheet.com)

Besides project management, another role that is important to have good management, especially in construction in construction management.

2.3.2 Construction Management

Construction projects are growing more complicated, and traditional management systems have reached a stalemate (Nkolika J. Pete, 2020). The difficulty may be traced back to the intricacy of designs, which need involvement from several vendors and contractors. This has resulted in fragmentation, with suppliers/contractors specializing in a certain project and being hired to supply just what they know. Construction management is a professional service that ensures that a project's time, cost, quality, safety, scope, and function are all managed effectively by the project's owner(s). All project delivery techniques are compatible with construction management. A Construction Manager's (CM) obligation is to the owner and to a successful project, regardless of the context. A capital project is made up of three parties (excluding the CM) at its core:

i. The project's owner, who commissions the work and either funds it directly or via a number of mechanisms.

ii. The architect/engineer who is in charge of the project's design.

iii. The general contractor is in charge of day-to-day operations and subcontractor management.

The CM represents the owner's interests and oversees the whole project on the owner's behalf. His/her mission is to collaborate with all stakeholders to complete the project on schedule, on budget, and to the owner's expectations for quality, scope, and function. CMs are uniquely qualified to work with the owner, architect, general contractor, and other stakeholders to determine the best possible sequence of construction operations and develop a detailed schedule and budget, as well as establish plans for project safety and security and assist the owner in risk management, thanks to their combined education and experience. This necessitates the use of project management information systems (PMISs), complicated planning approaches such as the critical path method, and an understanding of building procedures. From start to finish, construction management involves the complete planning, coordination, and control of a construction project. The goals of project management are to deliver a project that satisfies the needs of the customer on time and on budget, with acceptable risk, quality, and safety. Project managers often earn their jobs by demonstrating effective management of similar-value initiatives. The development of 17 teamwork is critical to their project management success. As a consequence, the structure is of great quality, with a steady and harmonious evolution. As a result of good construction workers, mismanagement of building materials, project site untidiness, and construction flaws are avoided, resulting in a reduction in the project’s overall cost.

2.4 CONSTRUCTION

Construction comes from the word `'construct," which means "to build." Building a sandcastle, a fort out of pillows, or a house of cards are all examples of constructing something. In engineering terms, construction is usually associated with large structures like houses, railways, and power plants. In terms of engineering, construction is the activity of putting together different elements, using a detailed design and plan, to create a structure for a certain location. When construct large structures, need to have a clear plan of how it is going to do that. Also need to know the specific location. Architects and engineers design

and build the structure with that location in mind. Construction has always been a communal effort involving a greater or lesser number of people. Communication technology has had a profound influence on interactions among individuals connected throughout history (Žiga Turk and Robert Klin, 2017).

Almost all construction projects can be broadly categorized into one of three types of projects buildings and houses, public works and industrial-type structures. Each of these designs has many subcategories. For example, buildings include both residential and commercial high-rise buildings. Construction projects may include refurbishment or new construction of existing buildings. Public works include roads, railroads, water and sewerage distribution and purification systems, dams and bridges. Finally, industrial projects include refineries, pipelines, utilities, manufacturing facilities, and communications infrastructure. In company, to know the progress ahead of their construction progress is relatable to planner or planning job. That is why companies has their own planner engineer to plan ahead the progress of the construction.

2.5 PROJECT MONITORING

Project monitoring and evaluation are used to measure a project's progress. It's important because it lets you keep tabs on a project and identify potential problems. Project monitoring is the process of keeping a close eye on the entire project management life cycle and ensuring project activities are on the right track. Project monitoring is all about comparing actual performance to the goals you set. If you're not hitting milestones (e.g., delivering a prototype within a specified time), the project has a high chance of failure (Mondy,2020)

A project can be divided into five phases: Initiating, Planning, Executing, Closing, and Monitoring and Control.

- Initiation: The initiation phase outlines the steps and processes that must be approved before any planning begins (A Watt,2014).
- Planning: The planning phase determines the project scope and details the processes for the execution phase (Adrienne,2014)

- Executing: The execution phase involves carrying out the activities defined in the planning phase (Noel.2021)
- Closing: The closing phase finalizes the project and its completion is communicated to all stakeholders (Adrienne,2014)
- Monitoring and control: The monitoring and control phase involves making sure the project is on track and incorporating any necessary changes.

This happens at the same time as the planning and execution phases (Adrienne,2014) (Isaac, 2014) Project monitoring is the 'monitoring part' of the monitoring and control phase. The first attempts to systematically improve productivity in industrial manufacturing processes, which were conducted over a century ago, focused on the close observation of existing practices. Processes were divided into discrete parts, and these parts were adjusted to increase productivity. The goal of these early productivity studies was to define precise procedures for the optimal execution of repetitive tasks and to create standardized best practices Monitoring and controlling the manufacturing processes were essential parts of this effort to increase productivity. Gantt charts, which are currently primarily used for planning in construction projects, were originally developed as monitoring tools designed for supervisors to quickly know where production stood relative to the plan, and identify causes for reduced productivity. This may sound familiar to those involved in the management of construction projects, which typically display significant deviations from the planned objectives (Hwang et al., 2009, Ahsan and Gunawan, 2010; Love et al., 2010).

2.6 MISCOMMUNICATION AND MISINFORMATION AT WORK

One of the factors causing a delay in construction work on site is miscommunication and misinformation which lead to a lack of understanding of work the o be executed. This situation caused the delay by doing the double-handling work to repair or adjust the mistake done to follow the right specification proposed earlier in the beginning by the client. Since there are many parties involved in a project (client, consultant, contractor, sub-contractors), communication between the parties is very crucial for the success of the project. Proper communication channels between the various parties must be established during the

planning stage. Any problem with communication can lead to severe misunderstanding and therefore, delays in the execution of the project. (Sambasivan, 2006). There were a lot of digitalization technology currently implemented in all industries especially construction as it is the main field in growing a well-developed country. The e-book application can be used as a reference anywhere and anytime to counter the issue of lack of information on project specification because current generation in the mid 21 st century are carrying mobile phone as a regular basis item. In a nutshell, the issue on unable to bring ha hardcopy of project specifications such as drawing will not exist anymore. The development of BIM and other technologies, such as augmented reality, drones, and advanced building materials, which have all reached market maturity, has vast potential for improving productivity and efficiency in the AEC industry. To utilize the enormous potential a committed and collaborative effort will be required by the whole industry. (Heigermoser, 2019).

2.7 SUSTAINABLE APPLICATION

Sustainability 'anything' functions to minimize its impact or the existing impact on the environment. Apps are not used to connect devices, but to monitor data streams collected by devices, and to analyze what mean (AppFutura, 2016). Sustainable Engineering is an operating system process that makes use of energy and sustainable resources. In addition, a rate that does not compromise the natural environment or the ability of future generations to meet their own needs (UNESCO, 2017). The concept of engineering sustainability is simply to apply the general definitions of sustainability to engineering. Sustainability engineering involves providing engineering services in a sustainable manner, which, in turn, requires engineering services to be provided to all people in ways that are present and future. The Guide to Sustainable Engineering and 16 Design and the application of engineering to problem-solving related to sustainability is being investigated (Rosen, 2012) Sustainability has three principles: environmental, social, and economic. A three-pillar model often depicts sustainability. The 'Sustainability Triangle' solves the problem because the sustainability dimension is clear (Austria, 2002)

2.8 ANDROID DEVELOPMENT

Android software development is the process of creating new applications for devices running the Android operating system. Android mobile app development is

ongoing in the industry, with new mobile applications and other products being released daily. There was a time when we didn't have a choice but to code an application from Graze for each stage. With the constant advancement of technology, it is now possible to code your Android mobile application efficiently and quickly using a variety of Android 15 Development Tools. There are application development tools available, such as Android Studio, Visual Studio Xamarin, and Phone Gap (Latif et al., 2016).

2.9 HYPERTEXT PREPROCESSOR (PHP) SOFTWARE

PHP (Hypertext Preprocessor) is a widely used server-side scripting language specifically designed for web development. It plays a crucial role in creating dynamic and interactive web applications by executing code on the server and generating HTML to be displayed in the client's browser. With its user-friendly syntax and extensive community support, PHP offers developers a powerful framework for building web applications. One of its notable features is seamless integration with databases, allowing easy management and manipulation of data. PHP is compatible with various web servers and operating systems, making it highly versatile. It also benefits from a vast ecosystem of frameworks and libraries that streamline development processes. Additionally, PHP applications can be scaled and optimized to ensure high performance and responsiveness, even under heavy traffic. The robust PHP community ensures continuous development, security updates, and valuable resources for developers. Overall, PHP provides developers with the necessary tools and flexibility to create efficient and feature-rich web applications.(Saroni & Mulyanti, 2020).

2.9.1 Advantage of Hypertext Preprocessor (PHP)

PHP has some advantages that have made it popular and it’s been the go-to language for web servers for more than 15 years now. There are some PHP benefits:

Table 2.2 Hypertext Preprocessor (PHP) benefits

Cross-Platform	PHP is platform-independent. You don't have to a particular OS to use it because of runs on every platform whether it's Mac, Windows or Linux
Open Source	PHP is an open source. The original code is made available to everyone who wants to build upon it. This is one of the reasons why one of its frameworks and Laravel is popular.
Easy to learn	PHP is hard to learn for absolute beginners. You can pick it up pretty if you already have a programming knowledge
PHP syncs with all the Database	It can easily connect PHP to all Databases, relational and non-relational. So, it can connect in no time to MySQL, Postgres, MongoDB and other databases.

2.10 MYSQL DATABASE

MySQL is one popular system that can store and manage the data and it's an especially popular database solution for WordPress sites. MySQL was originally launched all the way back in 1995. It's gone through a couple's changes in ownership/stewardship before ending up at Oracle Corporation in 2010. While Oracle is charge now, MySQL is still open-source software which is can freely use and also modify it. MySQL have two connected concepts which is relational database and also client-server model. For the relational database, if the data is broken up into multiple separate storage areas that called tables rather than throwing everything together into one big storage unit. For the client-server model is where the data actually resides. In order to access this data, you need to request it. By using SQL, the programming languages that mentioned early that the client sends a request to the database server for data that the client needs. (MySQL, 2023)

2.11 SUMMARY

Using technology in the construction industry will have a positive impact on efficiency and time savings. Furthermore, by utilizing technologies such as apps or systems, it can be opened from anywhere and simplifies day-to-day work with the touch of a finger.

Efficient site monitoring and accurate progress reporting are essential for ensuring the successful execution of construction projects. Site engineers and supervisors are responsible for completing vital forms and documents that track construction activities and ensure adherence to the project plan. However, the reliance on traditional paper-based documentation processes can lead to inefficiencies and delays in information dissemination.

To improve efficiency and streamline site monitoring processes, there is a pressing need to leverage technology in construction site monitoring. The development of user-friendly applications or systems that can be accessed anytime and anywhere, whether on-site or at the site office, would significantly enhance the monitoring and reporting capabilities of site engineers and supervisors. By utilizing digital tools, such as mobile apps or cloud-based systems, the real-time recording, tracking, and analysis of construction activities can be facilitated, leading to more accurate progress reporting and improved project management.

Therefore, this research aims to explore and develop technology-driven solutions for site monitoring in construction projects. The focus will be on creating intuitive and accessible applications or systems that optimize data collection, analysis, and reporting processes. By integrating technology into site monitoring practices, construction projects can benefit from increased efficiency, enhanced communication, and improved decision-making throughout the project lifecycle.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

In this chapter, the development process of the proposed system and the project's methodology will be explained briefly. Starting from the early stage of the project until the final stage of the project. The development of the proposed system which includes the process of identifying the problems, planning, developing, collecting data and analyzing data. These methods were used in order to create a system that surely can accommodate with the problems that occurred. Furthermore, the methodology explained in this chapter was taken into the measure to achieve the objectives of the project with a greater outcome.

