BLOCKCHAIN SYSTEM FOR LOGISTIC & PURCHASING SHIP MAINTENANCE COMPONENT PROCESS IN SHIPYARD

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SURABAYA
2022

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SURABAYA
2022

APPROVAL SHEET

BLOCKCHAIN SYSTEM FOR LOGISTIC AND PURCHASING SHIP MAINTENANCE COMPONENT PROCESS IN SHIPYARD

BACHELOR THESIS
Submited to fulfill one of the requirements for obtaining an Bachelor Engineering Degree in the field of study of *Digital Marine Operation and Maintenance*
(DMOM)
Program Study of Bachelor Engineering (S-1) of Departement Marine Engineering
Faculty of Marine Technology
Sepuluh Nopember Institute of Technology

Prepared by :
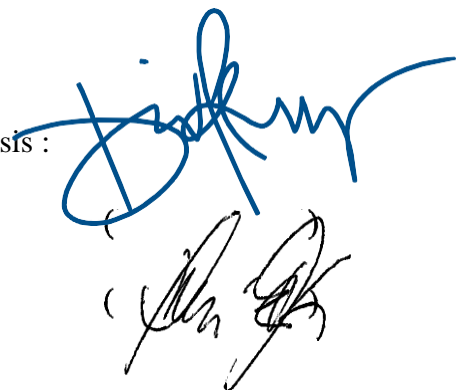**MOHAMMAD IQBAL BAIHAQI AMINUDDIN**
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SURABAYA
FEBRUARY 4th, 2022

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BLOCKCHAIN SYSTEM FOR LOGISTIC AND PURCHASING SHIP
MAINTENANCE COMPONENT PROCESS IN SHIPYARD

MOHAMMAD IQBAL BAIHAQI AMINUDDIN

A thesis submitted in fulfilment of the
requirements for the award of the degree of
Bachelor of Engineering
Digital Marine Operation and Maintenance (DMOM)

Faculty of Marine Technology
Institut Teknologi Sepuluh Nopember
FEBRUARY 2022

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"I declare that this thesis entitled *BLOCKCHAIN SYSTEM FOR LOGISTIC AND PURCHASING SHIP MAINTENANCE COMPONENT PROCESS IN SHIPYARD* is the result of my own research except as cited in the references. This thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree."

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ACKNOWLEDGMENT

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ABSTRACT

Indonesia is one of the largest maritime countries in the world. With superior geographical conditions, Indonesia can excel in competition in the maritime sector. Innovation can utilize the rapid development of technology and digitalization to develop the maritime sector. Pursuing technology development and digitalization can produce industrial productivity in the industrial era 4.0. Blockchain is one of the innovations in technology and digitalization. It can be applied in the maritime world, one of which is supply chain management. The use of blockchain-based information systems can be implemented in shipyards to increase the productivity of the maritime industry. In this technology, transparency, as well as data decentralization, can be applied to shipyards. Blockchain can be applied in the procurement process at shipyards. Blockchain can be applied in the procurement process at shipyards. This information system feature is used to procure materials and components for the ship reparation. So, a blockchain-based information system can simplify procuring goods at the shipyard to increase the industry's productivity.

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ABSTRAK

Indonesia merupakan salah satu negara maritim terbersar di dunia. Dengan kondisi geografis yang unggul, Indonesia dapat unggul dalam persaingan dibidang kemaritiman. Perkembangan teknologi dan digitalisasi yang pesat dapat dimanfaatkan untuk pengembangan di bidang kemaritiman. dalam mengupayakan pengembangan teknologi dan digitalisai, dapat menghasilkan produktifitas industri dalam era industri 4.0. *Blockchain* merupakan salah satu inovasi pada bidang teknologi dan digitalisasi yang dapat diterapkan dalam dunia maritime, salah satunya untuk supply chain management. Penggunaan sistem informasi berbasis blockchain dapat diimplementasikan dalam galangan kapal untuk meningkatkan produktifitas industri kemaritiman. Dalam teknologi ini, transparansi dan juga desentralisasi data dapat diterapkan pada galangan kapal. Blockchain dapat diterapkan dalam proses procurement pada galangan kapal. Fitur sistem informasi ini difungsikan untuk proses pengadaan material dan component untuk reparasi kapal. Sehingga dengan sistem informasi berbasis blockchain dapat mempermudah proses pengadaan barang pada galangan untuk meningkatkan produktifitas industri tersebut.

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LIST OF ABBREVIATIONS

MRF   :   Material Request Form
PR   :   Purchase Request
PO   :   Purchase Order
DO   :   Delivery Order

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CHAPTER 1
INTRODUCTION

1.1 Research Background

Material problems for activities in shipyards often occur. This problem is common in every shipyard, both in new shipbuilding and repair activities (Erraguntla & Mayer, 2003). One of the most significant ongoing problems facing shipbuilders today in both new construction and repair is the inability to efficiently identify, procure, and deliver the materials necessary to complete the job to the job site. In dealing with this problem, a system is needed to fix the issues that exist in the shipyard.

