POLITEKNIK UNGKU OMAR

REQUEST FOR INSPECTION TRACKER APPLICATION (RIN TRACKER APP)

MUHAMMAD AMIR FITRI
BIN MOHD BAHANDI
01BCT20F3006

CIVIL ENGINEERING DEPARTMENT

SESSION 2 2022/2023

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A report submitted in partial fulfilment of the requirements for the award of the Degree of Bachelor of Civil Engineering Technology with Honours.

CIVIL ENGINEERING DEPARTMENT

SESSION 2 2022/2023

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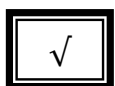4. ** Please mark (√)

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APPRECIATION

ABSTRACT

In the construction sector, effective management of project files and documents is crucial for tracking inspections and ensuring timely completion of construction operations. However, many construction organizations face challenges in maintaining paper records at job sites, resulting in missing progress reports and disorganized files. To address these issues, the objective of this study is to develop the Request for Inspection Tracker Application (RIN Tracker App), a dedicated tracking system for monitoring project progress timelines. The RIN Tracker App is designed to be user-friendly and has been selected as the preferred solution for document tracking and storage. All relevant documents are conveniently accessible through the dashboard view, ensuring easy access for all users of the RIN Tracker App. By simply signing in and entering the digital form, users can immediately obtain all necessary papers. The study indicates that 75% of respondents found the RIN Tracker App to be straightforward to use. Furthermore, 76.7% of participants agreed that the app can expedite work processes, reduce paper usage, and facilitate portable documentation. To assess the effectiveness of the RIN Tracker App, a questionnaire was distributed, and the descriptive test yielded a high mean score of 4.77 with a standard deviation of 0.56, indicating positive results. The SPSS method was employed for comparison against the T Test method. Overall, the Request for Inspection Tracker Application (RIN Tracker App) offers a promising solution to address the challenges faced in the construction sector.

Keywords: Entreat RIN, Tracker Applications, Digital Form, Amelioration, Monitoring Timelines

ABSTRAK

Dalam sektor pembinaan, pengurusan fail dan dokumen projek yang berkesan adalah penting untuk mengesan pemeriksaan dan memastikan penyiapan operasi pembinaan tepat pada masanya. Walau bagaimanapun, banyak organisasi pembinaan menghadapi cabaran dalam mengekalkan rekod kertas di tapak kerja, mengakibatkan kehilangan laporan kemajuan dan fail tidak teratur. Untuk menangani isu-isu ini, objektif kajian ini adalah untuk membangunkan Aplikasi Penjejak Permintaan Pemeriksaan (RIN Tracker App), sistem penjejakan khusus untuk memantau garis masa kemajuan projek. Aplikasi Penjejak RIN direka bentuk untuk mesra pengguna dan telah dipilih sebagai penyelesaian pilihan untuk pengesanan dan penyimpanan dokumen. Semua dokumen yang berkaitan boleh diakses dengan mudah melalui paparan papan pemuka, memastikan akses mudah untuk semua pengguna Apl Penjejak RIN. Dengan hanya mendaftar masuk dan memasukkan borang digital, pengguna boleh mendapatkan semua kertas yang diperlukan dengan segera. Kajian menunjukkan bahawa 75% responden mendapati Apl Penjejak RIN adalah mudah untuk digunakan. Tambahan pula, 76.7% peserta bersetuju bahawa aplikasi itu boleh mempercepatkan proses kerja, mengurangkan penggunaan kertas dan memudahkan dokumentasi mudah alih. Untuk menilai keberkesanan Aplikasi Penjejak RIN, soal selidik telah diedarkan, dan ujian deskriptif menghasilkan skor min yang tinggi iaitu 4.77 dengan sisihan piawai 0.56, menunjukkan keputusan yang positif. Kaedah SPSS digunakan untuk perbandingan dengan kaedah Ujian T. Secara keseluruhan, Aplikasi Penjejak Permintaan untuk Pemeriksaan (Aplikasi Penjejak RIN) menawarkan penyelesaian yang menjanjikan untuk menangani cabaran yang dihadapi dalam sektor pembinaan.

Kata kunci: Meminta RIN, Aplikasi Penjejak, Borang Digital, Ameliorasi, Garis Masa Pemantauan

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LIST OF ABBREVIATION

RIN	Request For Inspection
DC	Document Control
8MD3	8 Mixed Development 3
TRC	Trans Resources Cooperation
IR 4.0	Innovation Revolution 4.0
IoT	Internet of Thing
MSA	Method Statement Approval
COW / IOW	Clerk of Work / Inspector of Work
SPSS	Statistical Package for the Social Sciences

CHAPTER 1

INTRODUCTION

1.1. INTRODUCTION

. The construction industry contributes greatly to the national economy. The process or technique used to create something, particularly structures like buildings, bridges, and roads, is construction Based on the Department of Statistics Malaysia, this sector recorded a construction work value of RM37.4 billion in the first quarter of 2019 (Berita Harian,2020). The population growth was accompanied by a steady increase in garbage production, most of which was dumped in landfills (Shamsul Bahar Mohd Nor,2022).

Construction Industry has four types: home building, heavy industry, institutional and engineering. Home building is the development of the resident area. For heavy industries like power plants, refineries, nuclear plants, and mines. For institutions like office towers, stadiums, schools, hospitals, malls, and art galleries. For engineering construction like bridges, highways, and mass transit systems. Document management is a standardized process that occurs regardless of time, place, or person (Senaratne. S, & Mayuran. J, 2015). Documentation for the building project includes information or reports on the activity. By looking at the project's actual circumstances, functions, and activities, accurate documentation in a systematic storage system application can save time and money while also improving building projects' overall performance and assisting with judgement in the future.

On the construction site, work is being done to create the building, including casting the concrete, setting up formwork, laying brick, and plastering, among other things. Every work on the premises will have a daily inspection report prepared for it. The construction site office will receive all work-related information, and a report will be created there for the developer's reference meeting. As a result, every step of the construction site's work process, including working hours and impending work schedules, should be documented.

Request for Inspection (RIN) is a site construction term that refers to "requesting a plan for a next-day job inspection." It is used throughout the construction process, including the basement. This form will be used during three different phases of the construction process: before the start of construction, during construction and after completion, for example, before installation, brick from the subcontractor. RIN need to submit for a consultant to inspect the brick setting out. The brick set out needs to marking on-site based on the shop drawing. After marking on site, the RIN setting out brick will be forwarded to the consultant. Consultants will be approved for this form once all items on the checklist have been completed. RIN is very useful in guiding construction toward specification compliance, but how it is used or how it is used must be addressed.

1.2. PROBLEM STATEMENT

Manual methods are still utilized in daily work, particularly the collecting of information in tasks related to this management and administration, like the management of building site records or related Officeworks. The lack of a framework that combines all data in a condition that enables effective information storage, management, analysis, and display results in several difficulties and limitations for planning and management tasks

There is still a problem with the inspection work processes at the office at the 8MD3 site office, where the system could be more organized and easier for new employees or others who are just beginning their employment at the site's office. They will be looking for old Request Work Inspection (RIN) records as they make their way to building sites. Additionally, there could be miscommunications between staff members at the corporate office, site offices, and site location. The voluminous paperwork utilized on construction sites needs to be more organized, and the site office still fills out paper-based forms using antiquated procedures. Additionally, employees must fill out forms at the site office rather than on the job site.

The purpose of this study is based on "Proposed Construction and Completion of Architect work like brickwork, plastering work and painting work" This demonstrates that there is no suitable structure for inspection management that combines sustainability and functional (shared) issues and enables effective communication between construction management teams and site management. After that, no

monitoring system is efficient in managing the site. For example, the site planner has a planning progress schedule at the site, but the site does not follow the schedule based on the site planner because have problems at the site like materials, workers and so on. To carry out systematic work to avoid this problem at the construction site, there is an appropriate or effective technique or solution for the firm or site office to promote the management of the construction record system. The ideal option is to create clouds that can be used for any purpose.

1.3. OBJECTIVE OF STUDY

The purpose of the study is to create an application with the aim of establishing a basis to monitor the work progress and quality of workmanship and to ensure understanding between staff members on the project. The goals are as follows:

   i.   To identify the issue RIN tracking application during construction.
  ii.   To develop the RIN tracking application using Android Studio.
 iii.   To evaluate the effectiveness of the RIN tracking application.

1.4. SCOPE OF PROJECT

The location of the study, as shown in figure 1.1, is in the area of the office and construction site of 8MD3, Presint 8, Putrajaya. This project has a few buildings, which are a residential tower, podium, serviced apartment, hotel, event hall and 3 levels of basement. This construction site spans 9.3 acres. RIN Tracker App is exclusively focused on this project's architectural work and includes a work schedule and an inspection checklist. Respondents involved in this research include on-site staff members from various backgrounds. The data used in the RIN Tracker app is acquired from the actual work inspection report.

Figure 1.1: Map 8MD3

1.5. SIGNIFICANT OF THE STUDY

Long working hours and job completion result from the construction site's execution. The issues raised demonstrate that a task or project cannot be completed within the time limit established by higher authorities. In addition, it follows the Industrial Revolution (IR) 4.0 idea, which calls for digitizing industrial processes to build a flexible but extensive network of production and services. A significant number of RIN forms in hardcopy are lost as a result of the old system. As a result, the efficiency of application creation on the site office document will be revealed by this research. Applications that are simple to use, such as document sharing and stored in the cloud, can be evaluated in terms of performance.

Additionally, this system will be used at the 8MD3 location because consumers have praised the mobile management system's user-friendly design. This framework can facilitate and increase the speed of file retrieval if it is necessary. It also lessens the cost

and time of handling documents and the waste of paper, ink, and paper. Additionally, to shop at a stationery store for files.

Aside from that, the building sector needs to be improved to keep up with technological breakthroughs and better systems due to the Fourth Industrial Revolution, which has been widely debated recently. A physical cyber system is being created due to this Revolution, which will change how buildings are built. Utilizing technology and developing knowledge and abilities are essential for coping with these developments.

WhatsApp was often used in the workplaces of the building to communicate and exchange documents and images. This solution, specifically using the approach of informing the employer of work or notice via a mobile application, can be used in the same way that it was for photo sharing notification and can be updated instantly without the need for a long period of time or to be resolved for the numerous developments. In this way, the manager will respond to the memo that was distributed to everyone.

1.6.   CONCLUSION

The introduction, problem statement, aim, scope of investigation, and significance of the study have all been covered in the conclusion for this chapter. Overall, from this chapter alone, the problems and issues that faces at the construction site is inspection especially for architecture work. This is because it is difficult to keep track of how the real work is progressing on the job site. Due to this, every progress work, need to be reported to the planning about daily progress on the construction site.

According to the problem statement, this study's three main goals are to: identify the Request Inspection tracking application issue during construction; develop the Request Inspection tracking application using Android Studio; and assess the RIN tracking application's effectiveness. The researcher's field of inquiry is situated at the 8MD3 construction site and site office. The outcomes and conclusions of this research will have a beneficial impact on how the construction project operates and managed. The benefit of this application is that it will make it simpler and more effective to check on the status of the task. The goal of creating this program was to make monitoring job progress for engineers, supervisors, and other users considerably easier.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

One of the two primary categories of review articles is a literature review or narrative review; the other is a systematic review. It is an academic publication that presents the most recent information on the subject, including original substantive results and theoretical and methodological advancements. Reviews of the literature are both original experimental effort and secondary sources. A literature review aims to identify earlier areas of investigation and provide a critical written assessment of the current state of research on a certain topic. Such reviews can be found in academic journals and are typically connected with scholarly material. The foundation of research in almost every academic discipline is a literature review.

This chapter includes introduction, Request for Inspection (RIN), construction Document Control, Application Development, Mechanical, Electrical & Plumbing (MEP), and conclusion. Each of these sections has its sub-content tailored to the studies. The researcher will summarize the literature in this chapter to identify current research knowledge. Predicting a superior solution is also relevant. A previous case study involving the other researcher may also help the researcher.

Due to new developments that are increasingly affecting the economy, Malaysia is becoming more advanced than before. The building sector is one of the sectors that influences and contributes to a nation's development. Several studies have also been motivated by the fact that the construction industry will contribute to the economy's expansion. Malaysia aims to advance from the development structure that includes this construction industry by 2020, (Abdul Aziz, 2015).

Progress reports will be needed by project management. Greater engineering firms will have their methods for doing this. You will likely need to set up a reporting system in conjunction with project management if you work for a smaller organization. Reporting is crucial because it is necessary to know where you are in the project,

whether you are staying within the budgeted hours, and to identify when things are going off track so that you can take corrective action. This is true if periodic client payments are tied to the progress (Beale, 2018).

In addition, technological improvement significantly impacts a nation's development within the developed world. assist with the current development that is occurring in Malaysia. Conventional construction techniques are minimized even with this new technology (Chudley, 2011). Here, the researcher will provide a summary of the research done to ascertain the extent of data currently known about the subject. It can also be used to forecast when a better solution to a problem will be discovered. Working with other researchers also enables researchers to improve the results of the previous case study. The planning and managing building projects at the job site are the key objectives of this project.

2.2. TYPE OF INSPECTION IN ARCHITECTURE

Architecture work is one of the most important groups to make sure a building looks gorgeous, as is widely recognized. Before the building may be occupied, various tasks must be completed. This process must be carried out correctly when constructing a building so that there are no defects at the end.

2.2.1. Door frame

Inspecting the installation of a door frame is crucial to ensure it is properly installed and functions correctly. there are a few things to look for before, during and after door installation. Here is a general framework for an inspection to installation door frame

i.   Alignment and Levelness
     Check if the door frame is properly aligned and level. Use a level to verify that the vertical jambs are plumb and the header is level. Misalignment can cause the door to bind or not close properly.

ii. Secure Attachment

Ensure that the door frame is securely attached to the surrounding structure. Check if nails or screws are properly driven into the wall studs and shims. Loose or inadequate fastening can result in an unstable frame and affect the door's functionality.

iii. Squareness

Confirm that the door frame is square, meaning that all corners form 90-degree angles. Use a measuring tape or carpenter's square to check for squareness. A non-square frame can cause the door to twist or stick when opening and closing.

iv. Gap Consistency

Inspect the gaps around the door frame to ensure they are consistent. There should be an even gap between the door and the frame on all sides. Inconsistent gaps may indicate an installation error or a warped frame, which can affect the door's operation and insulation.

v. Proper Shimming

Check the shims used during installation. Shims are typically placed between the frame and the wall studs to ensure stability and alignment. Verify that shims are properly positioned and provide even support. They should not be over compressed or create bulges in the frame

Figure 2.1: Installation Door Frame

If any issues or concerns are identified during the inspection, it is advisable to consult a professional contractor or installer to address them promptly. Proper installation of the door frame is essential for the door's functionality, security, and longevity.

2.2.2. Brick wall

Inspecting the installation of a brick wall involves assessing various aspects to ensure its structural integrity and overall quality. Here is a general framework for an inspection to installation brick wall

i Plumbness and Alignment

Check if the wall is plumb (vertical) and properly aligned. Use a level or plumb bob to verify that the wall is straight and not leaning. Misalignment can compromise the wall's stability and affect its overall appearance.

ii Bonding and Mortar Joints

Check the bonding pattern and mortar joints between the bricks. The bricks should be laid in a consistent pattern, such as a running bond or stack bond, with evenly spaced mortar joints. Check for proper mortar thickness and ensure that joints are filled uniformly.

iii Mortar Quality

Assess the quality of the mortar used. It should be well-mixed, properly proportioned, and applied evenly. Check for adequate mortar coverage on the bricks, without excessive mortar smears or voids. The mortar should be weather-resistant and compatible with the bricks.

iv Brick Quality and Condition

Inspect the quality and condition of the bricks. They should be free of cracks, chips, or other defects that may compromise their structural strength or aesthetic appeal. Verify that the bricks are properly sized, uniform in shape, and securely in place.

v   Levelness and Straightness

Verify that the wall is level (horizontal) and straight. Use a level to check the wall's horizontal alignment at various points. Unevenness or sagging can indicate problems with the foundation or structural supports.

Figure 2.2: Installation Brick wall

If any issues or concerns are identified during the inspection, it is advisable to consult a professional contractor or mason experienced in brickwork to address them promptly. Proper installation of the brick wall is crucial for its structural stability, durability, and visual appeal.