Additionally, data collection and data analysis will be conducted in the methodology to give an overall view of the proposed project. Observation and engaging by an interview with the targeted person were carried out during the early stage to define the problem statement. The proposed project will be evaluated by testing the effectiveness of the developed system by industrial experts and an online questionnaire will be handed out to the related person who will be using the product.

In order to maintain the flow of the development process, a research framework was built to clarify the whole process of the proposed system development phases. Furthermore, the implementation of design thinking was implemented into the methodology phase as an innovative problem-solving process. Additionally, it will be used as an alternative tool to create a new product that meets the user's requirements.

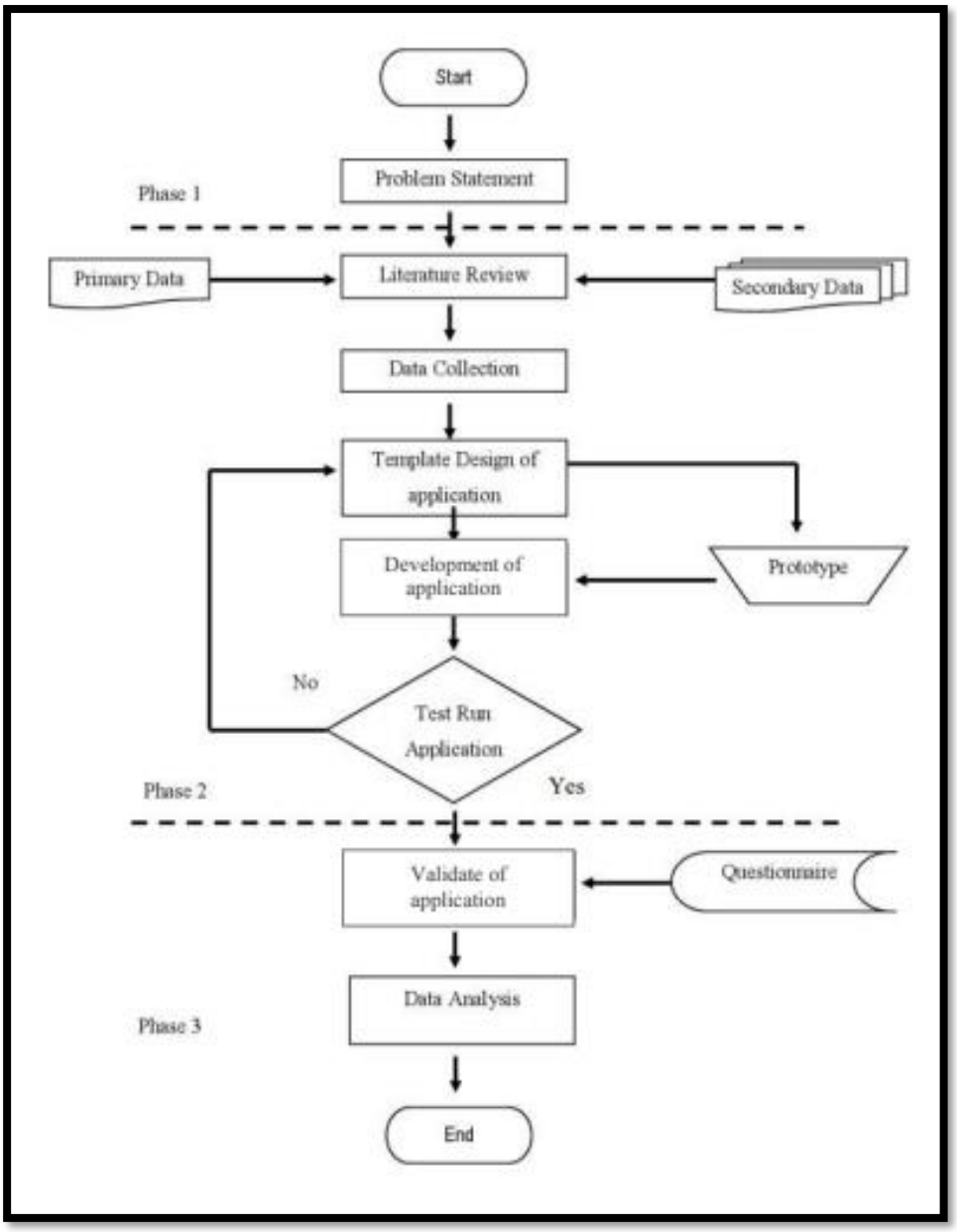


Figure 3.1 Research Design

3.2 PROCESS IDENTIFY THE ISSUES

Pre-made designs and documents that may be altered are known as design templates. Templates are often built to adhere to specified rules or specifications in order to maintain consistency across users and media. The template design is the prototype that had been made through the five design phase methods. This application will develop by

using Hypertext Preprocessor (PHP). Since the data will be obtained from section one until section five, it is much easier to create the template design in order to develop the application.

3.2.1 Method of Identifying Issues

The method that has been used for findings the targeted person, problem, and also the details of the problems using observation, engagement which is through interviews and self–experiences. Table 3.1 below shows the description of the method that had been used. For example, the site engineer and site supervisor are collecting information for monitoring contractor progress based on the work program that has already been decided by the planner and head of the project. The issues that had been identified are regarding the lack of site monitoring to track the progress of site construction. Without this oversight, miscommunications or misunderstandings may arise, leading to inefficiencies, conflicts, and disputes among project stakeholders.

Table 3.1: Method used to identify the issues.

Method	Details
Observation	The observation had been made since week 1 during Work Base Learning (WBL) to find the problem in the company. The issues that had been identified are regarding site monitoring implementation on the project.
Engagement: Questionnaire (Pre-Test)	To strengthen the problem of site monitoring in this project, the questionnaire had been distributed to the staff of the project.
Self-experience	As for self–the job scope during WBL, the supervisor gave a task to track the date and location of working progress. The task

	contractor is not following the work program that has already been scheduled for them.

3.3 RESEARCH DESIGN

Research design is very important for planning and observation. The implementation steps should be monitored to identify problems that will arise during implementation. Changes need to be made when there is a critical problem that is a major cause of job implementation failure. Control measures must be taken to maintain a constant flow. Figure 3.1 show a research design for this study.

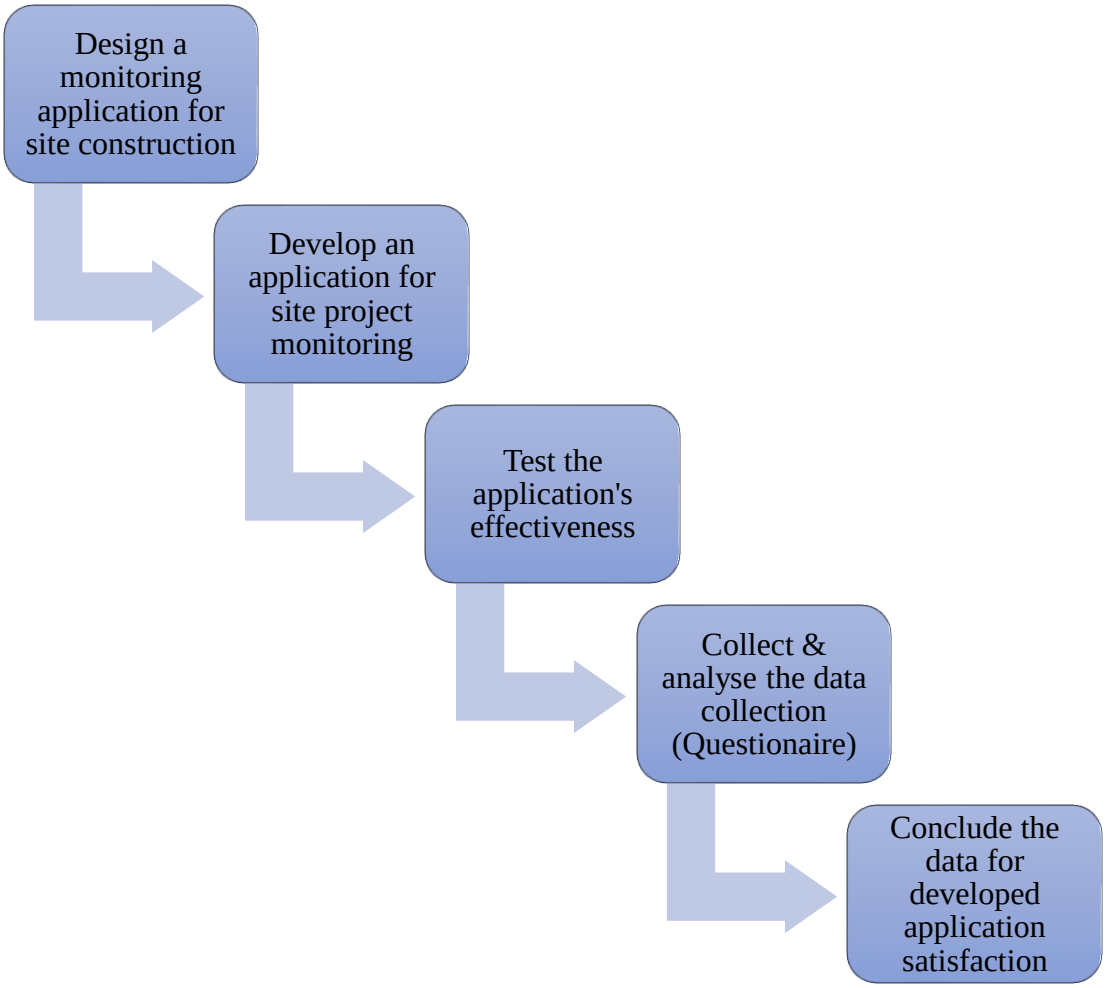


Figure 3.1 The Flow of Research Design

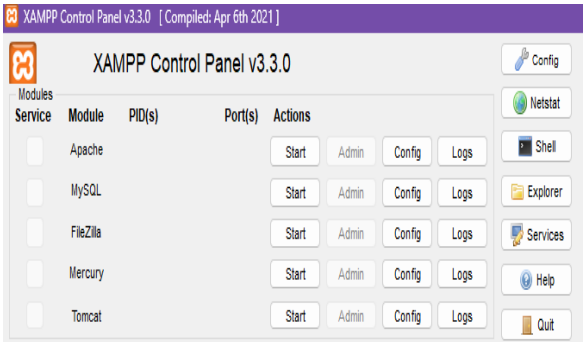
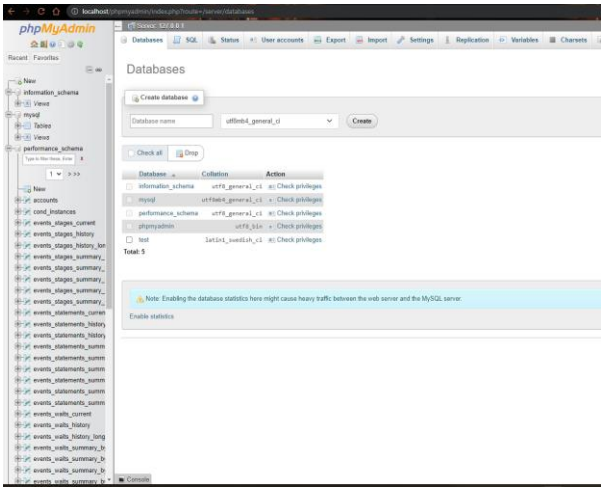
Table 3.2 Research Design