Several systems have been used in shipbuilding business processes, one the system is the Enterprise Resource Planning or ERP System. This system is software created to integrate the main functions of a company's business with centralized data (Gillis, A. 2020). However, some impediments occur. According to James A. Hall (2011), in a Delloite Consulting survey, 25% of companies experienced a sharp decline in performance after implementing the ERP System. Constraints on the ERP system include: The system is classified as complex, its implementation is difficult, the investment is expensive, it is necessary to make changes to business processes. Business processes are very diverse, including in shipyards. According to O'Brien, J. A., & Marakas, G. M. (2010), the modules of an ERP system are tough to change. The consequences of using an ERP system are changing management or changing information system features at a high cost.

In Field study activities at PT. Karya Teknik Utama, there are several obstacles in using ERP systems and business processes in shipyards. ERP systems require optimization so that the information provided is decentralized and transparent. This optimization needs to pay attention to 3M (Man, Machine, and Management) to provide user convenience. In this research, a blockchain system is used to optimize existing deficiencies. Blockchain is a network of transactions recorded and related to each other (Aruna, 2018). The blockchain system provides data transparency, transfer speed, and decentralized data. In Raymond Jonkers research (2020), this miscommunication can affect performance productivity system will be made based on existing business processes to reduce problems such as problems in logistics and purchasing, poor communication, a lot of paperwork, and issues in teamwork.

1.2 Problem Statements

The problem of the study is as follows: the lack of optimal information in the logistics and purchasing process due to data lack of transparency and decentralization of data. So that a transparent and decentralized information system is needed, a Block chain system is designed for logistics and purchasing at a shipyard.

1.3 Study Objectives

The purpose of the study is as follows;

1. Optimize information in logistics and purchasing processes;

2. Produce transparency and decentralization of data in logistics and purchasing processes

3. Facilitate shipyards for purchasing data on ship repair components

1.4 Scopes of Study

The scopes of the study are as follows;

1. Creation of an information system for block chain-based logistics and purchasing processes

2. The aim of this research is data transparency and decentralization

1.5 Study Contributions

The contributions to be achieved from this final project is to provide a transparent and decentralized information system facility in the logistics and purchasing process at the shipyard using the blockchain system. This blockchain technology also has more value, namely being able to obtain data in real-time, and the development of this system is being intensively developed.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The main objectives of this study are to optimize information, transparency, decentralization, and the speed of obtaining data in the logistics and purchasing processes for all stakeholders in the shipyard's procurement project. Basic knowledge of shipyard, organization, and the basics of logistics and purchasing needed to support the structure of this study.

2.2 Shipyard Digital Transformation

Shipbuilding (Maritime Industry) is a strategic industry and future industry to be developed. Shipyard must develop in the industry 4.0 paradigm. This condition causes the entire industry, including shipyards, to develop and adapt to face the digital era (Sanchez, 2020). The shipping sector has two important points: shipbuilding and ship repair. In implementing existing projects, human resources in a shipbuilding industry must be adequate and clear in carrying out the existing parts of the task.

2.3 Ballast System

According to Article 1, paragraph 36 of the Shipping Law, a ship is a water vehicle of any shape and type, which is driven by mechanical power, wind power, or delayed, including vehicles with dynamic support capacity, underwater vehicles, as well as floating equipment and floating buildings, which does not move. This description can interpret that the ship has a properly functioning system to support the operational activities. During operation, other things that must be considered and a dynamic system that can perform its functions are security and operational safety. One system that can maintain safety in the ship's stability function is the Ballast System.

According to the Guidance Note Bureau Veritas NI 538 DT R01 E regarding ballast management systems, ballast water is very important for efficient and safe modern ship shipping activities, stabilizing ships, and providing balance in ship operations. Ballast System is used for stability for a ship when the ship does not carry cargo or oil (for tanker), in port (loading-unloading), and trim condition well. The ballast can make the weight as low as possible; the ballast tank is placed on the double bottom. The water ballast process is divided into two; ballasting (filling ballast water) and deballasting (ballast water discharge). The working principle of this system is very simple, where pumps are used to suction seawater from the sea chest box and moved into water ballast tanks until stability is

completed. Then to deballasting, suck the seawater in water ballast tanks and discharge to overboard (O/B). System design ballasts are intimately connected with loading and unloading in ports, especially the time it takes to load the unloaded, and directly affect the change of ship's displacement.
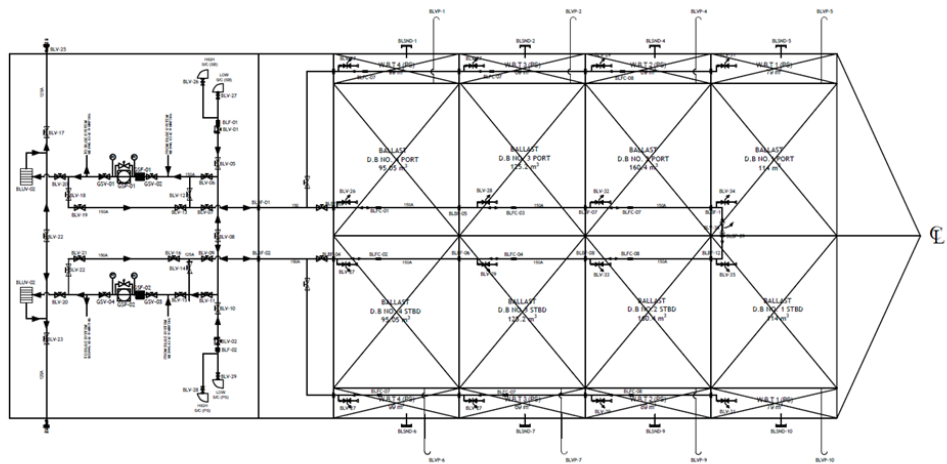
Figure 2.1 Ballast System