2.2.3. Floor Screeding

Inspecting the floor screeding involves checking various aspects to ensure a level, smooth, and structurally sound surface. Here is a general framework for an inspection to installation floor screeding.

i.   Levelness and Flatness

Use a straightedge or laser level to check the levelness and flatness of the screeded floor. It should be even and free from noticeable undulations or deviations. Check for any dips or high spots that could affect the final flooring installation.

ii. Thickness and Coverage

Measure the thickness of the screed to ensure it meets the specified requirements. It should be uniform and consistent across the entire area. Verify that the screed fully covers the substrate and there are no exposed patches or areas with inadequate coverage.

iii. Adhesion and Bonding

Assess the adhesion and bonding of the screed to the substrate. Check for any signs of delamination or loose areas. The screed should firmly adhere to the substrate, providing a solid foundation for the flooring system.

iv. Surface Quality

Inspect the surface of the screed for smoothness and finish. It should be free from cracks, lumps, or surface irregularities. Run your hand over the surface to detect any rough patches or inconsistencies that may affect the final flooring installation.

v. Moisture Content

Check the moisture content of the screed, especially if it is a cementitious screed. Excessive moisture can cause issues with flooring adhesion and lead to problems like warping or Mold growth. Use a moisture meter to measure the moisture levels and ensure they are within acceptable limits

Figure 2.3: Installation floor Screeding

If any issues or concerns are identified during the inspection, it is advisable to consult with the screeding contractor or a qualified professional to address them promptly. Properly installed and inspected floor screeding provides a level and stable base for the final flooring, contributing to its durability and performance.

2.2.4. Floor epoxy

Inspecting a floor epoxy installation involves evaluating various aspects to ensure a smooth, durable, and visually appealing finish. Here is a general framework for an inspection to installation floor epoxy

i. Surface Preparation

Assess the surface preparation before epoxy application. The substrate should be clean, free from dust, dirt, grease, or any contaminants that can interfere with the adhesion of the epoxy. Verify that any required repairs or patching of the substrate have been properly addressed.

ii. Adhesion and Bonding

Check the adhesion of the epoxy to the substrate. The epoxy should firmly bond to the surface without any signs of peeling, bubbling, or delamination. Pay attention to high traffic areas or areas prone to moisture to ensure the epoxy is securely adhered.

iii. Smoothness and Uniformity

Evaluate the smoothness and uniformity of the epoxy coating. The surface should be level and free from bumps, ridges, or unevenness. Verify that the epoxy has been evenly applied across the entire floor, without visible inconsistencies in thickness or coverage.

iv. Colour and Gloss

Inspect the colour and gloss of the epoxy. The colour should be consistent and match the desired finish. The gloss level, whether high gloss or satin, should be uniform and provide the desired aesthetic appearance. Look for any areas with dull spots or uneven gloss.

v. Durability and Resistance

Evaluate the durability and resistance properties of the epoxy. It should be resistant to chemicals, stains, abrasion, and impact. Check for any signs of chipping, scratching, or wear that may indicate a compromised surface.

Figure 2.4: Installation floor epoxy

If any issues or concerns are identified during the inspection, it is advisable to consult with the epoxy flooring contractor or a qualified professional to address them promptly. Properly installed and inspected floor epoxy provides a durable and visually appealing finish that enhances the functionality and aesthetics of the floor surface.

2.3. METHOD OF INSPECTION

In every phase of the building process, routine inspection is crucial. Inspections ensure that project work goes according to schedule and in conformity with specifications, standards, and regulations. The management of a building site requires the coordination of personnel, supplies, and equipment. As a result, construction inspections are carried out for a number of reasons throughout each building phase and for the length of the project to make sure everything is going as planned (LetsBuild, 2019).

Several techniques are used to conduct inspections on the construction site. The engineer must first submit the Request for Inspection (RIN) form to the Inspector of Work (IOW) before carrying out the inspection. With the RIN in hand, the IOW will

document any work done and make sure it complies with the RIN. Many different methods have been used to generate and store RINs over the years. Among the techniques employed are personal digital assistant inspection and paper-based inspection. Even though all of these techniques help the IOW and engineer complete inspections, only a handful of them are really in execution.

2.3.1. Paper based inspection

Paper-based inspection refers to the process of conducting inspections using physical paper forms or checklists. Instead of using digital or electronic tools, inspectors carry out the inspection by manually recording observations, measurements, and findings on paper documents. there are a few things to look at like design inspection form, conduct the Inspection and Capture Visual Evidence. for design inspection form, it needs to create inspection forms or checklists tailored to the specific inspection requirements. These forms typically include sections for recording information such as inspection date, location, item being inspected, observations, measurements, and any identified issues or deficiencies. after that, for conduct the Inspection, Visit the inspection site and systematically go through the checklist or inspection form, recording relevant information manually. Inspectors observe, measure, and document the condition, performance, or compliance of the items being inspected.

Next, for Capture Visual Evidence, need to use a camera or other imaging devices to capture visual evidence of the inspection findings. Attach printed photos or diagrams to the inspection form for reference and documentation. It's worth noting that while paper-based inspections are still commonly used, many organizations are transitioning to digital inspection methods. Digital tools offer several advantages, including real-time data collection, automated reporting, improved data analysis, and easier collaboration. However, paper-based inspections can still be effective, especially in situations where digital tools may not be feasible or accessible.

Figure 2.5: Inspection Form

2.3.2. Personal Digital Assistant (PDA) Inspection

Personal Digital Assistant (PDA) inspection refers to conducting inspections using handheld electronic devices equipped with specialized software or applications designed for inspection purposes. PDAs, also known as handheld or mobile devices, enable inspectors to record and manage inspection data electronically, providing a more efficient and streamlined approach to the inspection process. there are several steps for use it.

i.   Select the PDA Device and Inspection Software

Choose a suitable PDA device, such as a smartphone or tablet, that meets the requirements of the inspection. Install or select inspection software or applications specifically designed for inspections in your industry or for the specific type of inspection being conducted.

ii. Customize Inspection Templates

Configure or customize inspection templates within the software to match the specific inspection criteria, checklist items, and data fields relevant to your inspection. This allows you to tailor the inspection process to your specific needs.

iii.   Conduct the Inspection

Use the PDA device and inspection software to systematically go through the inspection checklist or template. Enter data directly into the software using the device's touchscreen or input mechanisms. Record observations, measurements, and other relevant information as required by the inspection.

iv.   Capture Visual Evidence

Utilize the PDA device's built-in camera or external imaging devices to capture visual evidence or attach images directly to the inspection record within the software. This provides visual documentation to support the inspection findings.

Figure 2.6: PDA Phone

PDA inspections offer several advantages over traditional paper-based inspections, including improved efficiency, accuracy, and data management. The digital nature of PDA inspections enables real-time data capture, automated validation, and streamlined reporting, resulting in more effective and informed decision-making.

2.4. WORK PROGRESS INSPECTION CHECKLIST

An inspection checklist is a tool used to systematically assess and evaluate the condition, compliance, or quality of something through a thorough inspection. It helps ensure that all necessary aspects are reviewed, documented, and addressed during inspection. Inspection checklists can be used in various contexts, such as building inspections, safety inspections, equipment inspections, vehicle inspections, and more.

Here is a general framework for an inspection checklist:

i. General Information
   a) Date and time of the inspection.
   b) Location or area being inspected.
   c) Name of the inspector or inspection team.

ii. Specific Items or Areas
   a) List the items, areas, or components that need to be inspected.
   b) Break down larger items into sub-items for detailed examination.

iii. Inspection Criteria
   a) Define the criteria or standards against which the inspection will be conducted.
   b) Include relevant regulations, guidelines, or specific requirements.

iv. Inspection Checklist Items
   a) For each item or area being inspected, provide a checklist of specific aspects to evaluate or tasks to perform.
   b) Include questions, measurements, observations, or actions to be taken.

v. Documentation and Recording
   a) Provide space for documenting the findings of the inspection.
   b) Include fields for notes, comments, and observations.
   c) Allow for marking items as compliant, non-compliant, or requiring further action

vi. Corrective Actions
   a) If any non-compliant or deficient areas are identified, provide space to record recommended corrective actions.
   b) Include fields for assigning responsibilities, setting deadlines, and tracking the progress of resolving the issues.

vii.   Signatures and Approval

    a) Include sections for the inspector, supervisor, or responsible parties to sign and indicate their approval of the inspection results.

It's important to customize the checklist to suit the specific inspection needs and context. Different industries or fields may have unique requirements and standards to be met during an inspection. The checklist should be comprehensive enough to cover all critical aspects and provide clear guidance to the inspector. Regular review and updates of the checklist based on feedback and changing requirements are also recommended to ensure its effectiveness.

Figure 2.7: Checklist for Skim Coat

2.5. CONSTRUCTION DOCUMENT CONTROL

"The paperwork must be completed before the job is finished." A similar caption could be used for a construction project. With the added requirement that the project documents be arranged and filed for quick retrieval and use by the project team. To prevent becoming mired in the massive amount of necessary contract documents, the project manager needs a document management plan that establishes the proper

documentation control procedure and implements the right system. All project 1 documentation, including subcontract agreements, vendor purchase orders, contractor payment records, correspondence, meeting minutes, construction drawings, technical specifications, progress reports, schedules, progress photos, daily logs, and reports, permits, and other documents about code compliance, must be under strict control.

Depending on the size of the project, a graded approach should be used to set up the project document control system. A small project could be supported by a simple document filing system with manual logs for tracking submittals and change orders. Expect to encounter digital and/or web-based document control solutions on most large projects.

The procedure for proper document control is largely the same on both large and small construction projects, regardless of whether there is a paper and filing cabinet system or an electronic scanned records control system. A consistent document file index should be the first thing implemented so that everyone is aware of where to look and how to access the needed project document. Another need is that the document control system must have a designated custodian who oversees maintaining track of all project documentation.

2.6. QUALITY CONTROL

To make sure that the building work complies with the standards, quality control (QC) inspections are performed. Technical specifications for construction quality specify the checks that must be made to guarantee that the job is finished successfully. These inspections cover the execution and completion of building projects as well as objects and materials. Inspections are a way to ensure the success of a finished construction project. Prior to delivering it to the client, the product or job has to be improved so that any problems are fixed. Whether internal, external, or a combination of both controls are implemented, we aim to cut costs associated with subpar work while ensuring that the completed project satisfies all customer demands.

Construction uses the ISO 9000 group of standards, which include technical recommendations, analyses, and requirements about the effectiveness of a construction organization's quality management system. The fundamental factors controlling quality management in construction standards are the project's scope, budget, and completion schedule. It is possible for quality inspections to include materials, work units, methods,

and services that were created and planned by the construction company to adhere to the contract's quality criteria. An inspection system is also connected to the quality plan for construction activities needing quality assurance for preventative measures. Inspections regarding papers, work instructions, action plans, and other related items may be carried out for the execution and supervision of building activities. Third-party certificates might take on the role of these quality control checks.

Effective quality control processes help deliver high-quality products and services and contribute to customer satisfaction and project success. It involves a combination of people, processes, tools, and quality management systems to achieve and maintain desired levels of quality throughout

2.7. APPLICATION DEVELOPMENT

Apps are widely displayed using application distribution platforms, which first appeared in 2008. Some apps can be used without being credited, while others must be credited. They are usually downloaded from a shop to a target device, such as an iOS, Android, or Windows device. Information and communication technology (ICT) has previously been said to help increase productivity and efficiency (Tong Liu, 2017).

Although it is still a relatively new technology, IT applications are becoming increasingly commonplace in the construction industry. However, managing IT successfully is getting more difficult because of a number of well-known barriers. The field of internal or external communication systems for allocation information has seen the most recent rise in IT use in the construction sector. the ability to debate facts and data among all project participants.

According to Salman Azhara et al. (2014), the life cycle of a building project may use the application system in mobile apps. According to this publication, this smartphone software has proven useful for its utilitarian duties related to quality control, particularly defect monitoring. The adoption of mobile phone applications can help the construction sector make technological improvements.

2.7.1. Firebase Realtime Database

Firebase Realtime Database is a cloud-hosted NoSQL database provided by Google as part of the Firebase platform. It allows developers to store and synchronize data in real time between clients and servers. The Realtime Database is commonly used in web and mobile applications to handle real-time data updates and collaboration features. There have several features which is Real-time Data Sync. The Realtime Database enables real-time data synchronization across multiple clients, such as web browsers, mobile devices, or backend servers. Any changes made to the database are instantly propagated to all connected clients, providing a real-time and collaborative experience. After that, it has NoSQL Data Model. The database follows a NoSQL data model, storing data in a JSON-like format as a hierarchical tree structure. It allows developers to store and retrieve structured data without the need for predefined schemas.

Next, it can Access Control and Security. The database provides granular access control and security rules, allowing developers to define who can read and write data. These rules are enforced on the server, ensuring data security and preventing unauthorized access. Lastly, it can Real-time Event Notifications. Developers can attach event listeners to the database to receive real-time notifications when data changes. This feature enables applications to respond dynamically to updates, triggering actions or updating the user interface accordingly.
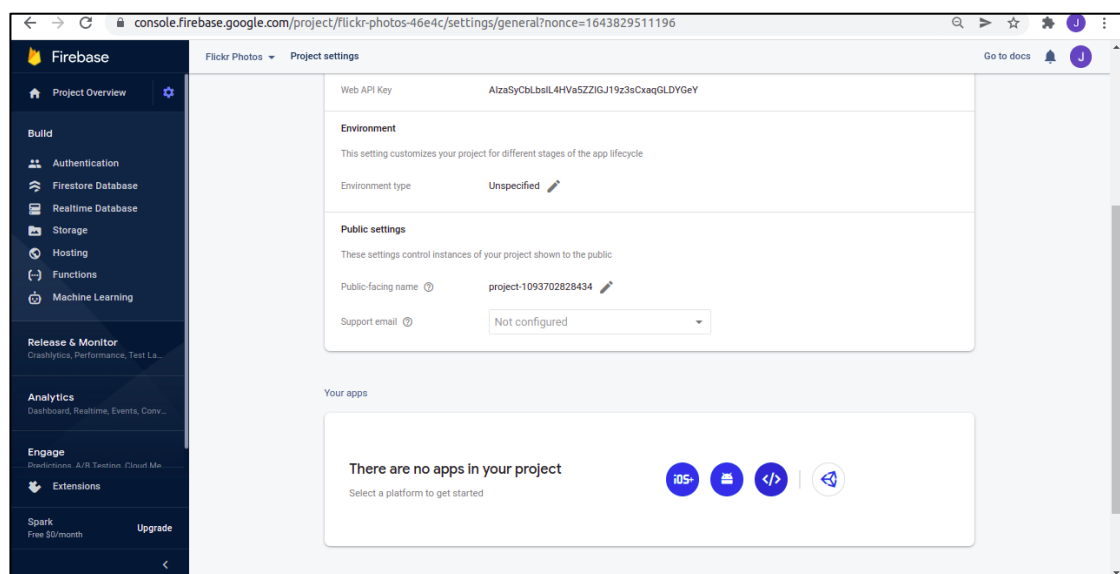
Figure 2.8: Firebase Website

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Developers can interact with the Realtime Database using Firebase SDKs for various platforms, including JavaScript, iOS, Android, and backend servers. The Firebase console provides a user-friendly interface to manage the database, define security rules, and monitor usage. Overall, Firebase Realtime Database simplifies the process of building real-time applications by handling data synchronization and providing a scalable and reliable infrastructure for managing data in real time.

2.7.2. Android Studio

Built on JetBrains' IntelliJ IDEA software and developed exclusively for Android development, Android Studio is the official integrated development environment (IDE) for Google's Android operating system. In 2020, it will be accessible for download on Windows, macOS, and Linux operating systems, as well as as a subscription-based service. It takes the position of the Eclipse Android Development Tools (E-ADT) as the main IDE for developing native Android apps. On May 16, 2013, during the Google I/O conference, Android Studio was revealed. Starting with version 0.1 in May 2013, it was in early access preview mode, then moved to beta mode with version 0.8, which was launched in June 2014. Starting with version 1.0, the first stable build was published in December 2014. With the help of Android Studio, users can preview any aesthetic adjustments they make to the app in real time and simultaneously see how it will look on several Android devices with varied settings and resolutions. Another improvement to Android Studio is the addition of additional tools for labelling and packaging codes. They enable the user to keep up with the project even while working with huge amounts of code. Additionally, the components may be dragged and dropped to move them throughout the interface. The cloud-based messaging capability in this new environment, which enables users to send data from the server to Android handsets, makes it the ideal way to send push notifications to users' applications.