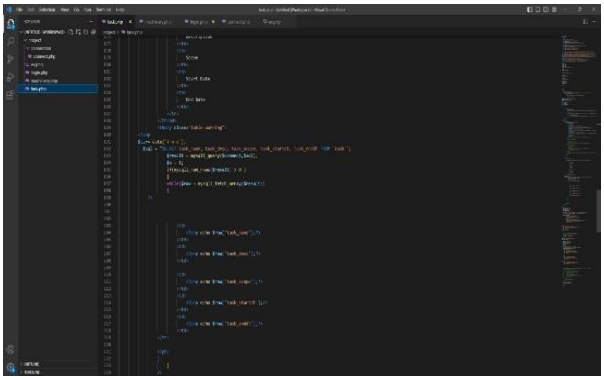
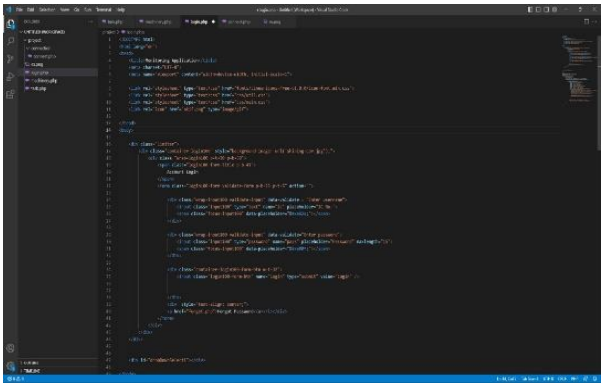
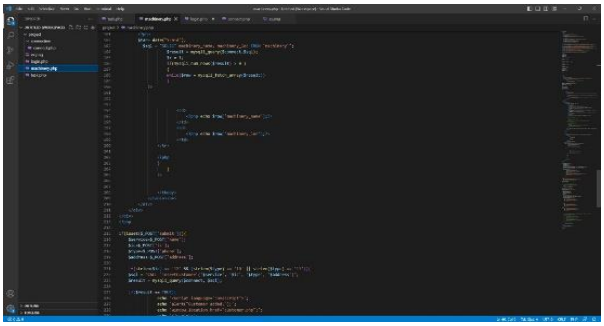
Objectives	Method	Instrument	Analysis
To identify problems in monitoring projects in real time.	Survey	i. Quantitative ii. Google Form and Respondents	SPSS Software - Reliability test - Frequency analysis - Descriptive analysis - Average mean (excel)
To develop an application for site monitoring by using Hypertext Preprocessor (PHP).	Develop	i. Application ii. Using the PHP iii. MySQL Database	- Efficient application for site monitoring in construction.
To validate the effectiveness of the application.	Survey	i. Quantitative ii. Questionnaire iii. Respondents iv. Google form	SPSS Software - Reliability test - Frequency analysis - Descriptive analysis - Average mean (Excel)

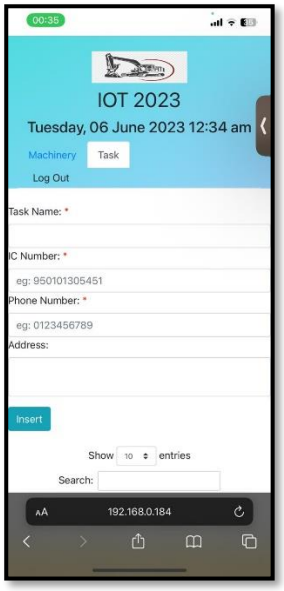
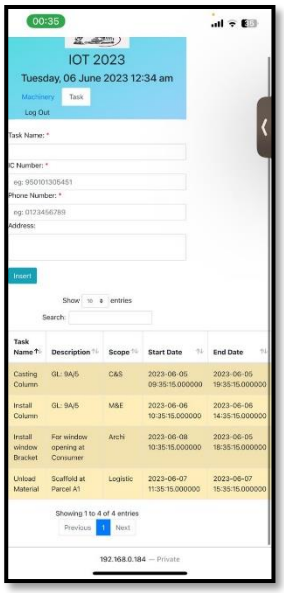
3.4 APPLICATION DESIGN AND DEVELOPMENT

The monitoring application was created step by step to ensure the application's success. Besides, the application is designed to be used on mobile devices such as smartphones or tablets. These apps are typically used by construction managers, supervisors, or other personnel to track and monitor aspects of a construction project, such as project progress.

Table 3.3 Development of the application

Development	Description
	Start XAMPP: Launch the XAMPP Control Panel and start the XAMPP environment. This will start the necessary services, including the MySQL server. Then, click on the "Start" button within the MySQL Control Panel to initiate the MySQL server. This will allow you to create and manage databases for your application.
	Create a Database: Use the provided options within the MySQL Control Panel to create a new database for your application. Specify the database name and any desired properties, such as character set and collation. Next, create database users, assign privileges, and manage user access to databases. This

	ensures secure access and control over your application's data.
	Set up server details: Obtain the necessary information for connecting to the server, including the server address (hostname or IP), port number (if applicable), username, and password. These details will be used to establish the connection. Refer appendix 4 for coding structure
	Set up the file structure: Organize your PHP files in a structured manner. You can create separate files for different functionalities or group-related functions in a single file. Consider using a framework or following a modular approach for better organization and maintainability.
	Test and debug: Thoroughly test your backend logic to ensure it functions as expected. Use appropriate testing techniques, such as unit testing or integration testing, to verify the correctness and reliability of your code.

	Debug any issues or errors that arise during testing.
	Access the PHP file: Open a web browser and enter the URL or local file path to access the PHP file. For example, if you're running the PHP file locally, the URL might be "http://localhost/layout.php". After running this coding, it displays the layout consisting of the task name, deadline, scope, and task description. This taskbar can be filled with the type of progress to be added to highlight the work to Staff.
	The layout appeared with the details of the tasks that have been inserted with detail to accommodate staff to monitor the work and focusing the critical part of the structure that needs to be done.

3.5 DATA COLLECTION

Once the developed system is ready to be evaluated and tested, the data collection procedures will be carried out by forming a questionnaire to give a view of its effectiveness. The aspects of the data collection will be discussed in terms of its location where it will be collected, the respondents, and the data collection method.

3.5.1 Location

This study will be conducted at 19BBR Warehouse Project because they have problems regarding monitoring site construction using an existing method process. Respondents are the related person who is responsible to monitor the condition of the site project.

3.5.2 Respondent

In research projects, respondents refer to individuals who actively participate in surveys, and interviews, or provide information that is used to evaluate data. These individuals are essential contributors to the research process and their involvement typically requires their informed consent. The age range of respondents can vary depending on the specific parameters of the study. In this particular case, the research project aims to gather data from 20 respondents who meet the criteria for participation.

3.5.3 Questionnaire Survey

The questionnaire was used by researchers to gather data for this investigation. A Google form might be used to collect data. When researchers are aware of the needs of the study, the questionnaire is a useful tool for data collection. The Google Form URLs will be sent to the responders in order to disseminate the questionnaire.

The questionnaire for this study is split into Section A and Section B, which are the two primary portions. Section A will concentrate on the respondent's demographic data, and Section B will concentrate on issues related to the site monitoring method. The

usage of site monitoring apps on construction sites, including implementation, employee knowledge, and employee engagement, will also be tested in all areas of the questionnaire.

Table 3.4 Distribution of the questionnaire items for the pre-test

Section	Aspects of evaluation
A	Demography
B	Issues Related to Existing Method of Site Construction Monitoring

Table 3.5 Distribution of the questionnaire items for post-test

Section	Aspects of evaluation
A	Demography
B	Issues Related to Site Construction Monitoring Application

Table 3.6 Likert scale items

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

3.6 TECHNOLOGY ACCEPTANCE MODEL (TAM)

The technology acceptance model (TAM) is a theory of information systems that describes how people come to accept and use technology. Regarding logy acceptance

model (TAM) is a theory of information systems that describes how people come to accept and use technology. Regarding Foley, Curley, and Barr (1984), Sharda, Barr, and McDonnellems that describes how people come to accept and use technology. Regarding Foley, Curley, and Barr (1984), Sharda, Barr, and McDonnell (1988, the acceptance and usage of information technology may result in both immediate and long-term benefits for organisations and individuals, such as enhanced performance, financial and time efficiency, and convenience. In this study, the Technology Acceptance Model (TAM) was applied to measure the validity of the survey. The major goal was to shed light on the mechanisms behind technology acceptance, forecast behavior, and give a theoretical explanation for effective technology deployment.

Besides that, to discover, define, and validate variables and measurements that would be highly correlated with system utilization Several studies designed, pre-tested, and validated multi-item measures for perceived ease of use and perceived utility based on past empirical research on human behavior and information system management.

3.7 DATA ANALYSIS

Data analysis is the systematic application of statistical and/or logical methods to describe and illustrate, condense, summarize, and evaluate data. Depending on the industry and the objective of the research, there are several approaches and strategies for doing analysis. Both quantitative and qualitative techniques of research serve as the foundation for all of these many approaches to data processing.

The data will be collected and then calculated using the Statistical Package for the Social Sciences (SPSS) program. The data will be shown using tables and a pie chart showing the response rates. Additionally, SPSS has a number of statistical techniques that may be applied, like:

i. Descriptive statistics, including methodologies such as frequencies, cross-tabulation, and descriptive ratio statistics
ii. Numeral outcome prediction methods such as linear regression

iii. Prediction for identifying groups, including methodologies such as cluster analysis and factor analysis.

3.7.1 Reliability Test

Sekaran &Bougie (2016), the reliability of a measure indicates the extent to which it is without bias (error free) and hence ensures consistent measurement across time and across the various items in the instrument. In other words, the reliability of a measure is an indication of the stability and consistency with which the instrument measures the concept and helps to assess the "goodness" of a measure.

3.7.2 Frequency Test

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

3.7.3 Descriptive Test

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

3.7.4 Mean and Average

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

3.7.5 Paired T-test

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

3.7.6 One-Way ANOVA

In the process of examining the relationship between variables, researchers can use a t-test or ANOVA to compare the means of two groups on the dependent variable (Green & Salkind, 2012). The main difference between t-test and ANOVA is that t-test only be used to compare two groups while ANOVA can be used to compare two or more groups. In the process of selecting the data analysis technique for this study, I considered both ANOVA and t-test. The advantage ANOVA has over t-test is that the post-hoc tests of ANOVA allow to better controlling type 1 error (Hopkins, 2000). Therefore, in order to control type 1 error, I chose ANOVA as data analysis technique for this study.

3.8 RESPONDENT (QUESTIONNAIRE)

As for the questionnaire, section A is regarding the details of respondents as gender, age, position, and work experiences.

3.8.1 Demographic Data

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

a) Gender

b) Age

c) Position

d) Work Experience

3.8.3 Gender

This research included 17 (85 percent) male respondents and 3 (15 percent) female respondents. Male respondents exceed female respondents by a wide margin, as seen by the proportion. This is because a male, rather than a woman, dominated the responses at the 19BBR Warehouse Project. The number of respondents by gender is shown in Table 3.7 below.

Table 3.7 Number of respondents by gender

No.	Gender	No. of Respondent	Percentage (%)
1	Male	17	85
2	Female	3	15
Total		20	100

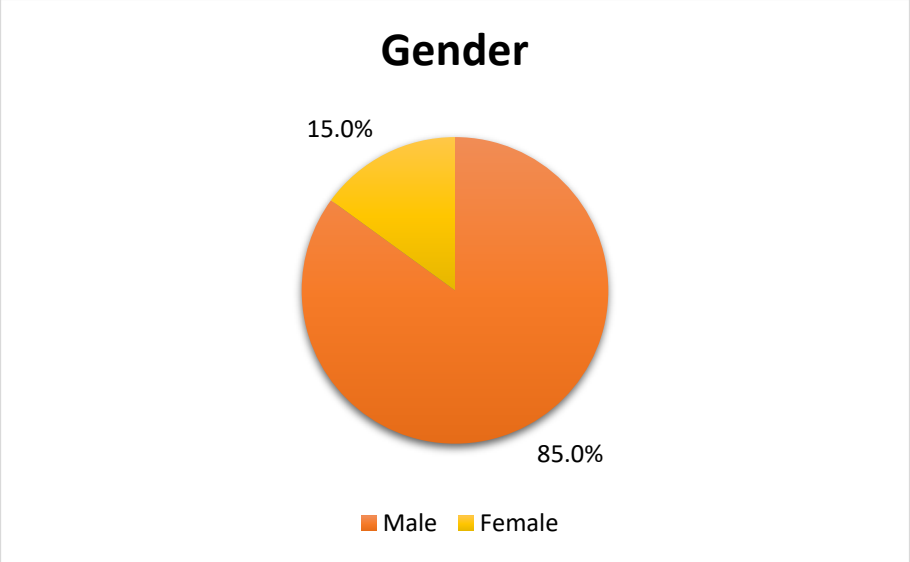


Figure 3.1 The percentage of respondents by gender

3.8.4 Age

Table 3.8 below shows the number and percentage of respondents in the age category divided into 4 categories. This section was formed to assist with data processing and identifying respondents at the site. In the survey, showing the age group of 26 - 35 years old is the largest number of respondents with 16 people (80 percent), and the age group of 36 - 45 years old is the second largest number of respondents which is a total of 4 people (20 percent). Meanwhile, for the under-25 age and 46 years or older, there were no respondents.