2.4   Purchasing - Logistics

Purchasing and logistics are two important functions in a company. The function focuses on selecting the right goods and services for the company. The selection of providers must be appropriate, of high quality, reasonably priced, and on time. The performance of each provider will be assessed on the purchasing and logistics functions (Ashenbaum, B & Terpend, R. 2010). In function, purchasing and logistics have different roles. However, the integration of these two functions will produce enormous potential. By having two different added values, the company can have competitive power in carrying out its business processes. These reasons can strengthen the function of purchasing and logistics, which are two important things in the internal functions of a company.

2.4.1 Role of Purchasing

Within the scope of company management, purchasing has several scopes, namely operational, commercial, integration with logistics, and business strategy. (Andersson, 2006). In carrying out its scope of duties, the purchasing department must have the ability to optimally contribute to company management because purchasing is one of the important lines in the organization to achieve the business targets planned by management.

In the scope of operational functions, purchasing is expected to overcome the need for orders within the company, administration, and calculate the number of incoming orders.

While purchasing is in a commercial scope, management focuses on reducing the required costs. Material costs in a manufacturing company generally have a very large weight, ranging from 60% to 80% of the total product cost. So in this function, purchasing must take a role to save costs.

In the integration function for logistics, management targets to get an item to be purchased by paying attention to improving quality, reducing lead-time, and increasing delivery reliability by suppliers. The thing to note is that when management puts too much pressure on buyers to buy very cheap items, it will impact the products to be purchased. The buyer can take the wrong item or affect the quality of the goods purchased.

Purchasing also has the same function as top management in a company, namely the strategic business function. With this function, purchasing can position almost the same level as the top management level in the company. Purchasing is evaluated from the performance achieved by considering several aspects, including changes in the amount of the company's existing supply base, contracts with several new suppliers, and the achievement of purchasing's contribution in contributing to reducing existing costs. The above functions make the purchasing line evolve. In the change, too, purchasing is responsible for administrative activities to ensure the right price for suppliers remains with the company. In planning strategies and commercial activities, purchasing is responsible for selecting the required suppliers and evaluating suppliers.

Alternative viewpoints / General information	The importance of purchasing	Hierarchical position of purchasing
Purchasing as an operational administrative function	Purchasing should evaluate operations such as order backlog, administrative lead-time, number of orders, etc	Low in organisation
Purchasing as a commercial function	Management are aware of savings potential of purchasing, targets are agreed together with purchasing, etc	Reporting to management
Purchasing as a part of integrated logistics management	Management are aware that hunting for the cheapest price will lead to sub-optimisation. They introduce targets to the purchasers, such as to increase quality and reduce lead-time	Purchasing integrated with other materials-related functions
Purchasing as a strategic business function	Purchasing is involved in deciding the company's core business and position on the market	Purchasing represented in top-management

Figure 2.2 Role Management of Purchasing (Andersson, H. 2006)

2.4.2 Activities of Purchasing

Purchasing has six main activities to support purchasing within a company: estimate demand for a particular item, product and assessment decisions, supplier selection, contract agreement, ordering, and supplier evaluation. (Andersson, H. 2006). These main activities have different types. The initial four activities are tactical purchasing activities. This activity is fundamental in commercial and technical. And the last two activities have both administrative and logistical characteristics.
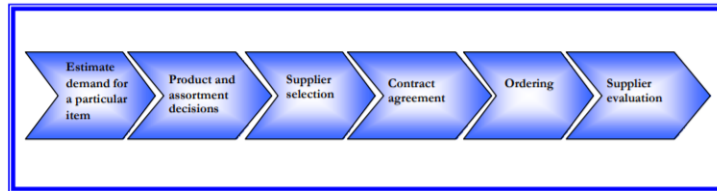
Figure 2.3 Purchasing Process (Andersson, H. 2006)

It refers to ordering activities within the company. The above activities are the main things that must be considered when purchasing needs in business activities within the company. Activities such as inventory management and quality control on a product are not needed because purchasing is not responsible for these activities. However, at least a purchasing manager must pay attention to each of the six activities that are central to purchasing.

2.4.3 Role of Logistics

According to the Council of Logistics Management (1996), Logistics is the process of planning, implementing, and monitoring the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption. It aims to meet the suitability of consumer needs. Logistics has a fundamental role in a company, connecting the materials needed in a project and information to realize a business's goals.

According to the book *Strategic Logistics Management* quoted by Hendrik Andersson, logistics can be seen from three different hierarchical levels. The highest level is the strategic level, which considers business objectives and customer service issues. The second level is tactical and handles decisions such as warehouse location and type of inventory control system. Operations level focuses on day-to-day decisions, such as quality control, vehicle routing, and scheduling.