By giving programmers a visual interface to continue programming while controlling the application's flow, the tool will also help users localize programmers. Additionally, Android Studio offers a straightforward method to assess performance across various device types as well as a straightforward and dependable development environment. Despite this, it also offers wizards and templates for standard parts of Android programming. Lastly, an editor with a full range of additional features to facilitate application development.
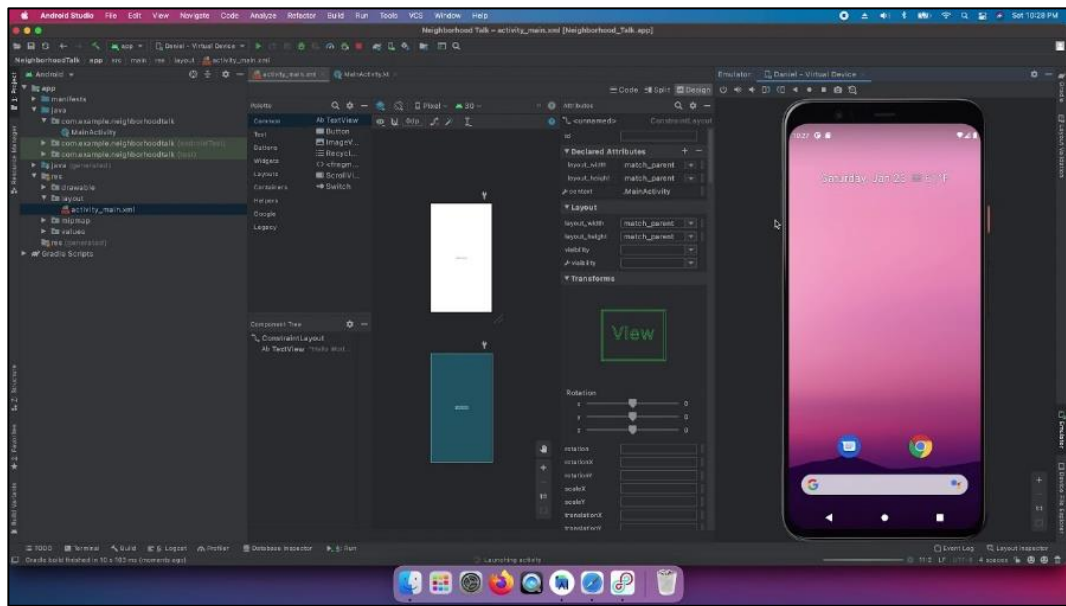
Figure 2.9: Android studio interface

2.8. IR 4.0

The definition of IR 4.0 is "Cyber-Physical Systems (CPS)" involving entirely new capabilities for people and machines. While these capabilities are reliant on the technologies and infrastructure of the Third Industrial Revolution, (World Economic Forum, 2016). We will experience significant changes in how we work, live, and interact as a result of IR4.0. New technical developments have opened a new chapter in human progress. These technological developments combine the physical, digital, and biological worlds in ways that provide almost limitless opportunities as well as possible dangers. We will be able to reevaluate how nations develop and corporations create value because to the pace, breadth, and depth of this change.

IR4.0 offers a chance to assist everyone - from leaders to policy-makers, academics to operators, individuals from all income levels and countries - in using convergent technologies to build an inclusive, human-cantered future. The true potential lies in looking beyond technology and using its influence on human modernization. Corporate executives may have more control and understanding of various business operations and processes thanks to this transformation, which will enable them to use real-time data to increase output, refine procedures, and spur development. There are 12 technology categories listed in IR 4.0 i.e.

i. Prefabrication & Modular Construction

ii. Building Information Modelling (BIM)

iii. Autonomous Construction

iv. Augmented Reality & Virtualization

v. Cloud and Realtime Collaboration

vi. 3D Scanning and Photogrammetry

vii. Big Data and Predictive Analytic

viii. Internet of Things

ix. Blockchain

x. Artificial Intelligence

xi. 3D Printing& Additive Manufacturing

xii. Advanced Building Materials

2.8.1. Cloud And Realtime Collaboration

Employees can collaborate on documents and other forms of data that are stored off-site and outside Employees can collaborate on documents and other forms of data that are stored off-site and outside of the business firewall using cloud collaboration, a sort of enterprise collaboration. To discuss, edit, and collaborate on projects, staff members use a cloud-based collaboration tool. The cloud allows for the simultaneous work of two or more individuals on a project. of the business firewall using cloud collaboration. To discuss, edit, and collaborate on projects, staff members use a cloud-based collaboration tool. The cloud allows for the simultaneous work of two or more individuals on a project.

A cloud collaboration project starts when one person generates the document or file and then grants access to certain others. For instance, the project creator may post a link to the project so that others can read and modify it. Even when workers are A cloud collaboration project starts when one person generates the document or file and then grants access to certain others. For instance, the project creator may post a link to the project so that others can read and modify it. Even when workers are concurrently reading and editing the page, users can make changes at any moment. Each user sees the same version of the project since all modifications are stored and synchronized. concurrently reading and editing the page, users can make changes at any moment. Each

user sees the same version of the project since all modifications are stored and synchronized.

Vendors' efforts to draw consumers have led to a rise in the sophistication of cloud collaboration. It is typical for a collaboration tool to have a feature that allows users to know who else is seeing the document and to interact with one another while working, for example, by leaving comments or using a chat feature. Users may frequently set up email notifications for time a file is modified using tools. The effectiveness and productivity of employees are improved by these and other features. (Moriah Sargent, Associate Director, February 2015)

2.9. ARCHITECT

Architects oversee design and project planning, and they are also responsible for the visual appearance of buildings and structures. The term "architect" refers only to individuals who are registered with a local governing body. To become licensed, architects must meet specific professional training requirements and pass an exam. Architectural services can be obtained from individuals without licenses, but they cannot call themselves architects or sign construction documents.

Architects collaborate with other professionals such as civil and HVAC engineers to deliver qualified designs. Architects have several responsibilities during all stages of a project, from the initial drafts and meetings to the inauguration of a building. The client appoints architects, and they must gather all the information and ideas necessary to create a functional space that meets client needs while being code compliant.

2.9.1. Brick wall

Brick wall work refers to the construction of walls using bricks as the primary building material. brick walls are commonly used in various types of construction, including residential, commercial, and industrial buildings. the steps involved in brick wall work are foundation preparation, mortar preparation, laying the bricks, mortar joints, wall reinforcement, wall ties, damp proofing, curing, drying and finishing. It's important to note that brick wall construction requires skilled masons or bricklayers with expertise in laying bricks and maintaining proper alignment, levelness, and bond strength.

Additionally, local building codes and regulations should be followed to ensure the structural integrity and safety of the brick wall.

Figure 2.10: Brick wall work

2.9.2. Skim Coat

Skim coat work refers to the process of applying a thin layer of finishing material, called a skim coat, to a surface to achieve a smooth and even texture. It is typically done on interior walls or ceilings to repair imperfections, create a uniform surface, or prepare the surface for painting or wallpapering. The key steps involved in skim coat work are Surface Preparation, Mixing the Skim Coat, Applying the Skim Coat, Smoothing and Levelling, Sanding and Feathering, Cleaning and Priming. Skim coat work requires attention to detail and proper technique to achieve a smooth and flawless finish. Ensuring that the skim coat material is applied evenly and the surface is properly prepared to achieve the desired results is important. If you are not experienced with skim coat work, consulting or hiring a professional may be advisable to ensure a high-quality and satisfactory outcome.

Figure 2.11: Skim Coat Work

2.9.3. Screeding work

Screeding is a construction process that involves levelling and smoothing a surface, typically a floor or a concrete slab, using a screed. The purpose of screeding is to create a flat, even, and level surface suitable for further finishing or installing flooring materials. The steps involved in screeding work are surface preparation, establishing the level, setting up guides, mixing the screed, applying the screed, screed compaction and finishing, checking and adjusting the level, curing and drying. Screeding work requires skill and attention to detail to achieve a level and smooth surface. It is important to use quality materials, properly prepare the substrate, and follow the correct techniques and procedures. Hiring a professional screeding contractor is often recommended to ensure accurate levelling and achieve a high-quality finish.

Figure 2.12: Screeding Work

2.10. CONCLUSION

Implementing technology will benefit the construction sector by improving efficiency and reducing waiting lists. Furthermore, it can be accessible from anywhere and simplifies daily work by utilizing technology like apps or systems. Project managers, site engineers, and site supervisors must complete documentation including site diaries, site memos, approval requests (RFA), and most crucially requests for inspection (RIN) during construction. an order to carry out construction as planned. Apps and systems that can be accessible from any construction site or site office should be utilized to create document construction forms.

The word "sustainability" has been bandied about a lot. To ensure that the advantage is realised without any problems, long-term construction is necessary in several forms of construction. In order to start procedures and raise production quality, this issue of sustainability is crucial in every project or Implementing technology will benefit the construction sector by improving efficiency and reducing waiting lists. Furthermore, it can be accessible from anywhere and simplifies daily work by utilizing technology like apps or systems. Project managers, site engineers, and site supervisors must complete documentation including site diaries, site memos, approval requests (RFA), and most crucially requests for inspection (RIN) during construction. an order to carry out construction as planned. Apps and systems that can be accessible from any construction site or site office should be utilized to create document construction forms.

The word "sustainability" has been bandied about a lot. Long-term construction is necessary in several forms of construction to ensure that the advantage is realised without any problems. In order to start procedures and raise production quality, this issue of sustainability is crucial in every project or industry. Create mobile systems and apps to solve the issue; the user will profit tremendously and the solution will be more long-lasting. The lack of paper, the capacity to manage and cut down on the time needed to finish paperwork, and the ability to organize and find information are just a few benefits of this system and apps. industry. Create mobile systems and apps to solve the issue; the user will profit tremendously and the solution will be more long-lasting. The lack of paper, the capacity to manage and cut down on the time needed to finish paperwork, and the ability to organize and find information are just a few benefits of this system and apps.

CHAPTER 3

METHODOLOGY

3.1. INTRODUCTION

The methodology of the system and its development process will be covered in this chapter. This chapter will also go through the methods employed to identify the issue and the suitable system used from the start of the project to its conclusion. This technique accomplishes the project's objectives and produces a successful outcome. This chapter outlines the methods and strategies for gathering information to identify the construction-related document that needs to be structured. This chapter discusses the research design, sampling design, data collection, data analysis, and hypothesis. Additionally, data from the primary (a survey questionnaire) and secondary sources will be collected by the study's objectives (literature review). For upcoming research, many of the findings from this plan have been published in peer-reviewed journals. The method is used to fulfil the goal of this report on the project.

The implementation would be led by observing and working on the assignment to determine the effectiveness of the application. Feasibility studies used primary and secondary sources to enhance the project. It was carried out using a questionnaire and preliminary source observation. The secondary source is obtained through the collection and analysis of data. After that, the chosen systems are to be employed and applied within the site based on the issues that have been recognized. This is based on all the available information, including articles, interviews, first-hand knowledge, and other factors.

This application can log in and log out for everyone anywhere. It can be navigated from a smartphone to know how the work is progressing on-site at any time. All the records of work progress can get in this application. This application also saves time reporting and analyzing data. The problem at the construction site may be solved, and an objective project can be achieved by identifying work inspection system issues

and the effectiveness of the work inspection system compared to the conventional technique. The questionnaire will be submitted to all staff involved at 8MD3 so that they can obtain feedback or comments on the effectiveness of the database in solving the RIN's problem at the construction site.

3.2. RESEARCH DESIGN

The framework guided the project's execution. Figure 3.1 shows the many components of the approach used in this investigation. This development study follows the RIN Tracker app from beginning to end in stages. A flowchart for this system should be created during this procedure to ensure that everything goes as planned and successfully.
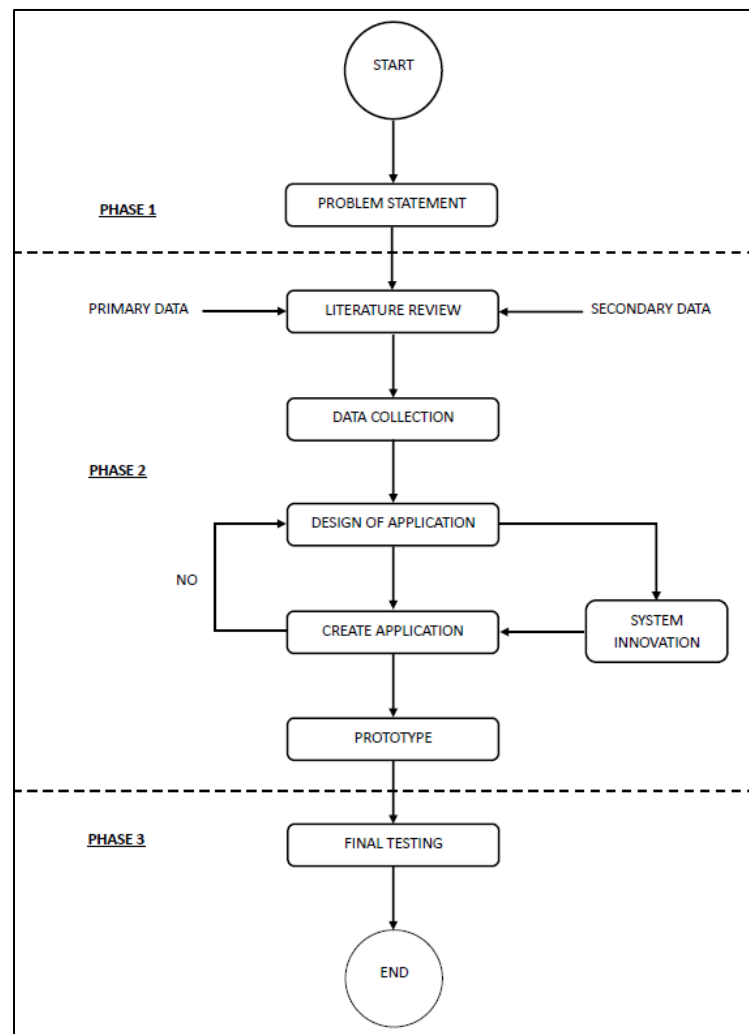
Figure 3.1: Flow of Research Framework

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The methodology of this study is divided into several elements, each of which will be discussed in detail. Various methods were also used to conduct interviews, examine research study findings, analyses the literature, develop a questionnaire, and assess the project's progress. Three stages of approach will be used during the project's completion:

Phase 1: Problem discovery and literature review
Phase 2: Method of collection data (Primary source and Secondary source)
Phase 3: Production of a system (Testing of data, analysis, and interpretation of data), and recommendation and conclusion

Phase 1: Problem discovery and literature review
Planning the design and analysis of the project that will be constructed is the most important part of this phase. This phase involves meeting with the mentor and supervisor as well as gathering data for the project's development. This process takes at least two weeks to complete.

Phase 2: Method of collection data (Primary source and Secondary source)
This phase's main goal is to assess and compare the oldest and newest websites currently available. The analysis makes use of questionnaires, interviews, and fact-finding methods. The information obtained will be used to develop the model and prototype before going on to the next stages.
a.   Primary Source
To acquire difficult facts, the questionnaire was used to conduct the interview and observation. To obtain assurance and comprehensive information on the elements being evaluated in interviews and surveys, this interview method is required. This information was acquired through direct contact with persons involved in construction projects, like contractors and professional engineers.
b.   Secondary Source
Secondary sources were gathered from various sources. The significance of this research is shown by the information. These details are also necessary to gather more data for this project. Additional details that were included in the project's content. This study's sources covered journals, the Internet, and the company's data collection procedures. At this point, the application's interface sketch and other elements must also

be drawn. During this stage, create a prototype that will be presented to the mentor and supervisor using sketches of the output and input of a mobile app as a guideline. The system is later developed by a programmer that uses software like Visual Studio Code.

Phase 3: Production of a system (Testing of data, analysis, and interpretation of data), and recommendation and conclusion

Following the completion of the whole mobile application, a number of procedures will be used to make sure the system is tested and that there are no compile or run-time defects in the application's execution. Lastly, to evaluate the workforce integration tracking system's effectiveness in light of current practices. To create the system's flowchart in order to make sure the project goes as planned and without a hitch.