Table 3.8 The number of respondents by age

No.	Age	No. of Respondent	Percentage (%)
1	Under 25 years old	0	0
2	26-35 years old	16	80
3	36-45 years old	4	20
4	46 years or older	0	0
Total		20	100

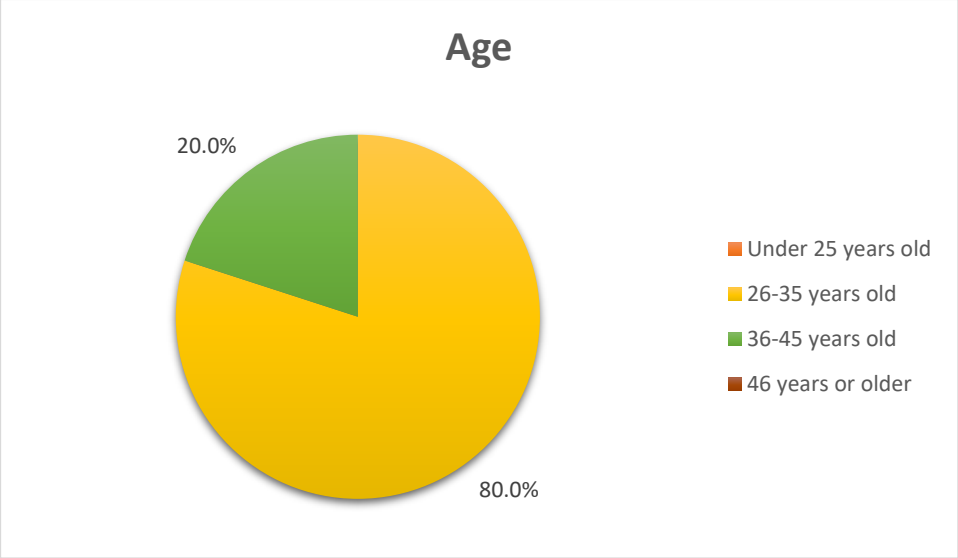


Figure 3.2 The percentage of respondents by age

3.8.5 Position

Table 3.9 shows that Site Supervisor / Assistant Engineer has the most respondents which are 11 respondents (55 percent). The second largest respondent was Engineer with a total of 5 respondents (25 percent). Meanwhile, for positions of Project Manager and Construction Manager share the same number of respondents which is 2 equals to (10 percent).

Table 3.9 The number of respondents by position

No.	Position	No. of Respondent	Percentage (%)
1	Project Manager	2	10
2	Construction Manager	2	10
3	Engineer	5	25
4	Inspector Of Works	0	0
5	Operation	0	0
6	Site Supervisor / Assistant Engineer	11	55
Total		20	100

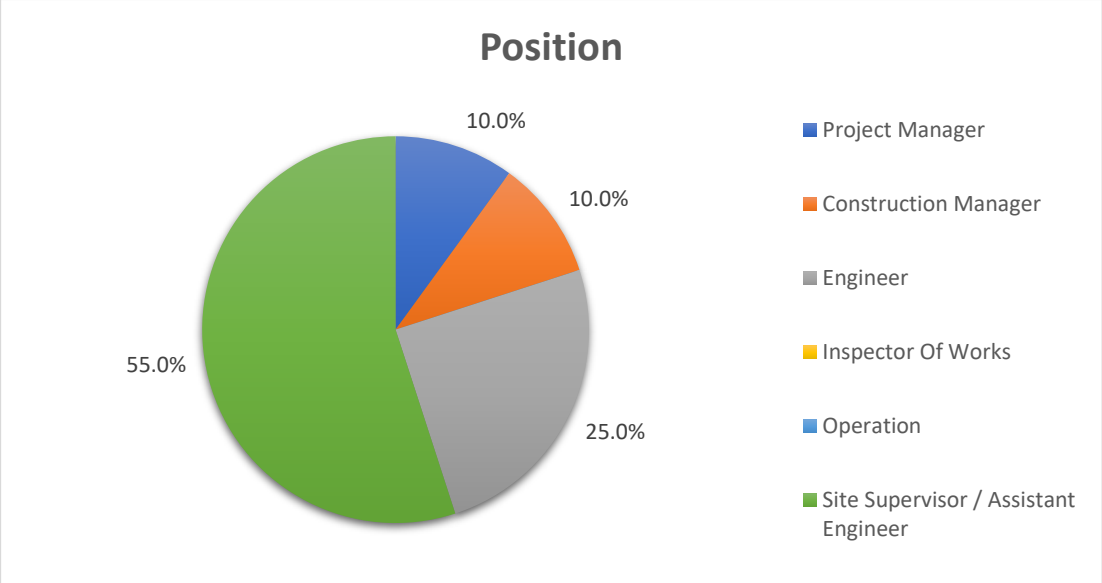


Figure 3.3 The percentage of respondents by position

3.8.6 Work Experience

Table 3.10 below shows the work experience of the respondents. A total of 17 respondents (85 percent) has work experience of 6-10 years. A total of 3 respondents (15 percent) has 2-5 years of work experience. Meanwhile, work experience below 2 years and above 10 years show 0 respondents (0 percent).

Table 3.10 The number of respondents by work experience

No.	Work Experience	No. of Respondent	Percentage (%)
1	< 2 years	0	0
2	2 - 5 years	3	15
3	6 - 10 years	17	85
4	> 10 years	0	0
Total		20	100

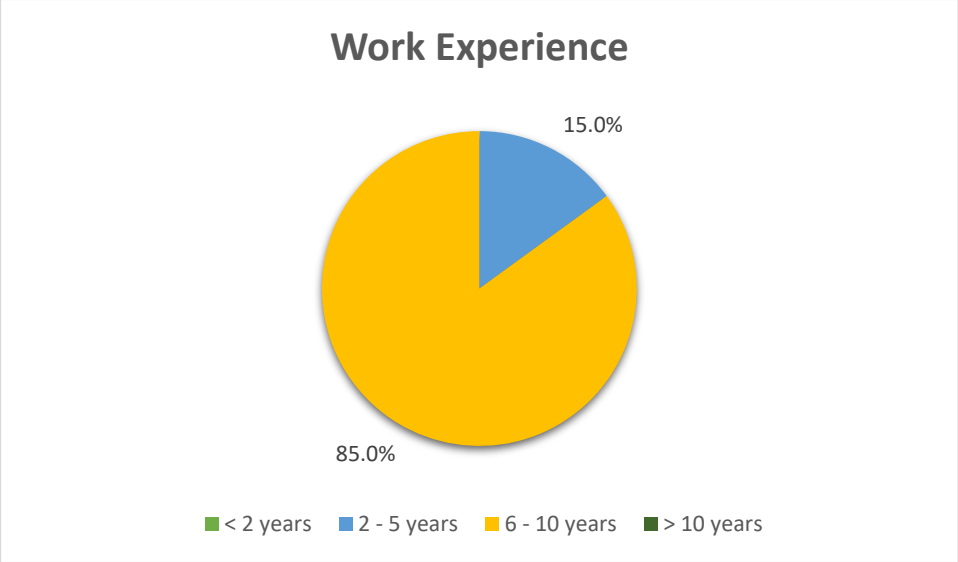


Figure 3.4 The percentage of respondents by work experience

3.9 Summary

The conclusion in this chapter is that the methods used to collect and collect the data from the study are discussed. The collected data will be analyzed to determine the results. This chapter also focuses on the location, respondent, the research method, the analysis of data and the steps taken during the evaluation process.

Furthermore, the methods to be employed are fully explained based on the available problems and the selection of appropriate systems, when used and appropriate for application on the site. This is based on all work, including the articles, interviews, experiences, and other factors, which are already referred to. The process path to be implemented for this project is attached to it in this chapter and applied on site to the working environment.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This chapter accomplishes two main objectives: identifying need assessments for monitoring projects in real-time and measuring the effectiveness of the developed application using T-test and ANOVA one-way statistical tests. Through a review of various need assessment methods, the chapter sheds light on their advantages, limitations, and areas for improvement, providing valuable insights for designing a monitoring application tailored to the specific needs of construction professionals. Additionally, by conducting quantitative analyses using T-test and ANOVA one-way, the chapter evaluates the application's performance, comparing it to alternative methods and identifying areas for further refinement. This comprehensive analysis contributes to the understanding of need assessments and the effectiveness of the real-time project monitoring application.

4.2. DATA COLLECTION AND FINDING

This study presents the findings of a questionnaire issued to respondents, who included project managers, engineers, site supervisors, and others, to determine the necessity for the site monitoring application. In Section, issues related to the site monitoring method will be tested using T-test ANOVA. This questionnaire has been distributed to 20 respondents through Google Forms links.

4.2.1 Data Analysis

SPSS is an acronym that stands for Statistical Package for the Social Sciences, and it is used by a wide range of academics to analyze complex statistical data. In this study, SPSS will be used to analyze the data. The methodical application of statistical and logical approaches to explain, demonstrate, and condense. Data should be summarized and evaluated. Researchers use data analysis to reduce data to a story and evaluate it to get different perspectives. Data analysis assists in reducing massive volumes of data into smaller, more consumable portions (parts).

4.2.2 Reliability Test for Existing Method

Cronbach's Alpha is a commonly used measure of reliability in scale development and psychometrics. In this case, the obtained Cronbach's Alpha coefficient of 0.915 indicates a high level of internal consistency or reliability among the items that form the scale.

Figure 4.1 Reliability Test for Pre-Testing

Cronbach's Alpha	Cronbach's Alpha Bases on Standardized Items	N of items
0.915	0.920	14

4.2.3 Frequency Analysis for 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 statisticalbranch that investigates the number of occurrences (frequency) and assesses metrics such as central tendency, dispersion, percentiles, and so on. Using SPSS to obtain the analysis frequency date. The table below outlines the challenges associated with the present technique.

Table 4.1 Frequency Analysis of the existing method

No.	Identify problems in the monitoring of projects in real-time	Issues Related to Existing Method of Site Construction Monitoring	Level of Agreement				
			Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
			1	2	3	4	5
1	To what extent do you agree with the following statements about the potential usefulness of the existing method for in-site construction monitoring:	Using the Existing method can improve the accuracy of monitoring construction progress.	15 (75%)	5 (15%)	0 (0%)	0 (0%)	0 (0%)
		The Existing method can provide real-time data and insights for better decision-making in construction monitoring.	13 (65%)	7 (35%)	0 (0%)	0 (0%)	0 (0%)
		The Existing method has the potential to enhance communication among stakeholders involved in construction monitoring.	6 (30%)	13 (65%)	1 (5%)	0 (0%)	0 (0%)
2	To what extent do you agree with the following statements about the perceived ease of use of the Existing method for	Integrating the Existing method into my existing monitoring practices would be easy.	14 (70%)	6 (30%)	0 (0%)	0 (0%)	0 (0%)
		The Existing method seems user-friendly	13 (65%)	7 (35%)	0 (0%)	0 (0%)	0 (0%)

	in-site construction monitoring:	and intuitive to me.					
3	To what extent do you agree with the following statements about your attitude toward using the Existing method for in-site construction monitoring:	Using the Existing method would be a positive innovation in construction monitoring.	14 (70%)	6 (30%)	0 (0%)	0 (0%)	0 (0%)
		Using the Existing method would enhance my effectiveness in construction monitoring.	14 (70%)	5 (25%)	1 (5%)	0 (0%)	0 (0%)
		Using the Existing method would align with my overall approach to adopting new technologies.	10 (50%)	9 (45%)	1 (5%)	0 (0%)	0 (0%)
4	Behavioral Intention to Use	How likely are you to consider using the Existing method for in-site construction monitoring in the future?	14 (70%)	5 (25%)	1 (5%)	0 (0%)	0 (0%)
		How likely are you to recommend the use of the Existing method for in-site construction	14 (70%)	6 (30%)	0 (0%)	0 (0%)	0 (0%)

		monitoring to others?					
		To what extent do you believe that using the Existing method for in-site construction monitoring would positively impact your work performance?	15 (75%)	5 (25%)	0 (0%)	0 (0%)	0 (0%)
5	General Assessment	How satisfied are you with your existing methods of monitoring construction activities?	11 (55%)	9 (45%)	0 (0%)	0 (0%)	0 (0%)
		How confident are you in your ability to adapt to the existing method of construction monitoring?	17 (85%)	3 (15%)	0 (0%)	0 (0%)	0 (0%)
		How likely are you to actively participate in the implementation and improvement of the Existing method for in-site construction monitoring?	13 (65%)	7 (35%)	0 (0%)	0 (0%)	0 (0%)

Table 4.2 Percentage of the respondents agree and disagree with the existing method.