Logistics is responsible for complying business objectives, marketing strategies, and customer service in the strategic section. In the tactical section, the logistics focus has four main points: inventory control, order processing, plant and warehouse location, warehousing, and storage. Meanwhile, in the operational section, things to consider are quality control, vehicle routing, and scheduling. It can be shown in the figure below.
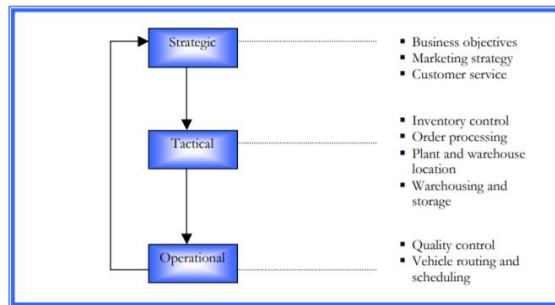
Figure 2.4 Different Levels of Logistics Decision (Andersson, H. 2006)

2.4.4 Activities of Logistics

According to The Council of Supply Chain Management Professionals (CSCMP, 2006), the major logistics activities are transport management, inventory management, warehousing and storage, packaging, materials handling, order processing, demand/sales forecasting, customer service, purchasing, warehouse site location, and return goods handling. In carrying out activities, logistics has seven main functions: planning and fulfilling needs, budgeting, procurement, storage and distribution, maintenance, elimination, and control.

2.4.5 Supply Chain for Maintenance

In their research on supply chain maintenance, Trappey, Hsiao, and Lin (2011) created a service center-based supply chain scheme with professional expertise. Figure 2.5 shows a supply chain scheme consisting of related entities.
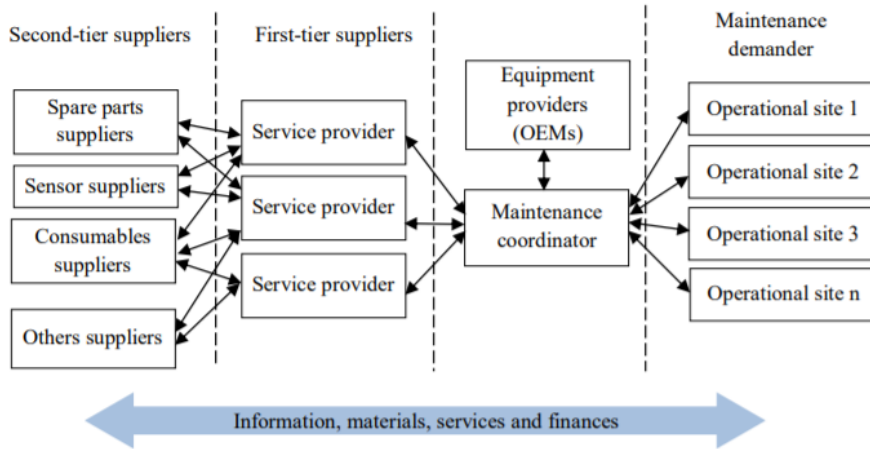
Figure 2.5 A maintenance supply chain model (Hsiao and Lin, 2011)

The original supply chain form of procurement on ship maintenance projects is still not concerned with good information flow, relationship development between entities, and the materials needed. The challenge is connecting every need from business processes within the company, especially maintenance, by prioritizing transparent information useful for developing existing goals and clear material flows.

2.5 Purchasing and Logistics in Shipyard

2.5.1 Responsibilities

The supply chain process in the shipyard includes purchasing and procurement process activities (Vlachakis, N. 2016). The purchasing process in the shipyard includes the supplier selection process and supplier coordinating process. The purchasing division is responsible for buying high-quality goods but low prices in the supplier selection process. The purchasing division will request goods to the supplier for the coordinating process.

In procurement activities at PT Karya Teknik Utama – Tanjung Riau, management involves the Purchasing and Logistics divisions. These two divisions have almost the same scope. Table 2.1 describes the scope of responsibilities of these two stakeholders.

Table 2.1 Procurement Responsibilities in PT. Karya Teknik Utama

Division	Responsibilities
Purchasing	Decide purchasing with reasonable quality and price
	Monitoring material delivery
	Create a request for quotation to suppliers
	Create Purchase Order and invoice
	Check for incoming shipment activities
Material & Logistics	Material check in warehouse
	Provide stock control and stock accuracy
	Storage material
	Release or issue material from the warehouse
	Check delivered materials from the supplier

2.5.2 Main Supply Chain in Shipyard

The supply chain at the shipyard includes the design process, approval of materials and components, supplier coordination process, marketing process, procurement process, assembly process, and maintenance process (Vlachakis, N. 2016). Figure 2.6 describes each activity in the supply chain process in the shipyard.

Design Process
➤Preliminary design
➤Sign of Contract – selection of suppliers and subcontractors
➤Design optimization for the supply of high risk material or components

Approval of material and components
➤Submission of relevant information to the classification society
➤Approval of the submitted information by the classification society
➤Certificate issuance to the supplier by classification society

Purchasing process
•**Supplier selection process**
➤Identification of possible high quality-low cost suppliers
➤Implementation of different types of contracts depending on the supplied materials or components
•**Supplier coordination process**
➤Request of material or equipment
➤Exchange of information during the design optimization process

Marketing process
➤Product description
➤Understanding of costs and pricing
➤Plan for product promotion
➤Promotion and sales

Procurement process
➤Supplier quality control
➤Order quality control
➤Order specification control
➤Payment process

Assembly process, control and approval
➤Assembly and test of supplied material or components
➤Incorporation of subcontractor in the shipyard planning system

Guaranties, after sale service, repair and maintenance
➤Real time information on the status of each component in order to be able to repair and maintain effectively

Figure 2.6 Shipyard Supply Chain (Vlachakis, N. 2016)

The process starts from the design process for signing contracts with suppliers and subcontractors. The stakeholders will be involved in the project from the start until the ship is repaired.