3.3. DEVELOPMENT OF PROJECT

In this study, the research framework is employed to construct the research. The observation of the research framework, upon which the study's flow is built in this project, is shown in Figure 3.1 below. The researcher will discuss this project's methodology throughout the study development phase. Anything that a user may interact with might be considered a development process, including a wall of post-it notes, a gadget that a researcher put together, a role-playing game, or simply a storyboard. There have two processes involve which design and develop

In order to complete the prototype and create the finished system, the author will construct the system using Android Studio and Firebase. In order to accomplish goal 1, literature research was conducted to identify the primary issues surrounding the creation of the progress report. The checklist feature was built into the prototype mobile app system by the author in order to accomplish goal 2. The author has been testing the mobile application for user experience to fulfil goal 3

3.3.1.   Design of RIN Tracker App

The overall objective of the application is described by the prototype design. The purpose and characteristics of the programmer must be understood by users and researchers. It also explained how each button functioned. Future employees will find

it convenient and user-friendly. It is the process of defining, developing, and designing systems to fulfil the unique goals and expectations of an organization or a company (Bennett,2021)

Applications, whether they are web-based or mobile-based, play a crucial role in today's digital landscape. the significance of an application's convenience and accessibility Access to information, services, and capabilities is made simple and rapid via applications. Users no longer need to open an interface and browse to a particular interface in order to simply start an application—they can do so with a single click or touch. Applications are a user's preferred option due to their accessibility and ease.

The next step is to personalize and customize the app. Applications often provide tailored user experiences based on choices, actions, and data. They may provide user-specific suggestions, features, and material that are suited to their requirements and interests. Users may adjust settings, layouts, and alerts to suit their tastes by using customization options. The following application activity is pushing notifications and real-time updates. Applications may use push notifications to send users alerts, reminders, and real-time changes. With the use of this function, businesses or service providers may interact with users, provide pertinent information, and promote dialogue. Users are kept informed, involved, and connected to the application using push notifications.

Users must log into their accounts as a first step. A need, such as a username or an email address, must be filled out in order to sign in. The steps and recommendations for using this digital application are shown below. The whole location and work schedule are shown on the main menu. The progress inspection may be updated by all parties involved, including the project manager, site engineer, site manager, and site supervisor, using this application. It is clear that it can save time and be used effectively since it can be updated on the spot as work progresses. Furthermore, during the site visit or circumstances of site monitoring and inspection, this digital format may be supplied to any other responsible parties, such as the client. It is efficient without needing to bring any hardcopy into the site and must keep it safe from damage.

At this step, the prototype is put to the test with actual users to see if they are happy with the outcome. Any enhancement that is possible may be made to the prototype. The survey should be sent to construction personnel like the site supervisor, engineer, and management. The implementation team would carry out the observation while completing the job in order to assess the efficacy of the application. To add value

to the project, feasibility assessments were conducted using primary and secondary sources. Surveys and observation were employed as the primary sources. While the secondary source is produced through data and analysis, the main source is obtained from it. The goal of this survey is to get feedback from the targeted consumers about their agreement or disagreement with the idea behind the mobile app.

The sign-in/registration procedure for new users. To sign in, a new user must first register. Using an already established username and password is a possibility to access the programmer, as shown in figure 3.2.

Figure 3.2: Sign Up

Secondly, the user can select the location and schedule for figure 3.3. Example for locations which are exhaust air room, staircase, lift lobby and fresh air room. for schedule is it can make target date to finish the work

Figure 3.3: Location & Schedule

After that, for architecture work have divided by 3part which are ceiling, wall and floor as shown in figure 3.4. For wall work have a few processes starting from brick wall work until painting work. for ceiling work have 2 types of work like skim coat and plaster ceiling. For floor work is starting from screeding work until epoxy or tiling work

Figure 3.4: Type of Work

Next, every type of work has checklist. the figure 3.5 shown the checklist of work. the checklist need have 3 phase which are before, progress and after. If work not follow, write "No" and write "Yes" for work follow the Method Statement Approval (MSA).

Figure 3.5: Checklist of Work

The figure 3.6 shown is cross check by department respectively. Every Inspector of work (IOW) need to check the work by department. If there is a department involved in the work, the department must take action before the work begins.

Figure 3.6: Cross Check

the figure 3.7 shown the schedule of work. The schedule needs to follow Planner Department so the work can achieve the target date. If have delay, the target date needs to reschedule.

Figure 3.7: Schedule of Work

3.3.2. Development of RIN Tracker App

Development aims to enhance system design by providing data and information useful and required for system component execution. Design definition is the process of creating, articulating, recording, and conveying the reality of the system's design via a thorough set of design features specified in a thorough implementation service.

Android Studio is intended to democratize this technology and is used in a few educational settings as a tool for teaching computational thinking and how to create applications to solve problems in issues. The application for the Request inspection form was developed using Android Studio. It enables anyone who has never programmed a computer before to develop application software (apps).

The first thing a user could notice after opening the RIN Tracker App on their phone is seen in Figure 3.8 below. using the string method with the file name. In this case, the email, password and submit font are determined here. From this point on, if the user tends to enter information incorrectly compared to what was entered during the registration phase, the system will immediately display "wrong TAC" and transmit as "could not launching," which means they are unable to go on to the next stage.

37
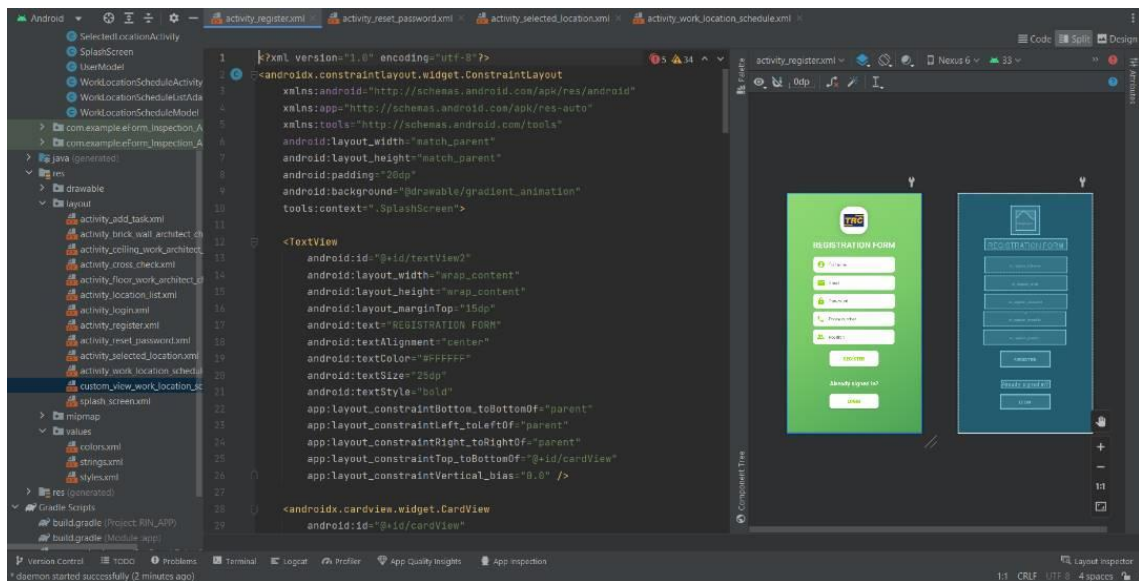
Figure 3.8: Log-in Interface

While in figure 3.9 above shows database for main menu which are location and schedule. Once used clicked the location. it shown the type of work
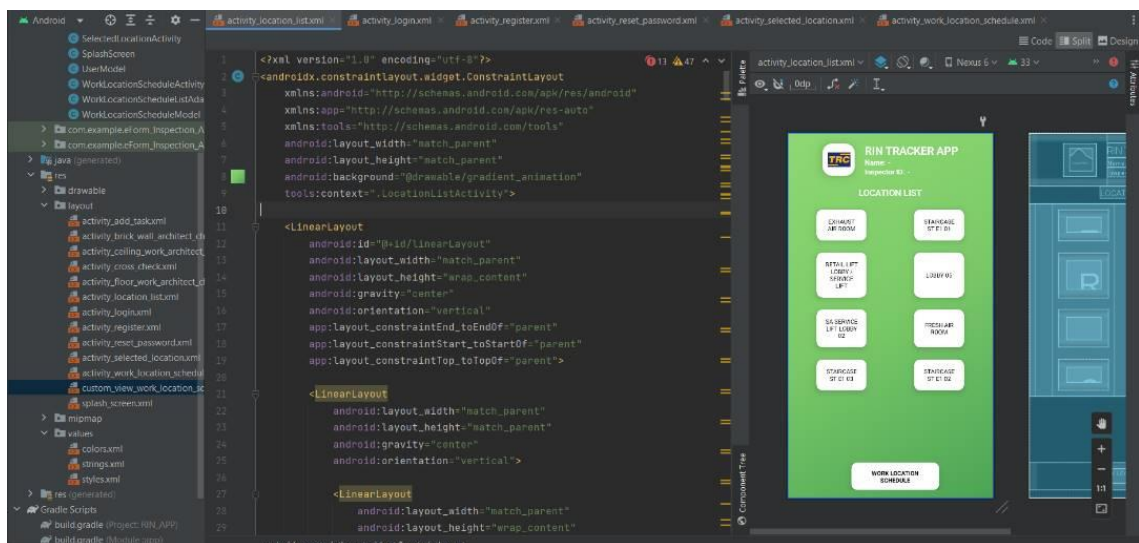
Figure 3.9: Main Menu

the figure 3.10 shown the checklist after user clicked the type of work. User need to fill up checklist before, progress and after work inspection.
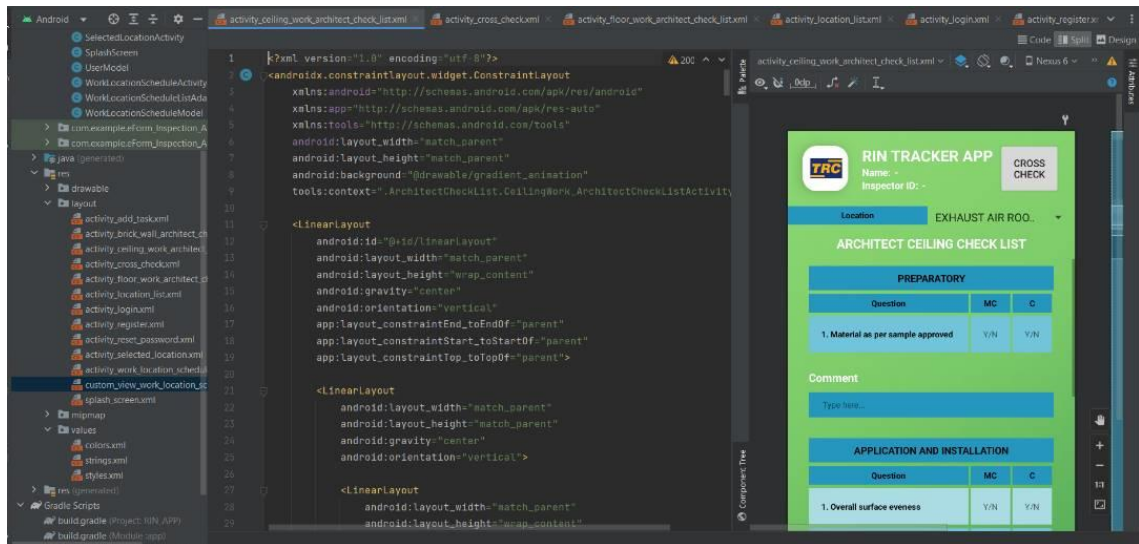
Figure 3.10: Checklist of Work

The figure 3.11 shown the cross-trade department respectively. The function of cross trade is to notification every department before starting the work. If there is a department involved in the work, the department must take action before the work begins
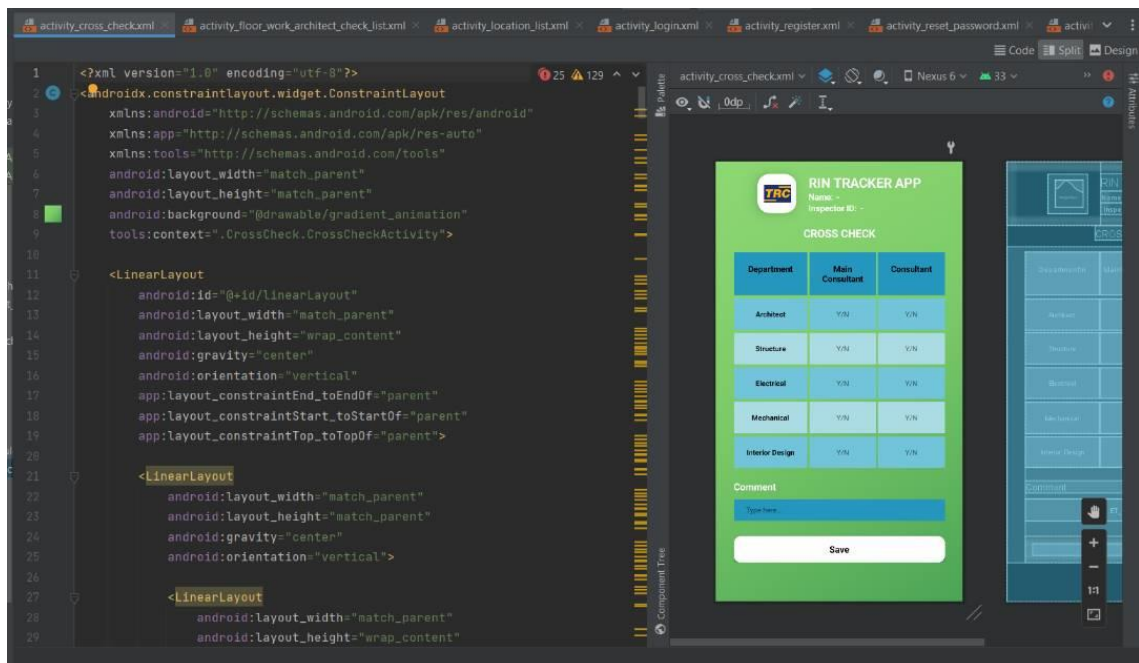
Figure 3.11: Cross check

Firebase used to data storage, security rules and offline data access. for data storage, Developers can store and retrieve data in the Realtime Database using a hierarchical JSON-like data structure. The database provides methods and APIs to create, update, delete, and query data. This allows for efficient and flexible data management. after that, for security rules has provides a powerful security rules system that allows developers to define who can read or write data and what data can be accessed. These security rules are enforced on the server, ensuring data privacy and preventing unauthorized access. lastly, for offline data access has allowing applications to continue functioning even when there is no network connectivity. When the device reconnects, the database automatically synchronizes the offline changes with the server. The figure 3.12 shown how data create and save by firebase
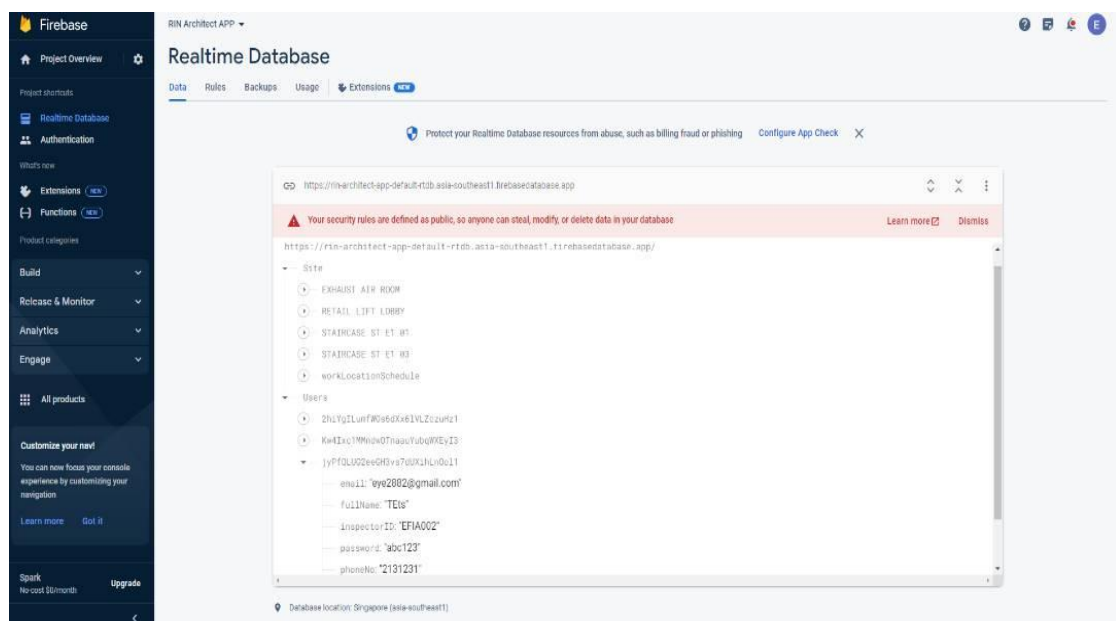
Figure 3.12: Firebase web

3.4. DATA COLLECTION

The procedures for gathering data, including how to get information from a questionnaire, will be covered in depth. We'll go into further depth on the setting, respondents, and study methodology. To make sure that all project goals are achieved, this information is required. The location, respondents, and study techniques will all be discussed. When working on a project, the implementation will complete the questionnaire and evaluate to examine the effectiveness of the apps. The main data of

the published questionnaire is to obtain insights about our project's perception and effectiveness, as well as feedback from targeted users on whether or not they accept with our application idea. This method of data collection is rapid, easy, and very inexpensive by using google form. In most cases, the questionnaire is formatted such that the answers are scored, and the scores are then added to provide an overall assessment of the respondent's beliefs. The standard technique, a questionnaire approach, will be utilised to verify this application. Every research endeavour needs a questionnaire since it is a well-liked method for acquiring data (Boparai, 2018). The questionnaire form shown at appendix

3.4.1. Location

The 8MD3 construction site will serve as the location for this study since the researchers consider the organizations selected to be appropriate and are acquainted with the situation and problems at the construction site. The study area is located at Presint 8, Putrajaya.