Existing Method	Level of agreement				
Problems in the monitoring of projects in real-time	Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
The potential usefulness of the existing method	56.67%	41.67%	1.67%	0%	0%
Perceived ease of use of the existing method	67.50%	32.50%	0%	0%	0%
Attitude toward using the existing method	63.33%	33.33%	3.33%	0%	0%
Behavioral Intention to Use	72.50%	27.50%	0%	0%	0%
General Assessment	70.00%	30.00%	0%	0%	0%

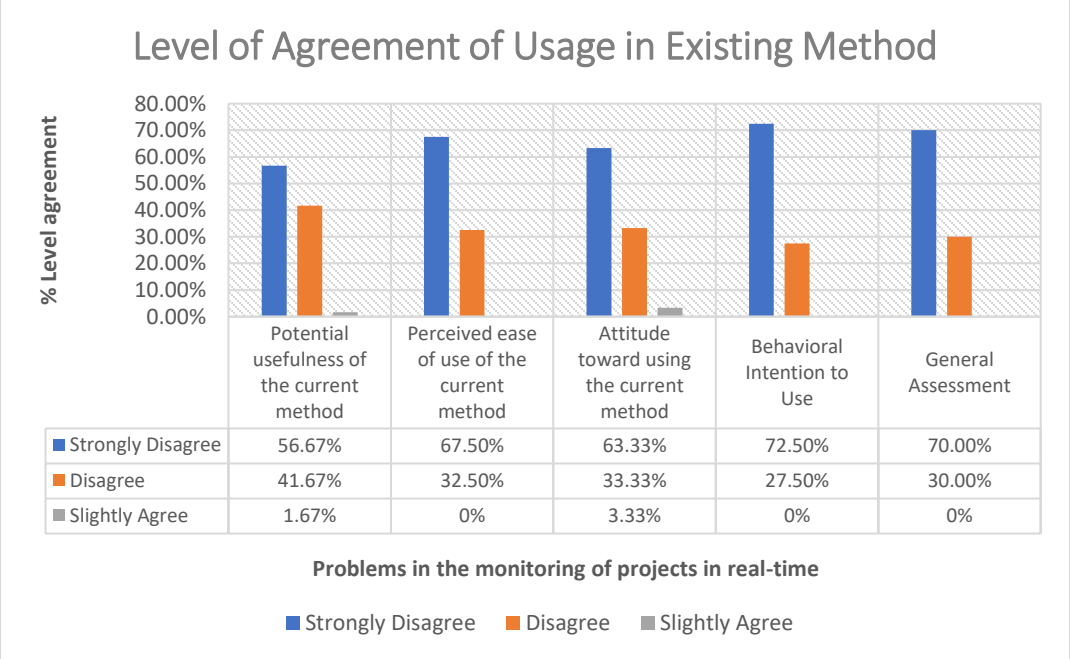


Figure 4.2 Percentage of level agreement of existing method

Figure 4.2 shows the percentage of respondents who do not agree with the use of existing methods for site monitoring. When comparing the existing method of monitoring with the data on the disagree percentages, it is evident that there is a significant need for an improved monitoring application. The potential usefulness of the existing method scored

at 56.67%, indicating that there is room for improvement in terms of its effectiveness and practicality. The perceived ease of use of the existing method scored at 67.50%, suggesting that users find it relatively challenging to navigate and utilize. Furthermore, the attitude toward using the existing method scored at 63.33%, indicating a lukewarm reception or reservations about its benefits. The behavioral intention to use the existing method scored at 72.50%, showing a moderate level of commitment to its adoption. Finally, the general assessment scored at 70.00%, suggesting a relatively neutral stance on the overall effectiveness and satisfaction with the existing method. These data collectively highlight the clear need for an improved monitoring application that can address the shortcomings and concerns associated with the existing method, offering enhanced usefulness, ease of use, positive attitude, higher intention to use, and overall satisfaction.

4.2.4 Descriptive Test of Average Mean

Descriptive statistics are those that describe or characterize the characteristics of a data set. It also categorizes measurements into two types: measures of central tendency and measures of variability (or spread). Additionally, central tendency measurements describe the focal point of a data set. The dispersion of data within a collection is described by variability or spread measurements.

Table 4.3 Mean and average mean of the categories for the existing method

No.	Problems in the existing method of monitoring projects in real-time	Mean	Average Mean	Average Mean (%)
1	The potential usefulness of the existing method	1.25	1.33	19.98
		1.35		
		1.40		
2	Perceived ease of use of the existing method	1.30	1.33	19.85
		1.35		
3	Attitude toward using the existing method	1.30	1.40	20.97
		1.35		
		1.55		
4	Behavioral Intention to Use	1.35	1.30	19.48
		1.30		
		1.25		
5	General Assessment	1.45	1.32	19.73
		1.15		
		1.35		
Total Average		1.34	6.68	100

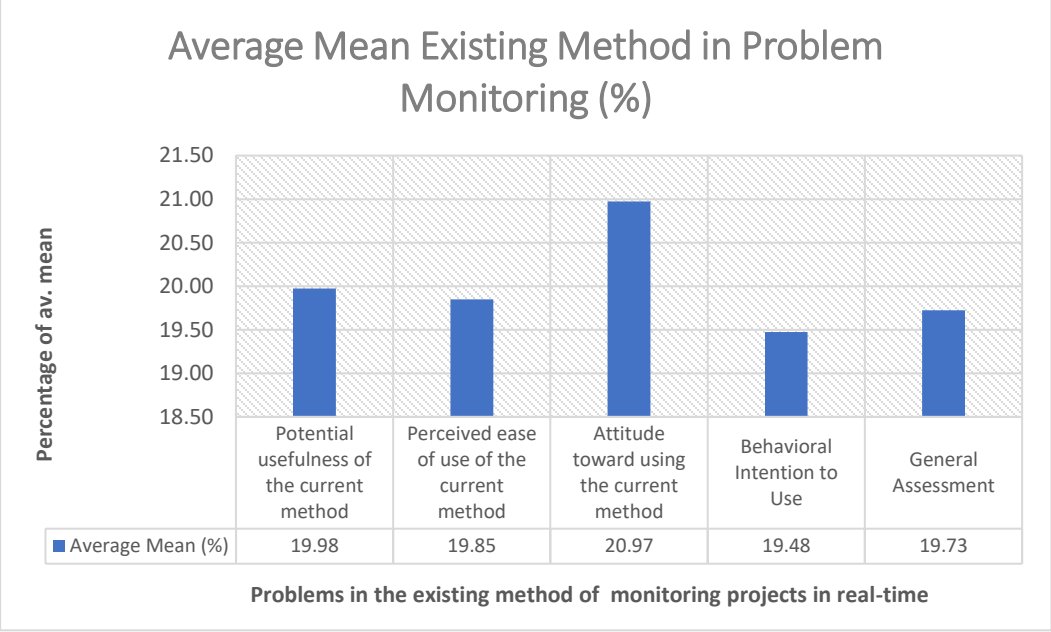


Figure 4.3 Percentage of the average mean.

Based on the statistics presented in Table 4.3 and Figure 4.3, the analysis reveals that the highest problem associated with the existing method is the attitude toward using it, specifically regarding the low effectiveness of monitoring site construction. The average mean for this problem is the highest among all the problems, scoring at 20.97%. This indicates that the participants or users perceive a significant issue with the effectiveness of the existing method in monitoring construction sites. It suggests that there is a need for improvement in this particular aspect to enhance the overall attitude toward using the existing method. Addressing this problem and finding solutions to improve the effectiveness of monitoring site construction would contribute to a more positive reception and adoption of the method.

Table 4.4 Usability of the existing method

Variables	Mean	Interpretation
The potential usefulness of the existing method	1.33	Low
Perceived ease of use of the existing method	1.33	Low
Attitude toward using the existing method	1.40	Low
Behavioral Intention to Use	1.30	Low
General Assessment	1.32	Low

Based on the findings presented in Table 4.4, the analysis reveals that the respondent's level of usability toward the existing method is significantly low. The mean score for all the variables tested is less than 2.50, indicating a clear indication of low usability. This implies that the existing method lacks effectiveness and efficiency in terms of usability. To address this issue and overcome the limitations of the existing method, there is a clear need for the development of a systematic and efficient monitoring application. The PHP monitoring

application can serve as a solution to improve the usability and address the issues related to the existing method. By leveraging modern technologies and incorporating user-friendly features, the PHP monitoring application can provide a more intuitive and streamlined approach to monitoring projects.

4.3 THE EFFECTIVENESS OF SITE MONITORING APPLICATIONS

The purpose of this study is to assess the effectiveness of site monitoring applications. In this chapter, the research results and data collected from the questionnaire and site project interviews will be presented. The outcomes of the project's aims will be discussed in detail, highlighting the achieved results for the objectives and indicating whether these objectives were met.

4.3.1 Reliability test for PHP application

Figure 4.4 below shows the reliability test for post-testing. A Cronbach's Alpha coefficient of 0.920 indicates a high level of internal consistency or reliability for the post-test questionnaire of Site Construction Monitoring Using PHP. This coefficient reflects the extent to which the items in the questionnaire consistently measure the same underlying construct or concept. This indicates that the questionnaire items effectively capture the desired information related to site construction monitoring using PHP. The high Cronbach's Alpha value of 0.920 provides confidence in the reliability of the post-test questionnaire and suggests that it is a robust measurement instrument for assessing the effectiveness and impact of PHP in site construction monitoring.