2.5.3   Procurement Supply Chain in PT. Karya Teknik Utama

An overview of the ship repair processes in PT. Karya Teknik Utama's supply chain is presented in Figure 2.7, based on interviews with higher management at PT. Karya Teknik – Tanjung Riau. This stage explains the scope of the company's internal activities. In the initial step, details of ship repair activities will include in the ship repair list.
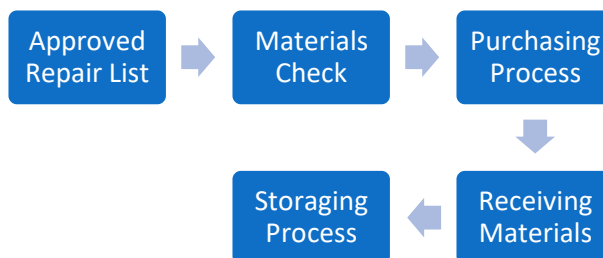
Figure 2.7 PT. Karya Teknik Utama Procurement Supply Chain

The materials included in the repair list will be checked by the availability at the warehouse. The next stage is the purchase of materials to fulfill the insufficiency of existing materials. Suppliers will be involved in issuing specification for the materials they sell. The shipyard will evaluate the materials provided by the supplier through technical analysis and price analysis. When the company and the supplier agree on the quality, price, and delivery terms, the supplier will proceed to the delivery stage. The materials sent will arrive at the estimated time specified by the supplier. The last stage is the receipt of delivered materials. The quality, quantity, and conformity of materials must match the order.

2.6   Blockchain

Blockchain is a transaction chain of blocks containing records that are linked to other blocks (Bogart & Rice 2015). The decentralized nature of blockchain makes this technology unnecessary to build to external authorities for validation and integrity of data authenticity. Decentralized process usually occurs between network nodes to ensure the information is valid. After the decentralization process, the data will be added to a new block. Each block contains a unique hash or code. And the average blockchain transaction is an investment. Blockchain can store different types of information in the same block.

2.6.1   The Conept of Blockchain

The blockchain is a decentralized, distributed ledger (public or private) of different transactions arranged into a P2P or *peer-to-peer* network (Lastovetska, A. 2021). Because it uses a P2P network, the blockchain structure requires many computers. In contrast to the client network in general, which can change data with only one party, the blockchain requires the approval of the entire network. Figure 2.6 shows the difference between a client network and a P2P network used in blockchain technology.
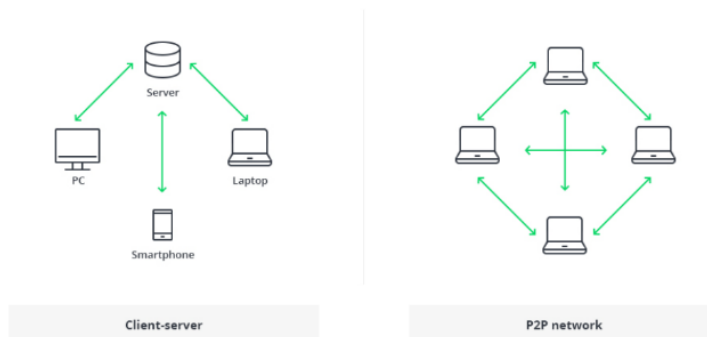
Figure 2.8 Difference Client Server & P2P Network (Source: MSLDev)

2.6.2   Blockchain Structure

Blockchain has several characteristics that make this technology unique, including decentralization, distributed data, anonymity, privacy, and audibility (Situmorang, D. S. 2021).

a) *Decentralization*
In terms of traffic on the network, blockchain does not require a third party to manage. Algorithms are used to maintain the consistency and originality of data in a distributed network.

b) *Distributed Data*
every stakeholder in the blockchain network has equal rights to access data and history on the database. Each partner can record, access, and review every transaction in the database without the need for a third party.

c) *Anonymity*
In a blockchain network, users can be identified. Under some conditions, blockchain can make user identity hidden and not known to the public. It allows each user on the network to interact using a specific address

d) *Privacy*
In all systems, the privacy of property or data on a network is important. But there is an uncorrelated between privacy and transparency. Property privacy is very easy to implement in a centralized system.

e) *Auditability*
transactions in a blockchain system are different from transactions in a centralized system. Every transaction on the blockchain network is connected to or refers to the previous block of transactions. So, it will be very easy in the auditing process when the verification and tracking data process is carried out.