3.4.2. Respondent

The survey's evaluation of the product's efficacy is necessary for the 8MD3 project. Respondents are given the survey to complete in order to answer the questions from the Google form. The target responder included respondents from a range of roles and levels, including planners, construction managers, engineers, site supervisors, and others. The questionnaire receives responses from 30 employees at the construction site.

3.4.3. Research method

For this study, researchers employed a Google form-based questionnaire to gather data. This technique might be used to gather information via open-ended or in-person interviews. When researchers are aware of what the study needs to assess the success of, the questionnaire is a useful data-gathering tool. Public studies may utilise Google Forms, and the number of replies can assist people in understanding the necessary information via the data already there in the questionnaire.

3.5. DATA ANALYSIS

Given that it depends on the subject and the objective of the study, data analysis offers a variety of approaches and strategies. The foundation of both quantitative and qualitative research methodologies forms the basis of data processing. As for the pre and post data form using the products, it will be calculated using the Statistical Package for the Social Sciences (SPSS) software. The data acquired will be displayed using tables and a pie chart indicating the response rates.

3.5.1. Reliability Analysis

Reliability analysis is used to investigate the characteristics of measuring scales and scale-related items. In addition to providing data on the correlations between the scale's constituent items, the reliability analysis technique creates a variety of regularly used scale reliability measures. Inter-rater reliability estimates may be calculated using intraclass correlation coefficients. The Cronbach's Alpha test is one way to gauge trustworthiness. A score below 0.6 is poor, between 0.60 and 0.70 is acceptable, between 0.8 and 0.9 is good and above 0.9 is excellent.

3.5.2. Frequency Analysis

The descriptive statistics category includes frequency analysis. Frequency in statistics refers to how often an event happens. The study of frequency analysis is a crucial field of statistics that analyses measures of central tendency, dispersion, percentiles, and other phenomena. It is a lone measure that seeks to characterize the body of data by a value that captures its central location. The Mean, Median, and Mode are the three most often used central tendency measurements in frequency analysis. The median is the middle observation in the data set (observation with an equal number of values above and below it), while the mean is the data set's average value. The value that appears the most often in data collection is the mode. While mathematicians and astrologers have computed means for centuries, the median was first used in Edward Wright's book on navigation in 1599, and the mode was created by Karl Pearson in 1895.

3.5.3. Description Analysis

In order for patterns to appear that satisfy all of the conditions of the data, descriptive analysis is the form of data analysis that helps explain, illustrate, or summaries data points in a helpful manner. It is among the most crucial phases in the process of statistical data analysis. It gives a conclusion of the distribution of data, helps detect typos and outliers, and enables the identification of similarities among variables, thus making it ready for conducting further statistical analyses. Descriptive analysis is considered more thorough than other quantitative techniques and offers a more comprehensive view of an event or phenomenon. Any number of variables, or even a single variable, may be used to perform a descriptive study.

3.5.3.1. Mean And Average Mean

A particular kind of average is the mean (or arithmetic mean). The calculation is done by putting the values together and dividing by the total amount of data. Arithmetic means, or average, is the value generated by dividing the sum of a set of values by the number of quantities in the set. Simply squared variance equals standard deviation. Another method of determining variability is the average deviation, sometimes known as the mean absolute deviation. Average deviation uses absolute numbers rather than squares to get around the problem of negative discrepancies between data and the mean.

3.5.3.2. Paired T-Test

When analyzing the difference between two variables, a paired t-test is used. Often, there is a temporal gap between these two variables. The test may be used when there are two paired measurements of data values. Pre-test and post-test results, for instance, were collected and will be used to this to determine the outcome. Additionally, the distribution of discrepancies between the matched measurements needs to be expected.

3.6. CONCLUSION

RIN Tracker App was developed to overcome problems while practicing conventional reporting methods. From the problem at site, creating idea from various sources to overcome the problem with a build the prototype and testing effectiveness of prototype. Then, the started to develop with what the software use it. RIN Tracker App development to help monitoring inspection, lessen down the miscommunication and reduce usage of paper. from the survey, RIN tracker App developed follow the user at site. the material used to develop the system which is smartphone and the software are android studio and firebase. Firebase and android studio were used for RIN Tracker App development due to their features that beginners can handle. Other than that, the file can be directly shared from WhatsApp. Instead of using unique passcode, this application can be controlled by using Firebase. Furthermore, this application is only available on Android software. That means IOS software cannot launch RIN tracker App. for testing effectiveness product with distribute questionnaire. The analysis data by using T test method and SPSS method with data from pre and post questionnaire.

CHAPTER 4

DATA AND ANALYSIS

4.1. INTRODUCTION

The results and data from the research are shown in the study, which are derived from the questionnaire and an interview conducted on the site. The results of the project's objectives were also covered in this chapter. It will describe the results that were acquired for the objectives and give the feedback and process by SPSS. The result has been analyzed by the Paired T test. The RIN Tracker Application indicates if the objectives will help achieve the following goals.

4.2. DATA COLLECTION AND FINDING

This survey presents the results of a questionnaire distributed to respondents, which included Project Managers, Site Engineers, Site Supervisors, Site Clerk, Manager Procurement, Procurement Executives, Assistant Procurement and Admin Clerk, in order to determine which needs to improve on tracking system and which system criteria to develop that the site team and procurement team will want to use to manage or tracking procurement documents. A total of 30 respondents were interviewed for these surveys. To highlight the relevant information, the collected results will give a complete study result and analysis in the form of tables, graphs, and figures.

4.2.1. Data Collection of Questionnaires

This questionnaire is divided into two survey questionnaires: pre-survey and postsurvey. This survey is divided into two sections: A and B. Section A deals with demographic information. Sections B give the respondents' perspectives on themes related to RIN Tracker Application This survey is using a Google form through links.

4.2.2. DEMOGRAPHIC INFORMATION

Section A is a demographic data section that contains four items on the respondents' backgrounds pre and post questionnaire respondents were the same which are:

i.   Gender

"Male" and "female" are designations for a person's biological sex. 30 respondents in all took part in the pre- and post-tests, making the total respondents 30. Nineteen (63% of the total responders) are men. Eleven responders (37% of the total) were female.

Table 4.1: Number of Respondent by Gender

Gender	No. Of Respondent
Male	19
Female	11
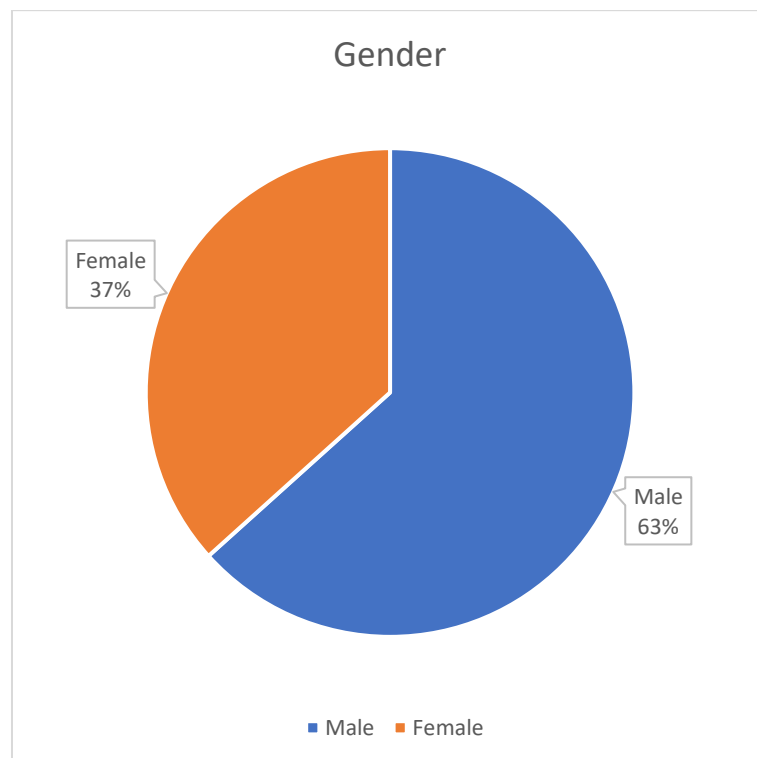
Figure 4.1: Number of Respondent by Gender

Work Experience

Work experience has been divided into four categories. According to Figure 4.2, the same majority of respondents have work experience ranging from 3 to 5 years (n=10, percent=33%) and from 6 - 10year (n=10, percent=33%), followed by less than two years (n=8, percent=27%), and ten years or more (n=2, percent =7%).

Table 4.2: Number of Respondent by Work Experience

Work Experience	No. of Respondent
< 2 years	8
3 – 5 years	10
6-10 years	10
≥ 11 years	2
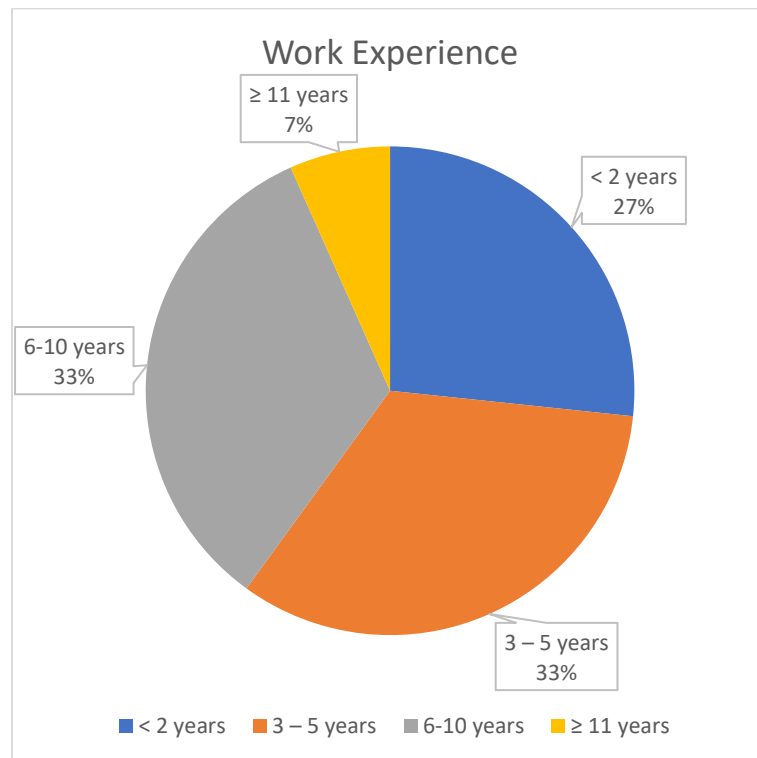
Figure 4.2: Number of Respondent by Work Experience

iii.   Age

This study's age group is divided into four categories: below 25 years old, between 26 and 35 years old, between 36 and 45 years old, and 46 years old and older. According to Figure 4.3, most pre-test respondents are between the ages of 26 and 35. There are 14 responses in this age range. The second and fourth category comprises respondents between the ages of 36 until 45 and less than 26, comprising five and nine respondents each. The third category only consists of two respondents who are 46 years or older.

Table 4.3: Number of Respondent by Age

Age	No. of Respondent
≤ 25	9
26-35	14
36-45	5
≥ 46	2
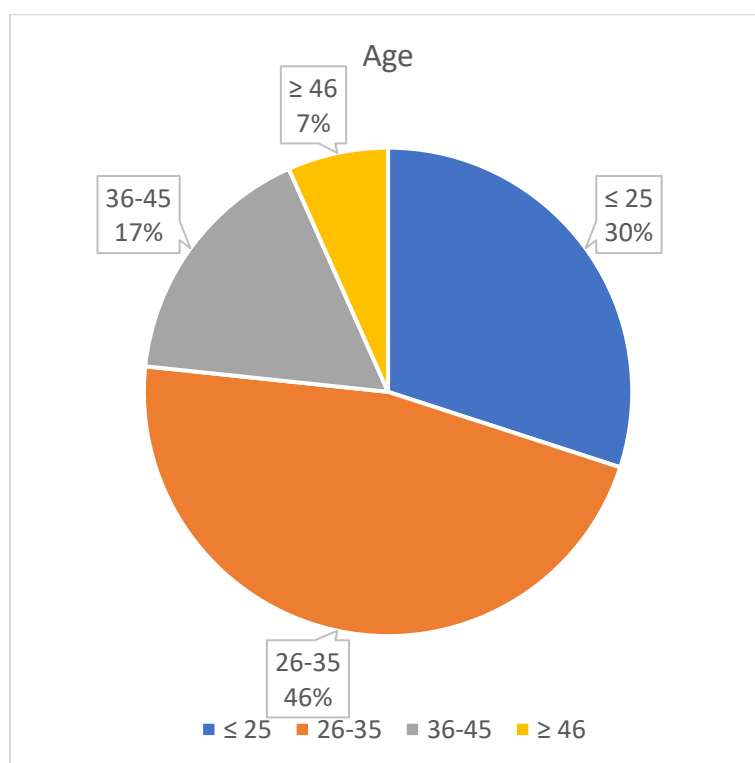
Figure 4.3: Number of Respondent by Age

iv.   Stakeholder

The Figure 4.4 Above shows the number and percentage of respondents in the stakeholder which are divided into four categories. The highest number of respondents is from main contractor (15 member), followed up Sub Contactor (9 member), Consultant which is 4 member and 2 members from other

Table 4.4: Number of Respondent by Stakeholder

Stakeholder	No. of Respondent
Client	0
Consultant	4
Main Contractor	15
Sub Contactor	9
Other	2
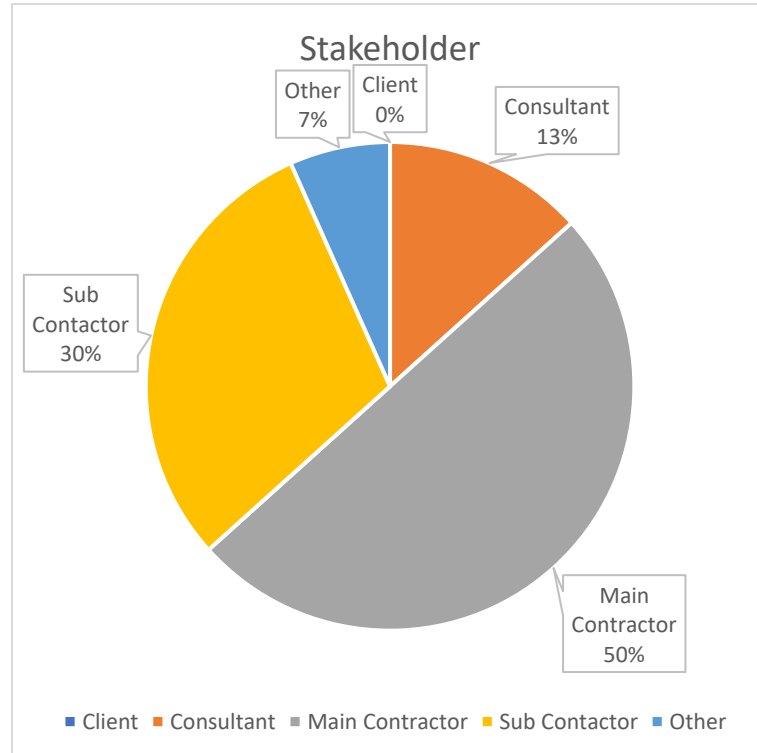
Figure 4.4: Number of Respondent by Stakeholder

v.   Position

The positions in this study have been divided into four categories. the same majority are 10 members (Engineer & Supervisor), followed up other 7 member from (Other) and 3 members from (planner)