Figure 4.4 Reliability Test for Post-Testing

Cronbach's Alpha	Cronbach's Alpha Bases on Standardized Items	N of items
0.920	0.920	14

4.3.2 Frequency Analysis for Site Monitoring Application Using PHP

Table 4.5 Frequency Analysis of the Application Method

No.	Site Construction Monitoring Using PHP	Issues Related to Site Construction Monitoring Application	Level of Agreement				
			Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
			1	2	3	4	5
1	Please indicate your level of agreement with the following statements about the perceived usefulness of the PHP application for site construction monitoring:	PHP application has improved the efficiency of construction projects.	0 (0%)	0 (0%)	0 (0%)	12 (60%)	8 (40%)
		PHP application has enhanced communication among project stakeholders.	0 (0%)	0 (0%)	0 (0%)	7 (35%)	13 (65%)
		PHP application has provided valuable insights for decision-making	0 (0%)	0 (0%)	0 (0%)	12 (60%)	8 (40%)
2	Please indicate your level of agreement with the following statements about the perceived ease of use of PHP application for site construction monitoring:	Learning to use the PHP application for site construction monitoring was easy for me.	0 (0%)	0 (0%)	0 (0%)	8 (40%)	12 (60%)
		Integrating the PHP application for site construction monitoring into my workflow was easy.	0 (0%)	0 (0%)	0 (0%)	8 (40%)	12 (60%)
		I felt confident in my ability to effectively use the PHP application for site construction monitoring.	0 (0%)	0 (0%)	0 (0%)	12 (60%)	8 (40%)

3	Please indicate your level of agreement with the following statements about your attitude towards using PHP application for site construction monitoring:	Using the PHP application for site construction monitoring is a positive development.	0 (0%)	0 (0%)	0 (0%)	7 (35%)	13 (65%)
		Using the PHP application for site construction monitoring is beneficial for my work.	0 (0%)	0 (0%)	0 (0%)	13 (65%)	7 (35%)
		Using PHP applications for site construction monitoring aligns with my approach to adopting new technologies.	0 (0%)	0 (0%)	0 (0%)	8 (40%)	12 (60%)
4	Behavioral Intention to Use	How likely are you to continue using the PHP application for site construction monitoring in the future?	0 (0%)	0 (0%)	0 (0%)	13 (65%)	7 (35%)
		How likely are you to recommend the use of the PHP application for site construction monitoring to others?	0 (0%)	0 (0%)	0 (0%)	8 (40%)	12 (60%)
		To what extent has using a PHP application for site construction monitoring positively impacted your	0 (0%)	0 (0%)	0 (0%)	12 (50%)	10 (50%)

		work performance?					
5	General Assessment	How satisfied are you with the functionality and features of the PHP application for site construction monitoring?	0 (0%)	0 (0%)	0 (0%)	7 (35%)	13 (65%)
		How confident are you in your ability to use the PHP application for site construction monitoring effectively?	0 (0%)	0 (0%)	0 (0%)	8 (40%)	12 (60%)

Table 4.6 Percentage of the respondents for the requirement of Monitoring Application

Monitoring Application	Level of agreement				
Site Construction Monitoring Using PHP	Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
The potential usefulness of Monitoring Using PHP	0%	0%	0%	51.67%	48.33%
Perceived ease of use of Monitoring Using PHP	0%	0%	0%	46.67%	53.33%
Attitude toward using the Monitoring Using PHP	0%	0%	0%	63.33%	36.67%
Behavioral Intention to Use	0%	0%	0%	55.00%	45.00%
General Assessment	0%	0%	0%	37.5%	62.50%

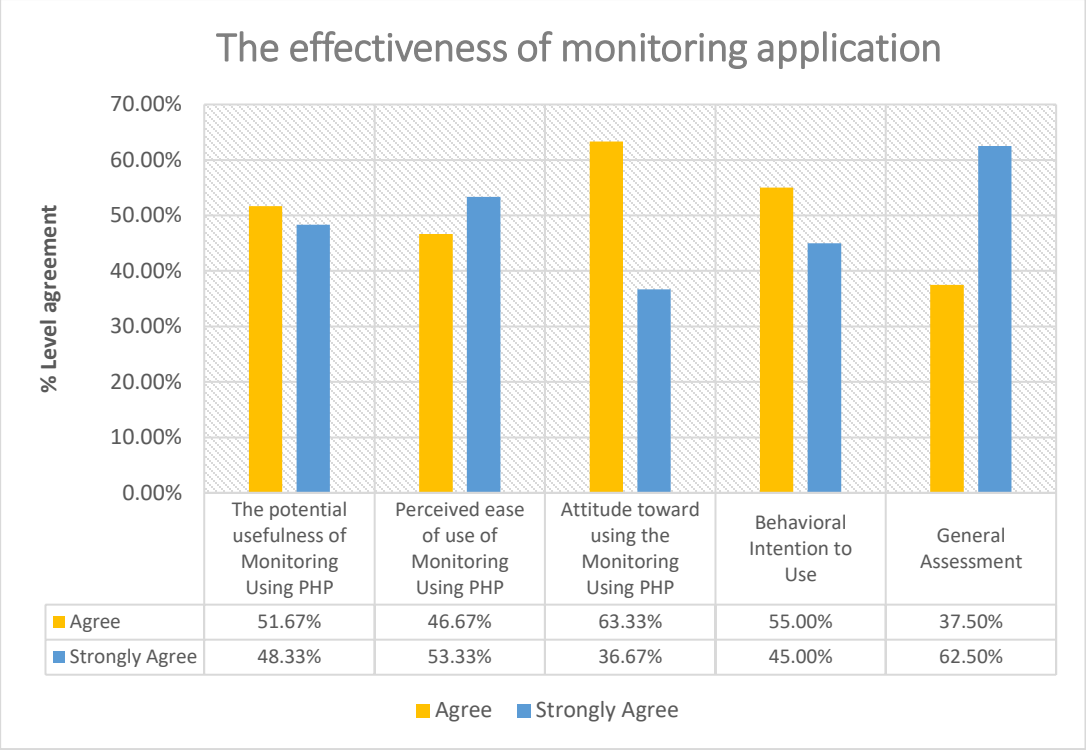


Figure 4.5 The effectiveness of monitoring applications using PHP

The findings from Figure 4.5 indicate that a significant percentage of respondents strongly agree with the potential usefulness (48.33%) and perceived ease of use (53.33%) of Monitoring Using PHP, suggesting its potential benefits and user-friendly nature. However, there is a slightly lower agreement regarding the attitude toward using the application (36.67%), indicating some reservations or concerns among respondents. Nonetheless, a substantial proportion expresses a behavioral intention to use the application (45.00%), and the general assessment is positive, with a majority strongly agreeing with it (62.50%). Overall, the data analysis reveals positive perceptions and attitudes towards Monitoring Using PHP, emphasizing its potential usefulness, ease of use, and overall positive evaluation, while acknowledging some reservations that may require further investigation and addressing.

Table 4.7 Percentage average mean of elements for monitoring application

No.	Site Construction Monitoring Using PHP	Mean	Average Mean	Average Mean (%)
1	The potential usefulness of the monitoring application using PHP	4.40	4.48	19.79
		4.65		
		4.40		
2	Perceived ease of use of the monitoring application using PHP	4.60	4.53	20.01
		4.60		
		4.40		
3	Attitude toward using the monitoring application using PHP	4.65	4.53	20.01
		4.35		
		4.60		
4	Behavioral Intention to Use	4.35	4.48	19.79
		4.60		
		4.50		
5	General Assessment	4.65	4.63	20.41
		4.60		
Total Average		4.53	22.66	100

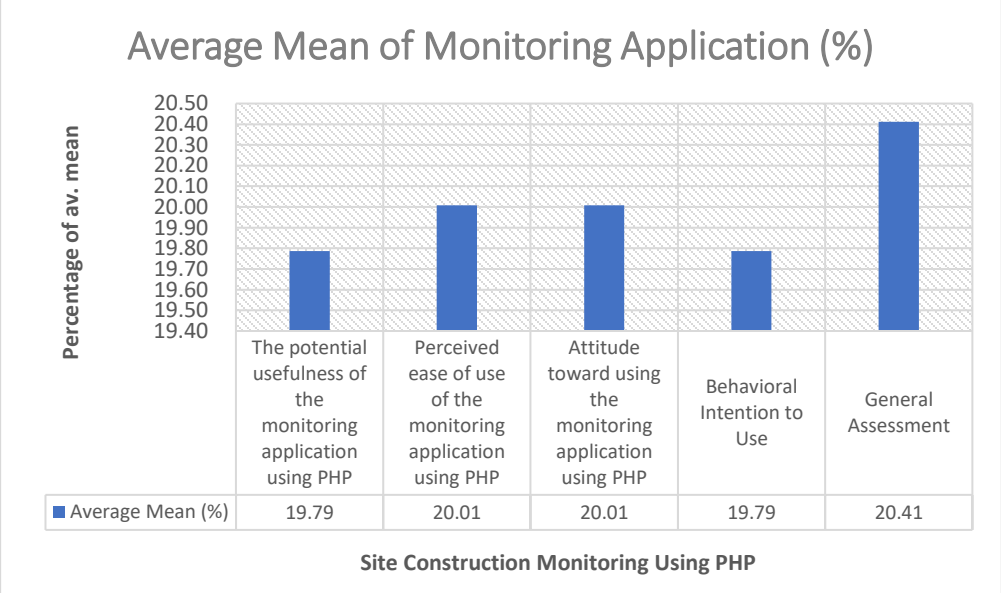


Figure 4.6 Average mean of monitoring applications using PHP

Table 4.8 Usability of PHP Application

Variables	Mean	Interpretation
The potential usefulness of using PHP Application	4.48	High
Perceived ease of use of using PHP Application	4.53	High
Attitude toward using the PHP Application	4.53	High
Behavioral Intention to Use PHP Application	4.48	High
General Assessment	4.63	High

The analysis of Table 4.8 reveals positive ratings for the usability of the PHP Application, indicating users' recognition of its high usefulness (average rating: 4.48) and perceived ease of use (average rating: 4.53). Users also display a positive attitude toward using the application (average rating: 4.53) and express a strong intention to incorporate it into their tasks or work (average rating: 4.48). Overall, the findings highlight the application's favorable usability, emphasizing its potential benefits, user-friendly nature, positive attitude, and strong behavioral intention to use. This suggests that the PHP Application is well-regarded by users and effectively supports their needs and tasks.

4.4 PAIRED SAMPLE STATISTIC

Paired sample statistics is the test to compare the effectiveness of the existing method for site monitoring with site monitoring using the PHP application.

Table 4.9 Paired sample statistics

Paired sample statistics		
Effectiveness category	Mean	
	Existing Method	PHP Application
The Potential Usefulness	1.33	4.48
Perceived Ease of Use	1.33	4.53
Attitude Toward Using Technology	1.40	4.53
Behavioral Intention to Use	1.30	4.48
General Assessment	1.32	4.63

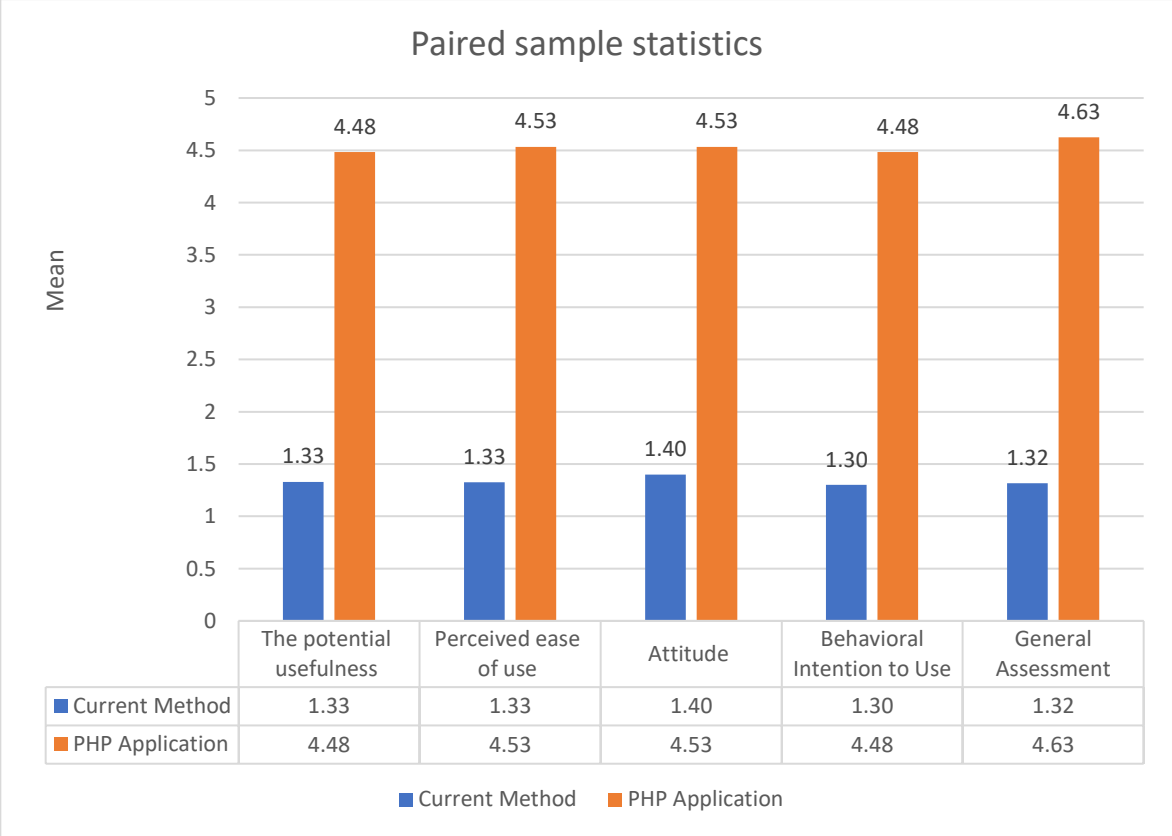


Figure 4.7 The mean value of the existing method and PHP application

According to Figure 4.7, the mean values for the effectiveness category clearly demonstrate a significant difference between the Existing Method and the PHP Application. The Existing Method receives relatively low mean scores across all effectiveness measures,

including Potential Usefulness (1.33), Perceived Ease of Use (1.33), Attitude Toward Using Technology (1.40), Behavioral Intention to Use (1.30), and General Assessment (1.32). In contrast, the PHP Application exhibits significantly higher mean scores across all effectiveness measures: Potential Usefulness (4.48), Perceived Ease of Use (4.53), Attitude Toward Using Technology (4.53), Behavioral Intention to Use (4.48), and General Assessment (4.63). This substantial discrepancy indicates that the PHP Application surpasses the Existing Method in terms of perceived effectiveness. Users view the PHP Application as more useful, easier to use, have a positive attitude toward using it, possess a higher intention to use it, and generally rate it more favorably compared to the Existing Method. These findings emphasize the superiority of the PHP Application over the existing approach in terms of perceived effectiveness and user satisfaction.