2.6.3 Type of Blockchain

There are four main types of blockchain networks: public blockchains, private blockchains, consortium blockchains, and hybrid blockchains, and each one of these platforms has its benefits, drawbacks, and ideal uses (Parizo, C. 2021).

a) *Public Blockchain*

a public blockchain is a type of blockchain that anyone can access. This type of blockchain is the first generation blockchain type used in the bitcoin cryptocurrency. Because anyone can access it, data and access in this blockchain system are available to the public who want to participate.

b) *Private Blockchain*

The private blockchain is a type of blockchain instead of the public blockchain. In its use, private blockchains can only be accessed by a limited individual, group, or organization. Users not included in the network cannot access this blockchain network with limited access.

c) *Consortium Blockchain*

consortium blockchain or federated blockchain is a type of blockchain that has a combined function between public and private blockchains. In this blockchain network, no single organization can control the network. Nodes control the control system on this network. It aims to eliminate risk because consortium blockchains have the same access as private blockchains but have limited access.

d) *Hybrid Blockchain*

Hybrid blockchain is a type of blockchain that has the combined functions of a public-private blockchain, but an entity governs this network. The system regulated by the organization is to restrict access to certain functions such as specific data storage. However, other users can still access data that remains publicly accessible.

2.6.4 Application of blockchain technology

In the application of blockchain technology, there are three major types of applications, including insurance, smart contracts, and supply chain management (Saputra, D. 2021).

a) *Finance*

One of the fields that can be applied in applying blockchain technology is the insurance sector. In the insurance claim process, verification is required that an incident, such as an accident, occurred. Apart from verifying, another function that blockchain can implement is to provide fair, transparent, and timely payments. With blockchain, the insurance claim process can be processed automatically, and policies are written in smart contracts stored in a blockchain database. In addition, the benefit of using blockchain-based technology in insurance is to reduce insurance fraud.

b) *Smart Contract*

Smart contracts are contracts in the form of codes applied to blockchain technology. In smart contracts, the terms and agreements that are changed in the code can be accessed by a computer to be opened on the blockchain network. A contract is an agreement between two or more parties to an agreement between related individuals. On the blockchain, the other party can see the agreement's contents in the contract as a form of validation of the contract.

c) *Supply Chain Management*

The use of blockchain technology in supply chain management will make the movement of products in the chain visible. Goods that move in the chain can be tagged in a barcode or QR code to be scanned and tracked. Transactions and movements can be recorded into a blockchain-based database, making it possible for users to track from the production stage to the final stage. in this function, blockchain technology serves as data storage.

2.6.5   Blockchain for Maritime Industry

The usage and implementation of blockchain technology in the frame of port logistics bears the potential to facilitate the transition from a paper documented process management to a digitalised. It aims more secured one by validating and storing each action or transaction, respectively, in the chain of blocks (Phillipp, Gunnar & Laima. 2019). The application of blockchain in the maritime world can have many benefits. The benefits include reducing administrative costs, clear communication, transparency, auditable and fraud proof (Marenkovic, S., Tijan, E. & Aksentijevic, S. 2021). Several companies have enforced blockchain technology in the implementation of their work.

Companies that implement blockchain in their business are IBM and Maersk. Maersk and IBM collaborate to create a blockchain platform in the shipping industry (Kralingen, B. 2018). It can reduce the use of paper documents for administrative shipping. This platform project focuses on several documents, including Bill of Lading, packing lists, letters of credit, invoices, etc. According to IBM Senior Vice President Bridget Kralingen, the cost of paper document processing and administration reaches 20% of the overall transportation costs.

CargoX is also implementing a paperless Bill of Ladings in the blockchain (Marenkovic, S., Tijan, E. & Aksentijevic, S. 2021). Their technology is the public blockchain for improving logistics processes in global maritime supply chains. Their main project is to replace the paper Bill of Ladings with a public blockchain-based smart Bill of Ladings. CargoX aims to eliminate mediators by providing a secure document-sharing

platform. This project can reduce shipping costs with a high level of security and transparency.

2.7 Existing System Information in Shipyard

2.7.1 ERP System

Enterprise Resource Planning or ERP System is software created to integrate the main functions of a company's business with centralized data (Gillis, A. 2020). One component of the ERP system software is modules. Modules function to meet the essential needs of a company's business. Examples of a company's business processes include finance, services, operations, human management. This system is very useful for solving business process management problems in companies.
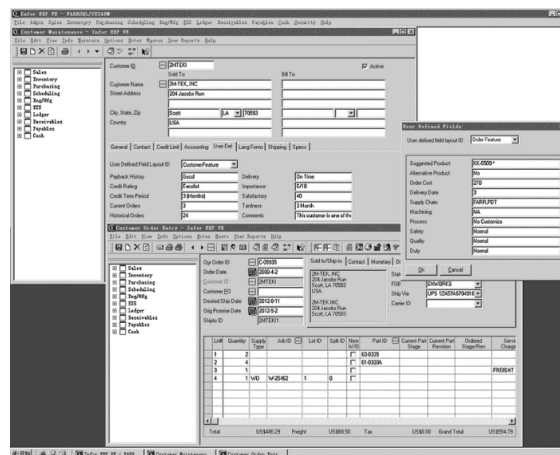
Figure 2.9 ERP System GUI (Source: Researchgate)

According to O'Brien, J. A., & Marakas, G. M. (2010), the challenge in implementing an ERP system requires a lot of costs, and the risk of failure in implementing a new ERP system is very large. Besides the advantages, some risks and weaknesses must be faced. Following are the disadvantages of an ERP system.