Table 4.5: Number of Respondent by Position

Position	No. of Respondent
Manager	0
Engineer	10
Planner	3
Supervisor	10
Other	7
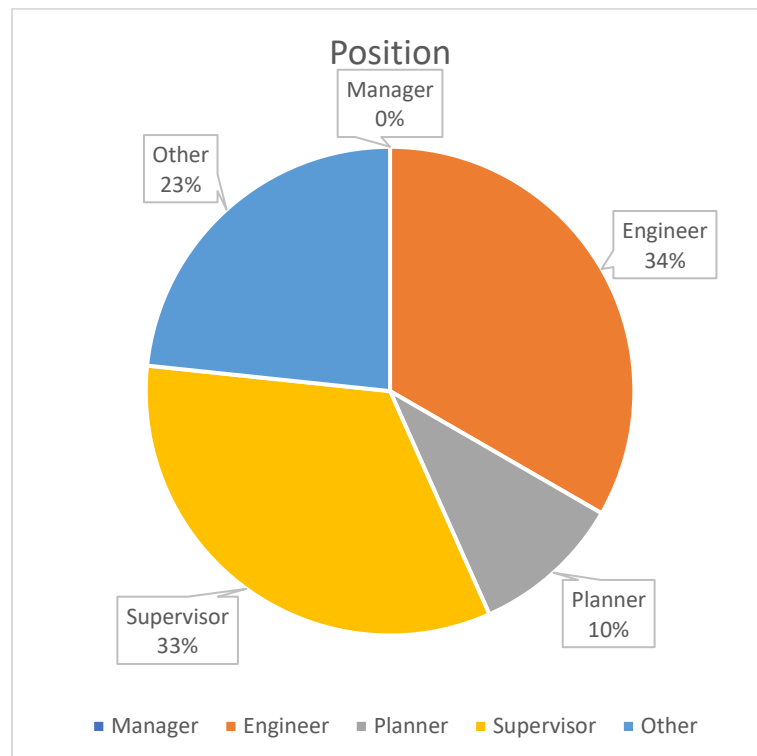
Figure 4.5: Number of Respondent by Position

4.3. RESPONDENT PERSPECTIVE (EXISTING METHOD)

4.3.1. Data Collection

The user's needs can be determined using a variety of techniques. Using data analysis and a questionnaire, we will develop an RIN TRACKER APP in this project. This questionnaire's objective is to ascertain the users' wants. This survey presents the results of a questionnaire distributed to respondents, which included Project Managers, Site Engineers, Site Supervisors and Site Clerk in order to determine which needs to improve on tracking system and which system criteria to develop that the site team and procurement team will want to use to manage or tracking procurement documents. A total of 30 respondents were interviewed for these surveys. To highlight the relevant information, the collected results will give a complete study result and analysis in the form of tables, graphs, and figures.

At this point, the questionnaire is evaluated on the target respondents to ascertain user needs. Three components, A and B, make up this questionnaire. Information about demographics is included in Section A. Section B, which discusses problems with the current approach. Paperless, Storage Method, Time Management, Work Progress (Defect & Schedule), preparation of Documentation and portable document are the seven criteria that make up Section B.

From table 4.6, It displays comments from respondents on the use of the current procedure on the construction site and in the administrative center to identify the teams needed to boost construction productivity and the system standards the team desires to develop to monitor construction productivity. On a scale of 1 to 5, respondents were asked to express their degree of approval for each question.

Table 4.6: Scale of agreement

Scale of agreement				
Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5

Table 4.7: Feedback regarding of using existing method

| No | Effectiveness Categories | Issues Related to Existing Method | Level of Agreement | | | | |
| | | | Strongly Disagree | Disagree | Slightly Agree | Agree | Strongly Agree |
			1	2	3	4	5
1	**Paperless**	Existing method consumes more papers	18	12	N/A	N/A	N/A
2	**Storage Method**	Existing storage method is limited space.	17	13	N/A	N/A	N/A
3	**Time Management**	Existing method is wastage time to find document	18	9	3	N/A	N/A
4	**Work Progress (Defect)**	Existing method commented in paper	17	12	1	N/A	N/A
5	**Work Progress (Schedule)**	Existing method need update progress manually	16	12	2	N/A	N/A
6	**Preparation of Documentation**	Existing method take time to prepare document related	14	16	N/A	N/A	N/A
7	**Portable document**	Existing method need to bring hardcopy documentation	16	11	1	N/A	N/A

4.3.2. Data Analysis

Use the information gathered from both surveys and Microsoft Excel. The findings' mean and standard deviation will be shown in this. Mean or also known as statistical mean is to essentially means average value and can be calculated by adding the data points in a set and then dividing the total by the number of values. The average function in Excel divides the total by the number of values after doing an accurate sum of all the data. Additionally, standard deviation is a group of figures that indicate how much the figures deviate from their mean. The statistics eventually remain unchanged and show no fluctuation. The numbers have a zero-standard deviation as a result.

Many academics use SPSS, which stands for Statistical Package for the Social Sciences, to analyses complex statistical data. The study's data will be analyzed using SPSS. the methodical application of statistical and logical techniques to describe, illustrate, condense, summaries, and evaluate data.

4.3.2.1.   Frequency Analysis for Existing Method

Not just in social measurement research but also in numerous other fields of science, frequency analysis is a general method of analysis. Additionally, it is a field of statistics that analyses measurements such as central tendency, dispersion, percentiles, and other metrics, as well as the frequency of events. use SPSS to collect the analysis frequency date. The table below lists the problems with the existing method.

Table 4.8: Data Collection from Existing Method

No	Effectiveness Categories	Issues Related to Existing Method	Level of Agreement				
			Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
			1	2	3	4	5
1	**Paperless**	Existing method consumes more papers	18 60%	12 40%	N/A	N/A	N/A
2	**Storage Method**	Existing storage method is limited space.	17 56.67%	13 43.33%	N/A	N/A	N/A
3	**Time Management**	Existing method is wastage time to find document	18 60%	9 30%	3 10%	N/A	N/A
4	**Work Progress (Defect)**	Existing method commented in paper	17 56.67%	12 40%	1 3%	N/A	N/A
5	**Work Progress (Schedule)**	Existing method need update progress manually	16 53.33%	12 40%	2 6.67%	N/A	N/A
6	**Preparation of Documentation**	Existing method take time to prepare document related	14 46.67%	16 53.33%	N/A	N/A	N/A
7	**Portable document**	Existing method need to bring hardcopy documentation	16 60%	11 36.67%	1 3%	N/A	N/A

4.3.2.2.   Reliability Test

Reliability analysis can be used to investigate the characteristics of measuring scales and the items that make up the scales. As part of the reliability analysis procedure, a variety of regularly used scale reliability measures are calculated together with information on the relationships between scale items. Calculating inter-rater reliability estimates may be done using intraclass correlation coefficients.

Table 4.9: Reliability Test of Existing Method

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.571	0.584	7

4.3.2.3.   AVERAGE MEAN

The sum of all values divided by the total number of values determines the mean (also known as the arithmetic mean, which differs from the geometric mean) of a dataset. It is sometimes referred to as the "average" and is the most often used central tendency measure.

In order to understand the population from which the samples were taken, inferential statistics are frequently used in research to collect data from samples. Table 4.10 show the result of respondents about the issues related to existing method. There are 7 criteria.

Table 4.10: Average Mean of Issues on Existing Method

No	Criteria	N	Mean, X	Standard Deviation
1	Paperless	30	1.40	0.498
2	Storage Method	30	1.43	0.504
3	Time Management	30	1.50	0.682
4	Work Progress (Defect)	30	1.47	0.571
5	Work Progress (Schedule)	30	1.53	0.629
6	Preparation of Documentation	30	1.53	0.507
7	Portable document	30	1.43	0.568

Table 4.11: Descriptive Statistics of Existing Method

	N	Minimum	Maximum	Mean	Std. Deviation
Existing method consumes more papers	30	1	2	1.40	0.498
Existing storage method is limited space.	30	1	2	1.43	0.504
Existing method is wastage time to find document	30	1	3	1.50	0.682
Existing method commented in paper	30	1	3	1.47	0.571
Existing method need update progress manually	30	1	3	1.53	0.629
Existing method take time to prepare document related	30	1	2	1.53	0.507
Existing method need to bring hardcopy documentation	30	1	2	1.43	0.568

Table 4.12: Percentage of Mean of Existing Method

NO	CRITIRIEA	MEAN, X	MEAN (%)
1	**Paperless**	1.40	13.61
2	**Storage Method**	1.43	13.90
3	**Time Management**	1.50	14.58
4	**Work Progress (Defect)**	1.47	14.29
5	**Work Progress (Schedule)**	1.53	14.87
6	**Preparation of Documentation**	1.53	14.87
7	**Portable document**	1.43	13.90
	Total	10.29	100

% Of Average mean of usage in existing method

	Paperless	Storage Method	Time Management	Work Progress (Defect)	Work Progress (Schedule)	Preparation of Documentation	Portable document
% av mean	13.61	13.9	14.58	14.29	14.87	14.87	13.9
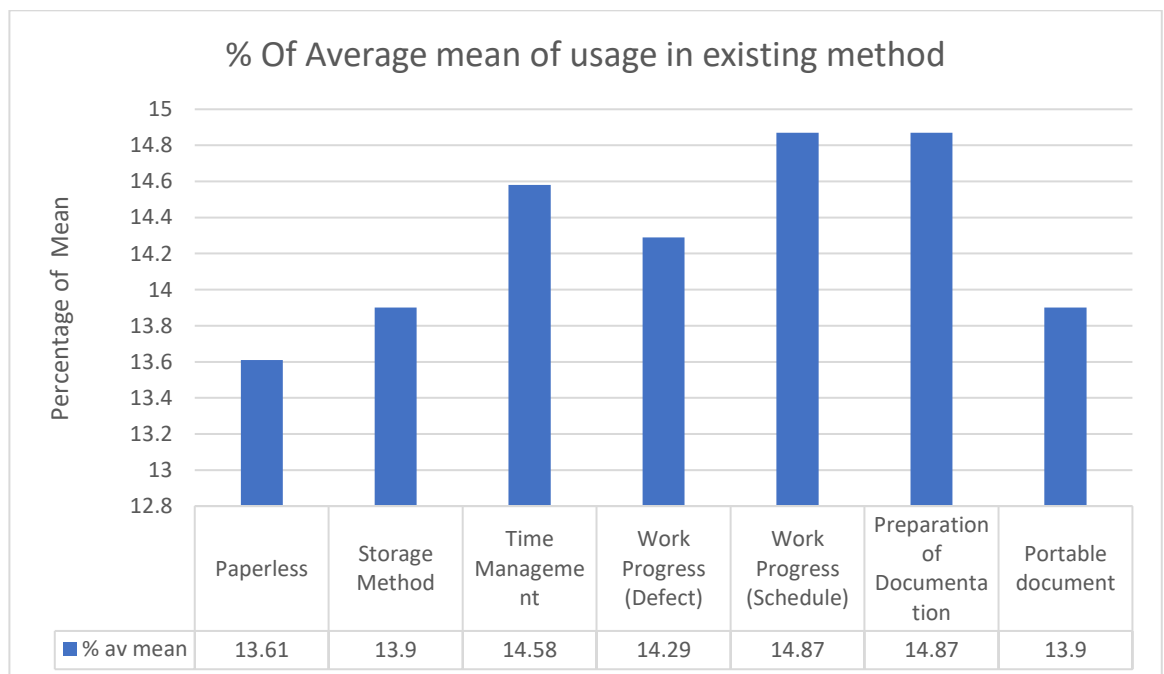
Table 4.6: Percentage of Mean Existing Method

Analysis shows that the mean score for all variables under consideration was less than 2.50, suggesting that the usability level of existing techniques was low. Table 4.13 shows the respondent's degree of usability toward employing present methods. To prepare for the efficient tracking of documents, a systematic methodology is required. To achieve IR 4.0, which includes the seven categories of RIN Tracker App which are paperless, storage method, time management, work progress, preparation and documentation and portable document. To address the problem of tracking documents, a RIN Tracker App must be created.

Table 4.13: Variable Interpretation

Variable	Mean	Interpretation for Result
Paperless	1.40	Very Low
Storage Method	1.43	Very Low
Time Management	1.50	Very Low
Work Progress (Defect)	1.47	Very Low
Work Progress (Schedule)	1.53	Very Low
Preparation of Documentation	1.53	Very Low
Portable document	1.43	Very Low

4.4. RESPONDENT PERSPECTIVE (RIN TRACKER APP)

4.4.1. Data Collection

The source material for the study's findings and data, which are presented there, came from a questionnaire and an interview conducted on-site. Additionally covered in this chapter were the project's objectives' results. It will outline the conclusions for the objectives and indicate whether or not the objectives were achieved.

4.4.2. Data Analysis

Use the information gathered from both surveys and Microsoft Excel. The findings' mean and standard deviation will be shown in this. Mean or also known as statistical mean is to essentially means average value and can be calculated by adding the data points in a set and then dividing the total by the number of values. The average function in Excel divides the total by the number of values after doing an accurate sum of all the data. Additionally, standard deviation is a group of figures that indicate how much the figures deviate from their mean. The statistics eventually remain unchanged and show no fluctuation. The numbers have a zero-standard deviation as a result.

Many academics use SPSS, which stands for Statistical Package for the Social Sciences, to analyses complex statistical data. The study's data will be analyzed using SPSS. the methodical application of statistical and logical techniques to describe, illustrate, condense, summaries, and evaluate data.

4.4.2.1.   Frequency Analysis for RIN Tracker App

Frequency analysis is a generic approach of analysis that is used widely in science, not just in social measurement research. In addition, it is a subfield of statistics that examines the frequency of events and assesses measures like central tendency, dispersion, percentiles, and so on. obtaining the analysis frequency date with SPSS. The drawbacks with the current technique are listed in the table below

Table 4.14: Issues related to RIN Tracker App

No	Effectiveness Categories	Issues Related to Existing Method	Level of Agreement				
			Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
			1	2	3	4	5
1	Paperless	Using RIN Tracker wastage paper	N/A	N/A	N/A	10	20
2	Storage Method	Using RIN Tracker is more space in the app	N/A	N/A	1	8	21
3	Time Management	Using RIN Tracker save time to find document	N/A	N/A	N/A	9	21
4	Work Progress (Defect)	Using RIN Tracker commented in the app	N/A	N/A	1	11	18
5	Work Progress (Schedule)	Using RIN Tracker is Update progress Automatically	N/A	N/A	N/A	8	22
6	Preparation of Documentation	Using RIN Tracker less time to prepare document related	N/A	N/A	1	9	20
7	Portable document	Using RIN Tracker easy to bring documentation in the app	N/A	N/A	7	23	30

4.4.2.2. Reliability Test

Table 4.15: Reliability Test of RIN Tracker App

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.773	0.769	7

From the table 4.15, the Cronbach's Alpha is showing 0.773 for 8 items which means is Good for the internal consistency. The reliability test show great result to approve the data collected and future the evaluation

4.4.2.3. Average Mean

Descriptive statistics are used in research to characterize the basic properties of the data. They provide a brief summary of the measurements and the sample. When coupled with straightforward graphical analysis, this serves as the cornerstone for almost all quantitative studies of data. There are common differences between descriptive and inferential statistics. When using descriptive statistics in this project, we are simply describing what is or what the data shows.