4.5 PAIRED SAMPLE T-TEST

Table 4.10 Paired sample T-test

Pair	Paired Different Mean	t	Significant (two-tailed)
The Potential Usefulness	3.15	26.83	.000
Perceived Ease of Use	3.30	26.23	.000
Attitude Towards Using Technology	3.13	24.13	.000
Behavioral Intention to Use	3.18	26.08	.000
General Assessment	3.31	24.00	.000

The paired sample t-test results from Table 4.10 reveal highly significant differences between the Existing Method and the PHP Application across all variables measured. The PHP Application demonstrates superior performance compared to the existing method, as indicated by the high t-values and the extremely low p-values (all less than .00001), suggesting strong statistical significance ($p < .05$). These findings provide compelling evidence that the implementation of the PHP Application in monitoring is more effective and efficient than the existing method. Users perceive the PHP Application as

significantly more useful, easier to use, and more positively assessed in terms of attitude, behavioral intention, and general evaluation. This supports the conclusion that the PHP Application offers enhanced effectiveness and efficiency, making it a valuable tool for monitoring purposes compared to the existing method.

4.6 ONE-WAY ANOVA

Table 4.11 One-Way ANOVA

Summary of Data						
	Treatments					
	1	2	3	4	5	Total
N	20	20	20	20	20	100
∑X	89.65	90.67	90.8	89.66	92.5	453.28
Mean	4.4825	4.5335	4.54	4.483	4.625	4.533
$\sum X^2$	404.4179	413.5979	415.1	404.729	432.25	2070.0948
Std.Dev.	0.3672	0.366	0.3885	0.3827	0.4833	0.3953

Result Details				
Source	*SS*	*df*	*MS*	
Between-treatments	0.2713	4	0.0678	*F* = 1.53582
Within-treatments	15.1959	95	0.16	
Error	3.3559	76	0.0442	

The *F*-ratio value is 1.53582. The *p*-value is .200321. The result is *not* significant at $p < .05$.

In the conducted one-way ANOVA analysis as shown above in Table 4.11, the F-ratio was calculated to be 1.53582, and the associated p-value was found to be 0.200321. The p-value indicates the probability of obtaining the observed results (or more extreme results) under the assumption that the null hypothesis is true. In this case, with a p-value of 0.200321, the result is not statistically significant at the conventional alpha level of 0.05.

The null hypothesis (H_0) for this one-way ANOVA can be stated as follows: There is no significant difference among the means of the groups being compared. The alternative hypothesis (H_1) would be: There is a significant difference among the means of the groups being compared.

Based on the analysis results, the p-value of 0.200321 exceeds the threshold of 0.05, indicating that there is insufficient evidence to reject the null hypothesis. Therefore, we fail to find statistically significant evidence to support the claim of a significant difference among the means of the groups being compared.

4.7 SUMMARY

The paired sample t-test analysis revealed significant differences in all variables measured between the Existing Method and the PHP Application. The t-values for Potential Usefulness, Perceived Ease of Use, Attitude Toward Using Technology, Behavioral Intention to Use, and General Assessment were 26.83, 26.23, 24.13, 26.08, and 24.00, respectively, with all associated p-values being < .00001. These results indicate that the PHP Application is significantly more effective and efficient compared to the Existing Method in terms of perceived potential usefulness, ease of use, attitude, behavioral intention, and general assessment.

Nevertheless, a one-way ANOVA analysis was also performed to examine the overall distinction among the means of the compared groups. The derived F-ratio amounted to 1.53582, accompanied by a p-value of 0.200321. Since the p-value surpasses the customary alpha level of 0.05, the outcome fails to achieve statistical significance. Hence, there exists

insufficient empirical support to substantiate a substantial divergence among the group means based on this analysis.

In light of the noteworthy results obtained from the paired sample t-tests, revealing significant differences across various variables, it can be confidently concluded that the application-based approach surpasses the existing method in terms of potential usefulness, perceived ease of use, attitude toward using technology, behavioral intent of use, and general assessment. Nevertheless, it is important to acknowledge the non-significant outcome of the ANOVA analysis when making informed decisions regarding the implementation of the application for site construction monitoring. In practical terms, this means that although the application shows promise in improving certain aspects such as potential usefulness, ease of use, attitude, behavioral intent, and general assessment, it may not necessarily outperform the existing method in all areas or provide a significant advantage overall. Other factors, such as cost, feasibility, and potential limitations, should also be taken into account when deciding whether to adopt the application-based approach for site construction monitoring.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The integration of mobile applications in the construction industry has transformed project management practices and improved overall efficiency. The focus of this research was to assess the usefulness, ease of use, functionality, user satisfaction, and effectiveness of mobile applications specifically designed for construction site operations. This study examines the Site Construction Monitoring using PHP developed for Orangebeam Construction Sdn Bhd for the Actual Activity at the I9BBR warehouse project. The evaluation of this application's performance in meeting the objectives of the study provides valuable insights for the application's project perspective and its potential impact on construction site management.

Design thinking served as the research framework, employing a solution-based approach to problem-solving. By understanding the needs of construction professionals, reframing challenges in a human-centric manner, and generating diverse ideas, design thinking enables the development of effective solutions for complex and ambiguous problems. The research methodology involved a combination of library research and field research, utilizing qualitative methods such as interviews to gather data. The collected data from questionnaires was analyzed using SPSS, leading to insightful discussions and the presentation of results.

This introduction sets the stage for the subsequent sections by emphasizing the significance of mobile applications in the construction industry. It introduces the specific focus of the

research, which is the Site Construction Monitoring using PHP, and highlights its relevance for the management of construction projects. The utilization of design thinking as a problem-solving framework and the research methodology employed in gathering data are also briefly discussed. The subsequent sections will delve into the findings, conclusions, and recommendations based on the assessment of the Site Construction Monitoring using PHP, providing valuable insights for construction professionals and stakeholders involved in site management.

5.2 CONCLUSION

In conclusion, the development and implementation of the application for monitoring site construction have proven to be highly beneficial for site management. The application successfully addressed the challenges associated with real-time monitoring and provided an efficient solution for site engineers, site supervisors, and planner engineers. Through its role as a data-gathering tool, the application streamlined construction processes, leading to significant time and cost savings. It also played a pivotal role in improving productivity throughout the construction project, benefiting all stakeholders involved, from owners and architects to general contractors and subcontractors.

The application's user-friendly interface and ease of operation contributed to its successful adoption among the various departments and users involved in site management. By leveraging digitalization tools from IoT and integrating Industry 4.0 principles, the application facilitated smoother and more manageable project management processes. It enabled efficient communication and information sharing, minimizing the likelihood of miscommunication and ensuring accurate site information.

The successful implementation of the application also brought broader benefits to the construction industry. By embracing technological advancements and the Internet of Things, companies were able to enhance their overall productivity, improve the quality of their work, and enhance customer satisfaction. The application's ability to centralize and

distribute detailed progress information contributed to better decision-making, avoided delays, and ultimately resulted in a superior finished product.

Overall, the utilization of this application for site construction monitoring has proven to be a game-changer for site management. Its effectiveness in tracking progress, streamlining processes, and enhancing collaboration has contributed to the success and efficiency of construction projects. Moving forward, it is crucial for the industry to continue embracing technological advancements and digitalization to further improve construction practices and achieve even greater outcomes.

5.3 RECOMMENDATION

In conclusion, based on the findings and conclusions of this research, several key recommendations are proposed for Site Construction Monitoring using PHP developed for Orangebeam Construction Sdn Bhd.

Firstly, it is recommended that the company prioritizes continuous improvement of the application. This involves actively seeking and incorporating user feedback to address any shortcomings, as well as staying abreast of emerging technologies and industry trends. By consistently enhancing the application's features and functionalities, Orangebeam Construction can ensure its long-term effectiveness and relevance in the ever-evolving construction landscape.

Secondly, providing comprehensive user training and ongoing support is crucial to maximize the application's potential. By conducting training sessions and establishing a dedicated support system, construction professionals can become proficient in utilizing the application's features and receive prompt assistance in case of any technical issues or queries. This will facilitate smooth adoption and optimal utilization of the application.

Furthermore, it is important to design the application with integration and compatibility in mind. Ensuring seamless integration with other construction management software,

scheduling tools, and communication platforms will enhance collaboration and data exchange between different systems. This interoperability will streamline project management processes and enable efficient information flow across the organization.

Scalability and flexibility are also key considerations for the application. It should be designed to accommodate projects of varying sizes and complexities. Customization options that allow users to adapt the application to specific project requirements will enhance its usability and applicability in diverse construction scenarios.

Security and data privacy should be given paramount importance. Robust security measures should be implemented to protect project-related data from unauthorized access or breaches. Compliance with data protection regulations and industry standards will ensure the confidentiality and integrity of sensitive information, fostering trust among users.

Lastly, establishing a feedback mechanism for users to provide suggestions, report issues, and share their experiences will enable iterative development and continuous improvement. By actively listening to user feedback and incorporating valuable insights, Orangebeam Construction can enhance the application's features, address user needs, and drive its ongoing success.

By implementing these recommendations, Orangebeam Construction Sdn Bhd can optimize the functionality and effectiveness of the Site Construction Monitoring using PHP. This will ultimately lead to improved construction site management, streamlined processes, enhanced collaboration, and successful project outcomes.

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APPENDIX 1

Example questionnaire for Pre-Testing

QUESTIONAIRE FORM

FINAL YEAR PROJECT

Title:

DEVELOPMENT OF SITE CONSTRUCTION MONITORING SYSTEM USING PREPROCESSOR HYPERTEXT (PHP)

Monitoring The Respondent's Point of View Regarding the Issues Related to Site Construction Monitoring

A part of my study final year project for Bachelor of Civil Engineering Technology (Bct) at Politeknik Ungku Omar (PUO), Ipoh, Perak. I am Muhammad Hafiz Bin Shahril (01BCT20F3022), and i am conducting a survey of pre-test and questionnaires. In order to overcome the need for a digital medium to design and **Develop Site Construction Monitoring Using PHP Software (Application)** for project I9 BBR2 WAREHOUSE.