- Requires large capital expenses
- Requires user or system adaptation
- The system is quite complex
- Modules cannot be customized
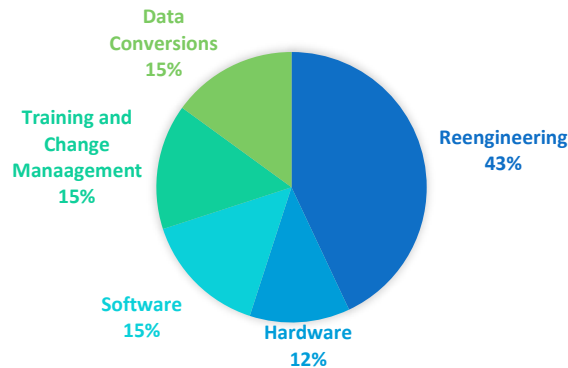
Figure 2.10 Type of Expenses for ERP System (O'Brien, J. A. & Marakas, G. M. 2010)

Figure 2.10 details the costs that need to be incurred by the company. In using the ERP system, the company requires a fairly expensive cost to use the module. There are five categories of costs for implementing an ERP system. These costs include reengineering, hardware, software, training and change management, and data conversions (O'Brien, J. A. & Marakas, G. M. 2010).

2.7.2   ERP System Constraints in Shipyard

Shipyards use several information systems to support their business processes. PT. Karya Teknik Utama - Tanjung Riau uses the ERP system to support the procurement process. The results of the field study activities, there are several obstacles. According to the shipyard, the SAP system tends to be difficult to implement in the shipyard business process. After interviews with several individuals involved in the purchasing and logistics process, this problem was identified.

The SAP system is designed for manufacturing companies whose business processes are much different from shipbuilding (Erraguntla & Mayer, 2003). The difficulty experienced when using the ERP system is changing the business model. According to Erraguntla & Mayet (2003), it is impossible to change the business model of the shipyard. A possible solution is to create an information system that fits the existing business model.

The following is a review of the shortcomings of the ERP system obtained through a field study at PT. Karya Teknik Utama – Tanjung Riau and the journal Material Identification and Procurement System (MIDAPS).

1. The system cannot be adapted to the shipyard business process

2. The system is more suitable for manufacturing activities

3. Maintenance and price are so high for initial investment.

2.8   Business Process

Business process is the foundation of the work organization of every business (Kaniski, I. & Vincek,I. 2018). It is a set of different activities or tasks that are carried out in a certain order and use certain resources of an organization with the aim of fulfilling the mission or the purpose of its existence. Business processes can help map existing activities within a company. The model of the business process is very diverse. To map business processes at PT. Karya Teknik Utama uses the standard Business Process Modeling Notation (BPMN) and Use Case Diagram.

2.8.1   Business Process Modelling Notation (BPMN)

Business Process Modeling Notation (BPMN) is a graphical notation that describes the logic of the steps in a business process (Yudhanto, Y. 2016). This notation has been specifically designed to coordinate the sequence of processes and messages that flow between actors in different activities. The purpose of using BPMN is to create a figure that is easy for everyone to understand. In addition, BPMN is an international standard process modelling. Figure 2.11 is an example of a BPMN of an activity.
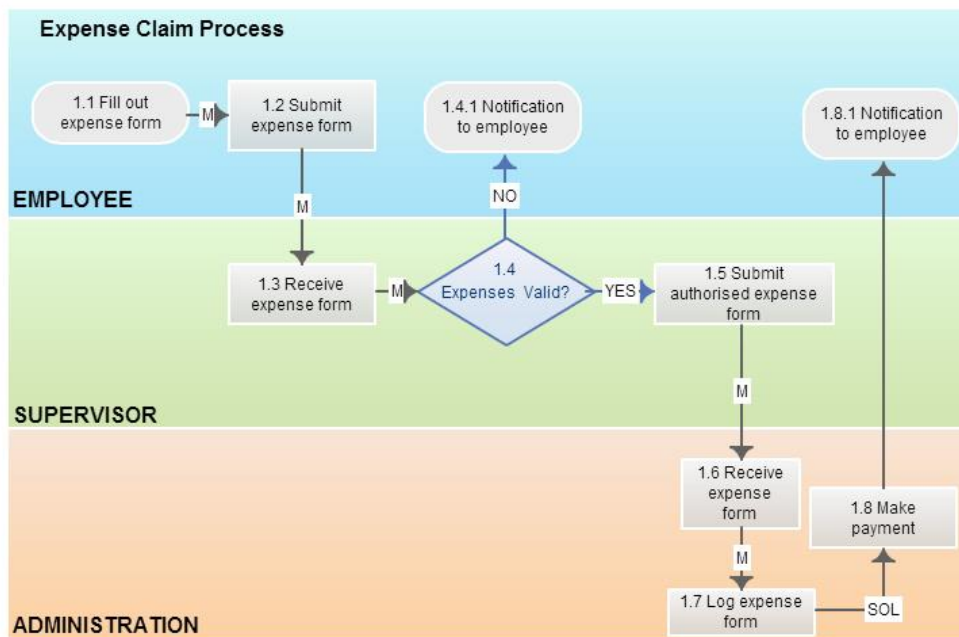
Figure 2.11 Example of Business Process Modelling Notation (Source : Creately)