Table 4.16: Descriptive Statistics of RIN Tracker App

	N	Minimum	Maximum	Mean	Std. Deviation
Using RIN Tracker wastage paper	30	4	5	4.67	0.479
Using RIN Tracker is more space in the app	30	3	5	4.67	0.547
Using RIN Tracker save time to find document	30	4	5	4.77	0.430
Using RIN Tracker commented in the app	30	3	5	4.57	0.568
Using RIN Tracker is Update progress Automatically	30	4	5	4.73	0.450
Using RIN Tracker less time to prepare document related	30	3	5	4.63	0.556
Using RIN Tracker easy to bring documentation in the app	30	4	5	4.77	0.430

Table 4.17: Percentage of Mean RIN Tracker App

No	Criteria	Mean, X	Std. Deviation	Mean, %	Interpretation
1.	Paperless	4.67	0.479	14.23	Very High
2.	Storage Method	4.67	0.547	14.23	Very High
3.	Time Management	4.77	0.430	14.54	Very High
4.	Work Progress (Defect)	4.57	0.568	13.93	Very High
5.	Work Progress (Schedule)	4.73	0.450	14.42	Very High
6.	Preparation of Documentation	4.63	0.556	14.11	Very High
7.	Portable document	4.77	0.430	14.54	Very High
	Average	4.69	0.49		

	Paperless	Storage Method	Time Management	Work Progress (Defect)	Work Progress (Schedule)	Preparation of Documentation	Portable document
% Mean	4.67	4.67	4.77	4.57	4.73	4.63	4.77
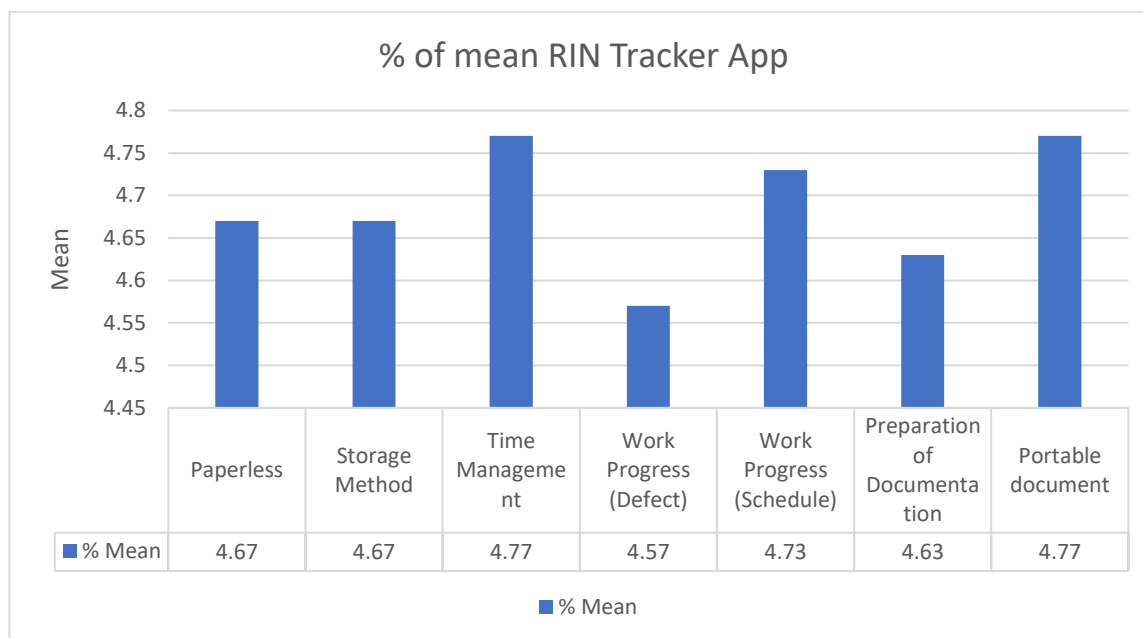
Figure 4.7: Percentage of Mean RIN Tracker App

Table 4.18: Variable Interpretation

Variable	Mean	Interpretation
Paperless	4.67	Very High
Storage Method	4.67	Very High
Time Management	4.77	Very High
Work Progress (Defect)	4.57	Very High
Work Progress (Schedule)	4.73	Very High
Preparation of Documentation	4.63	Very High
Portable document	4.77	Very High

Table 4.18 shows that interpretation is very high and that the highest mean   for variables efficient tracking document is 4.77

4.5. PAIRED SAMPLE STATISTICS T TEST

Paired Sample Statistic is a test conducted to compare the effectiveness of the Existing method in determining the paperless, storage method, time management, work progress (Defect & Schedule), preparation of documentation and portable document. This approach shows that the survey results will be reliable and give a mean that will be a good indicator of whether the project will be accepted or rejected.

Table 4.19: Paired Statistic Sample

Variables	Paired Sample Statistic	
	Mean	
	Existing Method	RIN Tracker App
Paperless	1.40	4.67
Storage Method	1.43	4.67
Time Management	1.50	4.77
Work Progress (Defect)	1.47	4.57
Work Progress (Schedule)	1.53	4.73
Preparation of Documentation	1.53	4.63
Portable document	1.43	4.77
Average	1.47	4.69
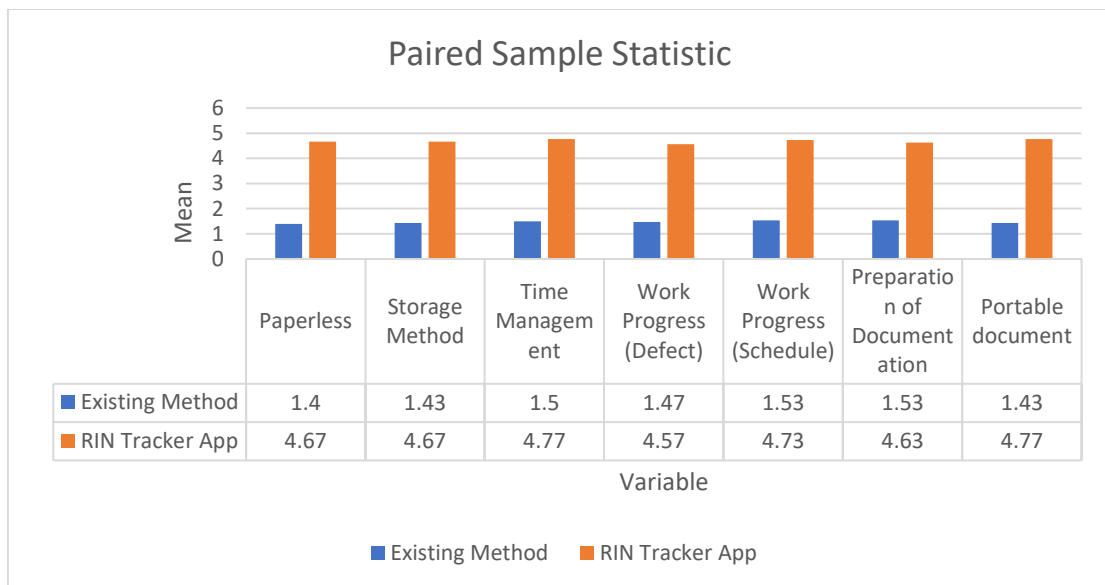
Figure 4.8: Paired Statistic Sample

Evaluation of RIN Tracker App in a project has been done, with a set of paired samples of T Test before usage of RIN Tracker App and regardless after the usage. The table 4.20 above show the result of both paired samples with their respective mean, it shows that the respondent preferring the usage of RIN Tracker App compared to the existing method from the data gained above it shows the existing method variables such as paperless (Mean=1.40),Storage method (Mean=1.43), Time Management (Mean=1.50), Work Progress (Mean=1.47), Preparation of documentation (Mean=1.53) and Portable document (Mean=1.43) has a lower mean compared to new method which is RIN Tracker App with the variables being paperless (Mean=4.67),Storage method (Mean=4.67), Time Management (Mean=4.77), Work Progress (Mean=4.57), Preparation of documentation (Mean=4.63) and Portable document (Mean=4.77)

Table 4.20: Sum of Different Paired Variables

Variables	Paired Different		Significant (two tailed)
	Mean	t	0.000
Paperless	3.27	30.67	0.000
Storage Method	3.24	24.33	0.000
Time Management	3.27	25.87	0.000
Work Progress (Defect)	3.10	20.10	0.000
Work Progress (Schedule)	3.20	20.70	0.000
Preparation of Documentation	3.10	22.38	0.000
Portable document	3.34	27.63	0.000

A paired sample t-test found this difference to be significant for all variables being measured, the value of t of paperless is 30.67 and the value of p is < .00001. The result is significant at p < .05. The value of t for storage method is 24.33 and value of p is < .00001. The result is significant at p < .05. The value of t of time management is 25.87 and the value of p is < .00001. The result is significant at p < .05. The value of t for work progress (defect) is 20.10 and the value of p is < .00001. The result is significant at p < .05. The value of t for work progress (schedule) is 20.70 and the value of p is < .00001. The result is significant at p < .05. The value of t for preparation of Documentation is 22.38 and the value of p is < .00001. The result is significant at p < .05. The value of t for portable document is 27.63 and the value of p is < .00001. The result is significant at p < .05. From the results above, it is clear that adopting RIN

Tracker App is more beneficial than the existing method in terms of improving productivity and speeding up performance on site. The findings indicate that the RIN Tracker App is more successful in advancing projects.

4.6. RESPONDENT COMMENTS

Table 4.21: Respondent acknowledgments

No	Comments
1	If can, make sure the apps can print same documentation. Sometimes hardcopy is important to follow up with the work progress.
2	Good Implementation towards the Application
3	It's a good app
4	No button to print
5	RIN Tracker App is one innovation that can cut off budgets and save time. Hopefully this app can be use in any construction industry
6	This app is very useful for the documentation work in the company and might save the money too.
7	Nice project app
8	Improve theme app more stylist
9	More graphics to attracts users to using it
10	Being able to use it offline would be appreciated
11	Very good
12	Technology is good, but somehow people will make it complicated when people don't know how to used.
13	Great App
14	easy to use
15	Good
16	Need to Print Out
17	need to attach drawing
18	Good
19	Need add photo
20	Need Notification for user reminder
21	Useful App for track RIN
22	Great app
23	Good app
24	Useful
25	Need to attached drawing
26	Nice App, improve it.
28	Proceed. Nice.
29	Good Idea
30	Easy to used

4.7. CONCLUSION

In order to determine the survey findings of the questionnaire, 30 respondents with a background in construction provided their responses to the survey forms. Section A of both the pre- and post-questionnaires covers the analysis based on findings of demographic data such as respondents' gender, age, position, stakeholder, and work experience. In addition, the pre-project questionnaire results revealed that the conventional method of creating a work inspection report takes a sizeable amount of paper. A quality report cannot be produced without sufficient communication and time synchronization between the site and the office. In addition, respondents concurred that the construction sector used a lot of inspection forms. Since RIN Tracker App wants to make sure that implementation relevance is based on industry requirements, respondents may submit their suggestions at the last section of the prequestionnaire. As a result, all of the respondent's suggestions were taken into account when designing the RIN Tracker App. The post-surveys were made available once the RIN Tracker App was created. In Section B of this questionnaire, respondents were questioned about the effectiveness of the RIN Tracker App in order to determine how satisfied users were with the app in general.

From the results of mean score distribution, all 30 respondents are satisfied with RIN Tracker App since all the scores were higher than 4.69 from 1.47 referring to table 4.19. for T test which is significant between method existing and RIN Tracker App because the result shown <0.001. With the survey the data was formulated through T-Test Paired Sample and SPSS the with the result the result of both paired samples with their respective mean, it shows that the respondent preferring the usage of RIN Tracker App compared to the existing method from the data gained above it shows the existing method variables such as paperless (Mean=1.40),Storage method (Mean=1.43), Time Management (Mean=1.50), Work Progress (Mean=1.47), Preparation of documentation (Mean=1.53) and Portable document (Mean=1.43) has a lower mean compared to new method which is RIN Tracker App with the variables being paperless (Mean=4.67),Storage method (Mean=4.67), Time Management (Mean=4.77), Work Progress (Mean=4.57), Preparation of documentation (Mean=4.63) and Portable document (Mean=4.77).

CHAPTER 5

DISCUSSION, RECOMMENDATION AND CONCLUSION

5.1. INTRODUCTION

This chapter's data analysis was used to generate the results, conclusions, and recommendations in this section. By assessing the degree to which a particular research aim was accomplished, it was possible to assess the efficiency of the RIN Tracker App for construction at the 8MD3 construction site. The researcher should propose a system update in this chapter that would make the project at hand considerably better and more functional. A further phase is for the researcher to carefully analyses the proposals that will be made during the project once it has been completed. The goal of this project's creation is to make it easier and more systematic for users to monitor the quality of their work. RIN Tracker App for construction also trains employees towards the Innovation Revolution 4.0 (IR 4.0) technology in the development sector.

5.2. DISCUSSION

The result showed those users were agreeing that RIN Tracker App is more effective compare to existing method. The current method that has been used on construction site is they use paper as their reference and record. Everything they want to know they used paper as a method which is produced a lot of paper usage. More than 75% agreed with this statement that existing method is hard to know cause delay. Based on this problem, the RIN Tracker App can be friendly user to the employee and can save their time to make RIN. The effectiveness of the application was evaluated using paired t-test. The result shows that RIN Tracker App and existing method when compare the mean is 3.22. For mean existing method is 1.47 and standard deviation is 0.30. For the mean of RIN Tracker App is 4.69 and for standard deviation is 0.31. That's mean RIN tracker

App was more effective compare to the existing method. This application was highly recommended to be used in construction site.

5.3. ADVANTAGE

There are a few advantages by using RIN Tracker App which is smooth communication to gain information on site without any misunderstanding on detail process on tracing related document of the project. Moreover, using RIN Tracker Apps also help into faster tracing on updating inspection and it allow most of the schedule to be view anywhere or can called it friendly user. Next, the data on RIN Tracker Apps is property and casual that can only admin can register the user.

i. RIN Tracker Apps can reduce cost of paper and equipment that related to paper documentation (files cabinet, pigeon holes, photocopy machines, cost for maintenance and save time in managing the documents). For this moment, researcher focusing only for selected documents from Project Department because it's related with Architecture works.

ii. RIN Tracker Apps is online website storage and can be used with computer or smartphone. This system is user-friendly where the system can access information anywhere and anytime

iii. Only authorize person or admin can enter the app by using private username and password.

5.4. RECOMMENDATION

There should be some recommendations for how to proceed and how to obtain better, more accurate results in this area for future research. The recommendations suggested are as below:

1) Publish at the Google Play store & Apple Appstore

For RIN Tracker App to be extensively utilized outside of the 8MD3 project, it must be published on Google Play and the App Store. To put this into action, the author must register as the app's publisher in both stores.

2) Offline Mode

It can be used even without an internet connection (offline). As we all know, the application requires an internet network for users to use it.

3) Print Out

this mobile application is capable of downloading and printing via smartphone if need a hard copy

4) Drawing, checklist forms and work done

The drawing file can be combined together with the checklist forms and work done report as this ease the user to view the related drawing once the user has viewed the work done report

5.5. CONCLUSION

In conclusion, the primary objective of the research is to make it easier to follow the progress of the building project and to lessen the difficulties that result from a lack of communication. The majority of respondents to the analytical questionnaire had difficulty tracking job progress, particularly when doing so via social media (particularly WhatsApp), which employees disliked since it was less suitable and unorganized. The specification objectives of this study are to identify the issue of RIN tracking during construction on targeted progress schedule which is researcher can investigate the caused in manual by using paper.

Next is develop an application to monitor the inspection progress according to the targeted progress schedule using appropriate software. the software are Android Studio and Firebase. Last objective of this project is to evaluate the effectiveness of application at construction site. The effectiveness of this application has been carried out by SPSS by using method paired T-test. The result shows that RIN Tracker App and

existing method when compare the mean is 3.22. For mean existing method is 1.47 and standard deviation is 0.30. For the mean of RIN Tracker App is 4.69 and for standard deviation is 0.31. That's mean RIN tracker App was more effective compare to the existing method. This application was highly recommended to be used in construction site. The findings indicate that respondents strongly believe that utilizing the RIN Tracker App for construction can handle the 8MD3 monitoring process very efficiently. RIN Tracker App can lessen communication gaps and aid in providing on-site progress monitoring for quality. RIN Tracker App has been recommended for usage at the 8MD3 site because users appreciated how easy it is to use for tracking work.