SECTION A: TICK (/)
DEMOGRAPHY

a) Gender

Male	
Female	

b) Age

Under 25 years old	
26-35 years old	
36-45 years old	
46 years or older	

c) Position

Project Manager	
Construction Manager	
Engineer	
Site Supervisor / Assistant Engineer	
Inspector Of Works	
Operation	
Others	

d) Work Experience

< 2 Years	
2-5 Years	
6-10 Years	
> 10 Years	

SECTION B: TICK (/)
PRE-TEST

No.	Identify problems in the monitoring of projects in real-time	Issues Related to Site Construction Monitoring	Level of Agreement				
			Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
			1	2	3	4	5
1	To what extent do you agree with the following statements about the potential usefulness of the existing method for in-site construction monitoring:	Using the Existing method can improve the accuracy of monitoring construction progress.					
		The Existing method can provide real-time data and insights for better decision-making in construction monitoring.					
		The Existing method has the potential to enhance communication among stakeholders involved in construction monitoring.					
2	To what extent do you agree with the following statements about the perceived ease of use of the Existing method for in-site construction monitoring:	Integrating the Existing method into my existing monitoring practices would be easy.					
		The Existing method seems user-friendly and intuitive to me.					
3	To what extent do you agree	Using the Existing					

	with the following statements about your attitude toward using the Existing method for in-site construction monitoring:	method would be a positive innovation in construction monitoring.					
		Using the Existing method would enhance my effectiveness in construction monitoring.					
		Using the Existing method would align with my overall approach to adopting new technologies.					
4	Behavioral Intention to Use	How likely are you to consider using the Existing method for in-site construction monitoring in the future?					
		How likely are you to recommend the use of the Existing method for in-site construction monitoring to others?					
		To what extent do you believe that using the Existing method for in-site construction monitoring would positively impact your					

		work performance?					
5	General Assessment	How satisfied are you with your existing methods of monitoring construction activities?					
		How confident are you in your ability to adapt to existing method of construction monitoring?					
		How likely are you to actively participate in the implementation and improvement of the Existing method for in-site construction monitoring?					

APPENDIX 2

Example questionnaire for Post-Testing

QUESTIONAIRE FORM

FINAL YEAR PROJECT

Title:

DEVELOPMENT OF SITE CONSTRUCTION MONITORING SYSTEM USING PREPROCESSOR HYPERTEXT (PHP)

Monitoring The Respondent's Point of View Regarding the Issues Related to Site Construction Monitoring

A part of my study final year project for Bachelor of Civil Engineering Technology (Bct) at Politeknik Ungku Omar (PUO), Ipoh, Perak. I am Muhammad Hafiz Bin Shahril (01BCT20F3022), and i am conducting a survey of post-test and questionnaires. In order to overcome the need for a digital medium to design and **Develop Site Construction Monitoring Using PHP Software (Application)** for project I9 BBR2 WAREHOUSE.

SECTION A: TICK (/)
DEMOGRAPHY

e) Gender

Male	
Female	

f) Age

Under 25 years old	
26-35 years old	
36-45 years old	
46 years or older	

g) Position

Project Manager	
Construction Manager	
Engineer	
Site Supervisor / Assistant Engineer	
Inspector Of Works	
Operation	
Others	

h) Work Experience

< 2 Years	
2-5 Years	
6-10 Years	
> 10 Years	

SECTION B: TICK (/)
POST-TEST

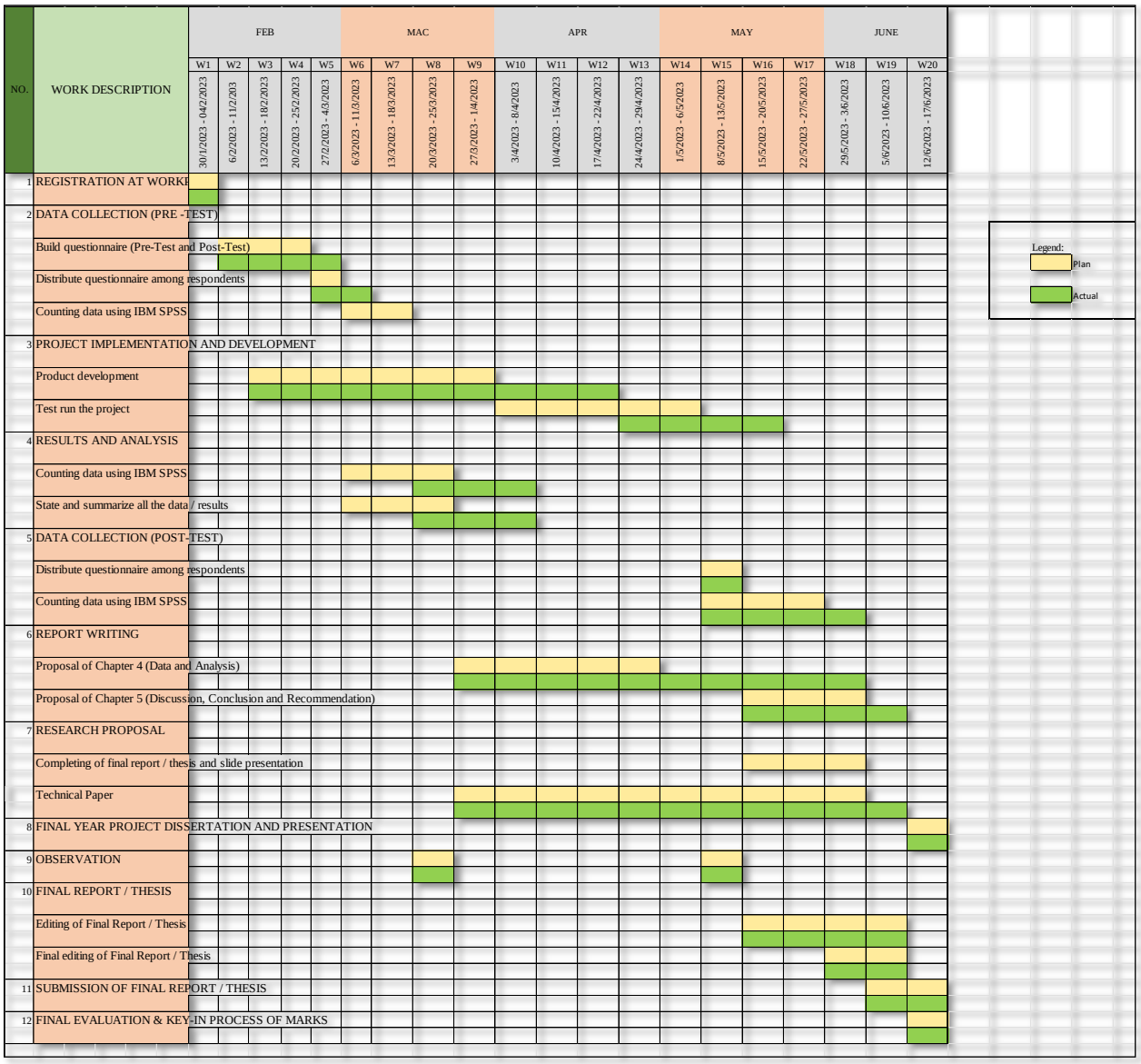
No.	Assessment Of Site Construction Monitoring Using PHP	Issues Related to Site Construction Monitoring	Level of Agreement				
			Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
			1	2	3	4	5
1	Please indicate your level of agreement with the following statements about the perceived usefulness of PHP software for site construction monitoring:	PHP software has improved the efficiency of construction projects.					
		PHP software has enhanced communication among project stakeholders.					
		PHP software has provided valuable insights for decision-making					
2	Please indicate your level of agreement with the following statements about the perceived ease of use of PHP software for site construction monitoring:	Learning to use PHP software for site construction monitoring was easy for me.					
		Integrating PHP software for site construction monitoring into my workflow was easy.					
		I felt confident in my ability to effectively use PHP software for site construction monitoring.					

3	Please indicate your level of agreement with the following statements about your attitude towards using PHP software for site construction monitoring:	Using PHP software for site construction monitoring is a positive development.					
		Using PHP software for site construction monitoring is beneficial for my work.					
		Using PHP software for site construction monitoring aligns with my approach to adopting new technologies.					
4	Behavioral Intention to Use	How likely are you to continue using PHP software for site construction monitoring in the future?					
		How likely are you to recommend the use of PHP software for site construction monitoring to others?					
		To what extent has using PHP software for site construction monitoring positively impacted your work performance?					

5	General Assessment	How satisfied are you with the functionality and features of PHP software for site construction monitoring?					
		How confident are you in your ability to use PHP software for site construction monitoring effectively?					

APPENDIX 3

The Gantt chart of the development progress from semester 7 to semester 8



APPENDIX 4

The coding structure of application development

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <?php
    include('connection/connect.php');
    ?>
<!--    <meta http-equiv="refresh" content="5"/> -->
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1">

    <title>IOT 2023</title>

    <meta name="description" content="Source code generated using
layoutit.com">
    <meta name="author" content="LayoutIt!">

    <link href="css/bootstrap.min.css" rel="stylesheet">
    <link href="css/style.css" rel="stylesheet">
    <link rel="icon" href="akif.png" type="image/gif">


<link rel="stylesheet"
href="https://cdn.datatables.net/1.10.21/css/dataTables.bootstrap4.min.css"
>
<link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/twitter-
bootstrap/4.1.3/css/bootstrap.css" >

<link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.1.1/css/bootstrap.min.
css">
<link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap-
select/1.13.1/css/bootstrap-select.css" />
<script
src="https://ajax.googleapis.com/ajax/libs/jquery/2.1.1/jquery.min.js"></sc
ript>
```

This is a piece of HTML and PHP code. Let's go through it step by step:

1. The code starts with the HTML doctype declaration (**<!DOCTYPE html>**) and the opening **<html>** tag. The **lang** attribute is set to "en" to specify the language as English.

2. The code includes a PHP file using the **include()** function. The file being included is "connection/connect.php". This suggests that the code is likely establishing a database connection or including some database-related functionality.

3. Various **<meta>** tags are used to provide metadata about the web page. The **charset** attribute is set to "utf-8" to specify the character encoding. The **http-equiv** attribute is used to set the "X-UA-Compatible" value to "IE=edge", which ensures the page is rendered using the latest version of Internet Explorer. The **name** attribute is used to provide a description and author metadata.

4. The page title is set to "IOT 2023" using the **<title>** tag.

5. The code includes external CSS and JavaScript files using **<link>** and **<script>** tags. These files are hosted on various CDNs (Content Delivery Networks) and are used to provide additional styling and functionality to the web page.

6. The code defines some custom CSS styles within the **<style>** tags. These styles define the appearance of elements with class names such as "foo", "queue", "blue", "completed", "collected", and "unstyled-button". These styles will be applied to elements that have these classes assigned to them.

7. The code begins the **<body>** section. It contains a ** ** element with the class "container-fluid", which provides a fluid layout for the content.

8. Inside the container, there is a ** ** element with the class "row" that has a background gradient set using the **style** attribute. This creates a gradient effect in the background of the row.

9. Within the row, there is a ** ** element with the class "col-md-12". This element takes up the full width of the row in medium-sized screens.

10. Inside the "col-md-12" div, there is a ** ** element with the class "page-header". It contains an image tag **<img>** with the source "ex.png", which is an image file.

The image is aligned to the center using the **align** attribute. Below the image, there is an **<h1>** heading with a **<small>** tag inside, displaying the text "IOT 2023" as a smaller text.

11. The PHP code starts with the **<?php** tag and ends with the closing **?>** tag. It sets the time zone to "Asia/Kuala_Lumpur" using the **date_default_timezone_set()** function. Then, it retrieves the current date and time using the **date()** function and stores them in the variables **$datenow** and **$timenow**, respectively. The values are displayed using **echo** statements inside the **<h4>** tag.
12. The PHP code continues by assigning the current date to the variable **$tar** in the "Y-m-d" format.
13. The code ends with the closing **</body>** and **</html>** tags.

Overall, this code seems to be creating a web page with a header section containing an image and displaying the current date and time. It also includes CSS and JavaScript files from external sources for styling and additional functionality. The purpose of the code can be better understood by examining the included PHP file and any other related files.