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APPENDIX 1

GANNT CHART

			SEMESTER 7																				SEMESTER 8																	
			SEP			OCT					NOV				DIS				JAN				JAN	FEB				MAC				APR				MAY				JUN	
NO	Task / Week	DATE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	REVIEW OF LITERATURE REVIEW	PLANNED / ACTUAL
2	CHAPTER 1 : INTRODUCTION	PLANNED / ACTUAL
	Problem Statement	PLANNED / ACTUAL
	Objective	PLANNED / ACTUAL
	Scope of Study	PLANNED / ACTUAL
	Significance of Study	PLANNED / ACTUAL
	Expected Outcome	PLANNED / ACTUAL
3	CHAPTER 2 : LITERATURE REVIEW	PLANNED / ACTUAL
	Knowledges / Information / Theory of the Study	PLANNED / ACTUAL
	Gap of Study	PLANNED / ACTUAL
4	CHAPTER 3 : METHODOLOGY	PLANNED / ACTUAL
	Flow Chart	PLANNED / ACTUAL
	Prototype Development	PLANNED / ACTUAL
	Design Storyboard	PLANNED / ACTUAL
5	PROPOSAL PRESENTATION	PLANNED / ACTUAL
6	SUBMISSION OF FINAL PROPOSAL	PLANNED / ACTUAL
7	FINAL EVALUATION & KEY-IN PROCESS OF MARKS	PLANNED / ACTUAL
8	CHAPTER 3 : METHODOLOGY	PLANNED / ACTUAL
	Application Development	PLANNED / ACTUAL
	Validatie of Application	PLANNED / ACTUAL
9	Chapter 4 : Data Analysis	PLANNED / ACTUAL
	Data Collection	PLANNED / ACTUAL
	Distribution of Questionnaire	PLANNED / ACTUAL
	Analysis the Data	PLANNED / ACTUAL
10	CHAPTER 5 : CONCLUSION AND RECOMMENDATION	PLANNED / ACTUAL
	Conclusion	PLANNED / ACTUAL
	Recommendation	PLANNED / ACTUAL
11	WRITING PROPOSAL	PLANNED / ACTUAL
	Submission Draf 1	PLANNED / ACTUAL
	Chapter 3	PLANNED / ACTUAL
	Chapter 4	PLANNED / ACTUAL
	Chapter 5	PLANNED / ACTUAL
12	PROPOSAL PRESENTATION	PLANNED / ACTUAL
13	SUBMISSION OF FINAL PROPOSAL — Semester 8	PLANNED / ACTUAL
14	Final evaluation & key-in process of marks — Semester 8	PLANNED / ACTUAL

Date ranges (by week): 12/9-17/9, 19/9-24/9, 26/9-1/10, 3/10-8/10, 10/10-15/10, 17/10-22/10, 24/10-29/10, 31/10-5/11, 7/11-12/11, 14/11-19/11, 21/11-26/11, 28/11-3/12, 5/12-10/12, 12/12-17/12, 19/12-24/12, 26/12-31/12, 2/1-7/1, 9/1-14/1, 16/1-21/1, 23/1-28/1, 30/1-4/2, 6/2-11/2, 13/2-18/2, 20/2-25/2, 27/2-4/3, 6/3-11/3, 13/3-18/3, 20/3-25/3, 27/3-1/4, 3/4-8/4, 10/4-15/4, 17/4-22/4, 24/4-29/4, 2/5-6/5, 8/5-13/5, 15/5-20/5, 22/5-27/5, 29/5-3/6, 5/6-10/6, 12/6-17/6

APPRNDIX 2

REQUEST FOR INSPECTION SAMPLE

TRC TRANS RESOURCES CORPORATION SDN BHD
PROPOSED INTEGRATED MIXED-USE DEVELOPMENT (8MD3) IN PRECINT 8, PUTRAJAYA

REQUEST FOR INSPECTION

Contractor's Request

RIN. NO: GDPA/ARCH/04552.

The following works are/will be ready for inspection at _8am._ on _25/03/2022_ (date)

Work is intended to commence at _10.30 am._ (time) on _26/03/2022_ (date)
(24 hours notice must be given)

Description of Work:

Location : _Block C (Basement 2)_

Type of Work : _Inspection for Surface Preparation Plastering work (GL: 16a-17a)_
_(21a - 23a)_

Inspection Checklist / Method Statement / Material / Product Approval Status: Approved / Not Approved

Submitted by Contractor	Received by Consultant (COW/RE/RA/Rep)
Name :	Name :
Time : MOHD FAHMI BIN ANI	Time : MOHAMAD REDZUAN MAT ARIFFIN
Date : PROJECT ARCHITECT TRANS RESOURCES CORPORATION S/B	Date : ARCHITECTUR... CLERK OF WORK ...TECTS SDN BHD
Signature : 25/3/22	Signature : 25/8/2022

Inspection Response

A. Inspection Passed. The Contractor is allowed to proceed with the works.
B. Remedial works listed below to be completed and re-inspection is required afterward.
C. Works not ready for inspection. New Inspection Form (RFI) to be submitted

Consultant [✓]   PJH [✓]

Comment:

Consultant All trades trame to sign off.
- Checked & Inspected.
- Work may proceed.

PJH   NUR FADZILLA ISMAIL
                                           Project Executive (Architect)
                                           KLCC Projeks Services Sdn Bhd
                                           @ Putrajaya Holdings Sdn Bhd
                                           1/8/22

Certified by Consultant (COW/RE/RA/Rep)	ER's/ ERA's Approval Status: (A/B/C)	Received by Contractor
Name :	Name :	RECEIVED
Time : MOHAMAD REDZUAN MAT ARIFFIN	Time :	Name :
ARCHITECTURAL CLERK OF WORK		Time : 2:0 AUG 2022
Date : GDP ARCHITECTS SDN BHD	Date :	Date :
Signature :	Signature : AHM...ZAWATI ISMAIL PROJECT MANAGER	Signature :
25/8/2022.	0 9 AUG 2022	

Document Ref: Doc Ref.: TRC/PQP/8MD3/RIN   Rev. no. : 0 ....   Effective Date : 6th December 2018

Work Package Contractor :		Project :		
TRC Trans Resources Corporation Sdn. Bhd.		PROPOSED INTEGRATED MIXED-USE DEVELOPMENT (8MD3) IN PERCENT 8, PUTRAJAYA		

Contract No. : MIX/COM/P8/8MD3/CONTRACTOR/2017-0085		8MD3

PLASTERING WORKS CHECKLIST

Project	:	8MD3.	RIN No.	:	GDPA/ARCH/04552.
Location	:	TNB SSU Room 4, Rooms and Room 6	Date	:	25/03/2022.
Drawing No	:	POH/8MD3/ARL/CN/06-B-002c.	Block No	:	C
Gridline/Zone	:	(66-199) 8/2 (9 - 2½)	Level	:	Basement 2.
Element	:	☐ External Wall/Column			
		☑ Internal Wall/Column			

Item	Description		Main Contractor		Client's Consultant		Remarks
			Acceptable		Acceptable		
			Yes	No	Yes	No	
	PREPARATORY WORKS						
	Brickworks: verticality/alignment/bonding		✓		✓		
A	**BASE COAT**						
	Prior to Base Coat Plastering						
1	Surface wetting						
2	Cement mortar mix (1:6)						
3	M&E Installation						
4	Door frame Installation						
	During Base Coat Plastering						
1	Accurate plaster thickness						
2	Use of expandable mesh over joints						
3	Use of mortar in-fill to frames						
4	Angle Beds						
5	Throating						
6	Groove Line						
	After Base Cost Plastering						
1	Surface cleanliness						
2	Plaster evenness						
B	**FINISH COAT**						
	Prior to Finish Coat Plastering						
1	Surface wetting						
2	Cement mortar mix - correct mix						
3	As Level / Plaster Peg						
	During Finish Coat Plastering						
1	Accurate plaster thickness						
2	Proper surface levelling						
3	Strengthness and squareness of corners						
4	Proper termination lines (vertical and horizontal)						
	After Finish Coat Plastering						
1	No surface defects / cracks / hollowness						

COMMENTS :

NUR FADZILLA ISMAIL
Project Executive (Architect)
KLCC Projeks Services Sdn Bhd
@ Putrajaya Holdings Sdn Bhd

Status of Inspection

We have carried out all necessary inspections and verify that the above items / activities conform to the contract specifications / document.

	Checked by Main Contractor	Verified By Client's Consultant	Acknowledged by ER/ERA
Signature			
Name	MOHD FAHMI AN ANI	MOHAMED REDZUAN MAT ARIFFIN	
Company	PROJECT ARCHITECT TRANS RESOURCES CORPORATION	ARCHITECTURAL CLERK OF WORK GDP ARCHITECTS SDN BHD	
Date	28/2/22	25/8/2022.	09 AUG 2022

Doc Ref : TRC / PQP / 8MD3 / ARW02   Revision: 0   Effective Date: 6th December 2018

Main contractor :	Project :
TRC Trans Resources Corporation Sdn. Bhd.	PROPOSED INTEGRATED MIXED-USE DEVELOPMENT (8MD3) IN PRECINCT 8, PUTRAJAYA.
Consulting Engineer :	

	Contract No. :MIX/COM/P8/8MD3/CONTRACTOR/2017-0088	8MD3

TRADE CROSS CHECK FORM

Project	:	8MD3.	RIN No.	:	GDPA/ARCH/04552
Location	:	TNB SSU ROOMS, Room6 & Room4.	Date	:	25/03/2022.
Structure	:	-	Time	:	8:00 AM.
Chainage/Gridline	:	16a-17a & 21a-23a			

Item	Description	Main Contractor			Client's Consultant			Remarks
		Yes	No	N/A	Yes	No	N/A	
1	**Architecture Inspected** TRC Verified by: MOHAMAD REDZUAN MAT ARIFFIN ARCHITECTURAL CLERK OF WORK GDP ARCHITECTS SDN BHD Name : MOHD FAHMI BIN ANI PROJECT ARCHITECT Date :		☑	☐	☑	☐	☐	
2	**Civil & Structure Inspected** TRC Verified by: Client's Consultant Verified by: ARK SYUKRI EFFENDI (IOW - W...) Name : NASRUL HAKIM MOHD DAUD Name : Nik Jai Associates PROJECT ENGINEER TRANS RESOURCES CORPORATION S/B Date : 24/3/22	☑	☐	☐	☑	☐	☐	
3	**Mechanical Inspected** TRC Verified by: Client's Consultant Verified by: Name : Name : Date : 31/3/2022 Date : 19/3/22	☐	☐	☑	☐	☐	☑	
4	**Electrical Inspected** TRC Verified by: Client's Consultant Verified by: MUHAMMAD IKHWAN b. MOHD YUNUS Muhammad Nafis Senik PROJECT ENGINEER Electrical Clerk Of Work (ELECTRICAL) Name : MSB Consult Sdn Bhd Name : YDI SYNERGY SDN BHD Date : 25/3/22 Date : 31/3/2022	☑	☐	☑	☑	☐	☐	coppor tape to cable.
5	**Facade Inspected** TRC Verified by: Client's Consultant Verified by: Name : Name : Date : Date :	☐	☐	☐	☐	☐	☐	
6	**Other Trade (Landscape/Interior Design etc)** TRC Verified by: Client's Consultant Verified by: Name : Name : Date : Date :	☐	☐	☐	☐	☐	☐	

Reason for Failure/ Re-inspection

☐ ALLOWED to proceed with the next stage of work ☐ NOT ALLOWED to proceed with the next stage of work

R.E /R.A/ I.O.W. Comment :

· Status Of Inspection: √= Acceptable , X = Not Acceptable, - = Not Applicable

TRC/PQP/8MD3/CSW/054 Revision: 1 Effective Date: 19 December 2019
TRC Trans Resources Corporation Sdn Bhd

Putrajaya, Putrajay
Feb 21,2022 03:28:11 pr

Putrajaya, Putrajay
Feb 21,2022 03:29:52 pr

Putrajaya, Wilayah Persekutuan Putrajay
Feb 21,2022 03:26:24 pr

01 BASEMENT 02 · PART PLAN (Part 3 of 6)
06 Series · General Arrangement

SCALE 1:150

DRAWING TITLE:
BASEMENT 2
- PART PLAN (part 3 of 6)

DOCUMENTATION STATUS: CONSTRUCTION

CONSTRUCTION DRAWING

APPENDIX 3

QUESTIONNAIRE

DEPARTMENT OF CIVIL ENGINEERING , UNGKU OMAR POLYTECHNIC (PUO)

To completing my final year project for the Bachelor in Civil Engineering Technology with Honours (BCT) at Ungku Omar Polytechnic, Ipoh, Perak. I'm Muhamad Amir Fitri Bin Mohd Bahandi (01BCT20F3006) as a researcher will be conducting a survey regarding on Request Work Inspection's form issues at construction industry. This questionnaire is conducted to evaluate the effectiveness of using the RIN Tracker App in the construction industry. The form of this questionnaire is to measure and collect data of perception regarding the issues related to monitor architecture work for construction users. The questions are prepared according to a few sections which are Section A, B & C.

* Indicates required question

STORYBOARD RIN TRACKER APPLICATION
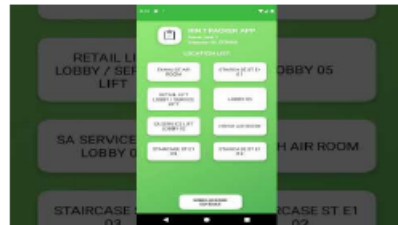
http://youtube.com/watch?v=Hto2G_XBJpo

SECTION A: DEMOGRAPHIC

1. Gender *

   Mark only one oval.

   ◯ Female

   ◯ Male

2. Work Experience *

   Mark only one oval.

   ⬭ < 2 years
   ⬭ 3 – 5 years
   ⬭ 6-10 years
   ⬭ ≥ 11 years

3. AGE *

   Mark only one oval.

   ⬭ ≤ 25
   ⬭ 26-35
   ⬭ 36-45
   ⬭ ≥ 46

4. POSITION *

   Mark only one oval.

   ⬭ Manager
   ⬭ Engineer
   ⬭ Planner
   ⬭ Supervisor
   ⬭ Others

5. STAKEHOLDER *

   Mark only one oval.

   ⬭ Client

   ⬭ Consultant

   ⬭ Main Contractor

   ⬭ Sub Contactor

   ⬭ Other

   SECTION B: EFFECTIVENESS USING RIN TRACKER

   INSTRUCTION: Kindly read each statement and lease indicate the degree of agreement or disagreement by selecting the most suitable number on a scale of
   1 = Strongly Disagree
   2 = Disagree
   3 = Neutral
   4 = Agree
   5 = Strongly agree

6. Paperless   *
   Existing method consumes more papers.

   Mark only one oval.

   Strongly Disagree

   1 ⬭

   2 ⬭

   3 ⬭

   4 ⬭

   5 ⬭

   Strongly Agree

7. Using RIN Tracker wastage paper *

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly Agree

8. Storage Method   *

   Existing storage method is limited space.

   Mark only one oval.

   Strongly Disagree

   1 ⬭

   2 ⬭

   3 ⬭

   4 ⬭

   5 ⬭

   Strongly Agree

9. Using RIN Tracker is more space in the app *

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly agree

10. **Time Management** *
    Existing method is wastage time to find document..

    Mark only one oval.

    Strongly Disagree

    1 ⬭

    2 ⬭

    3 ⬭

    4 ⬭

    5 ⬭

    Strongly Agree

11. Using RIN Tracker save time to find document *

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly Agree

12. **Work Progress (Defect)**   *

Existing method commented in paper

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly Agree

13. Using RIN Tracker commented in the app. *

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly Agree

14. Work Progress (Schedule)   *
    Existing method need update progress manually.

Mark only one oval.

Strongly Disagree

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Strongly Agree

15. Using RIN Tracker is Update progress Automatically *

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly Agree

16. Preparation of Documentation *
Existing method take time to prepare document related

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly Agree

17. Using RIN Tracker less time to prepare document related *

Mark only one oval.

Strongly Disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly Agree

18. Portable document *
   Existing method need to bring hardcopy documentation

   Mark only one oval.

   Strongly Disagree

   1 ⬭

   2 ⬭

   3 ⬭

   4 ⬭

   5 ⬭

   Strongly Agree

19. Using RIN Tracker easy to bring documentation in the app *

Mark only one oval.

Strongly Disagree

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Strongly Agree

SECTION C : RECOMENDATION

20. Please give us some feedback / improvement regarding RIN Tracker App *

_____
_____
_____
_____
_____

THANK YOU

APPENDIX 4

RIN TRACKER USER MANUAL
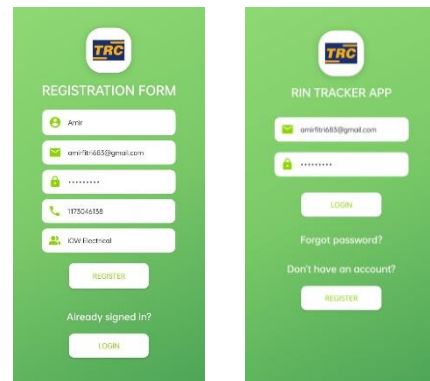
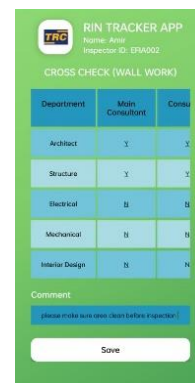|	
1.Click on icon to access the RIN Tracker App	2. Login/ Sign Up Interface
3.Click to choose location	4. Write "Yes" or "No" based on department representative
5.Click to choose type of work	6. Fill up checklist and click save