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2.8.2 Use Case Diagram

The Use Case Diagram is a behavioural diagram to present a graphical overview of the functionally in terms of actors and goals. It is the methodology to analyse,identify,clarify, and orginize base of system requirements (Aleryani, A. 2016). Use case diagrams are a good starting point in understanding and analyzing system requirements design. Use Case Diagrams are represented by stick figures, use cases, and associations. A Stick figure is a notation of actor or individual. Use cases describe the sequence of activities. A horizontal ellipse represents use cases. And associations are represented by lines that connect individuals with use cases.
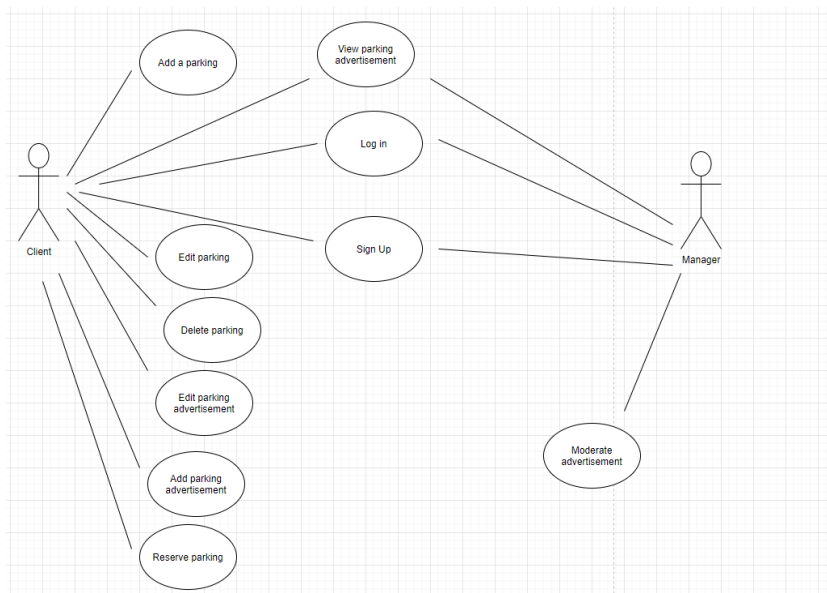
Figure 2.12 Example of Use Case Diagram (Source : Stackoverflow)

2.9 Applications Used for Website Development

2.9.1 Figma

Figma develops cloud-based prototypes for digital websites or application projects for certain functions (Ismi, T. 2020). The uniqueness of this application makes work easier for users to collaborate with all parties involved in the project.
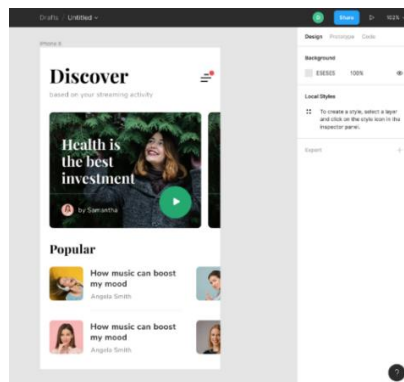
Figure 2.13 Figma Application (Source: Medium)

The focus of this application is for User Interface (UI) and User Experience (UX) Designers because this application has several tools that can simplify the process. This application has several excellent features, including a modern system, layout, or layout, and has plugins that make it easier for users. This application will make it easier for UI/UX designers because the design results that have been made will automatically appear in the form of a prototype. And the results of the prototype can be shared and consulted with other members.

2.9.2 Visual Studio Code

Visual Studio Code (VSC) is a software that can be used for website development created by Microsoft for multi-platform use or available on Linux, Mac, and Windows (Arumsari, M. 2019). The Visual Studio Code text editor can support many programming languages, including Typescript, Javascript, Node.js, etc. The advantages of the Visual Studio Code function are, has many tools to allow ease for development, lightweight text editor software and it accessible for free.

20
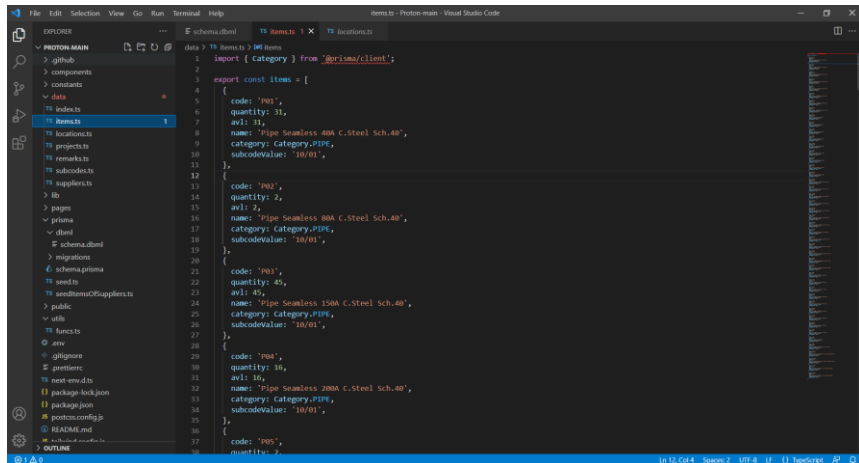
Figure 2.14 Visual Studio Code Software

2.9.3   Typescript

TypeScript is an open-source programming language built on JavaScript (Oktriwina, A.2020). TypeScript is one of the most widely used programming languages. This programming language was designed by Anders Hejlsberg of Microsoft, the C# programming language designer. In addition to programming languages,

TypeScript is also a tool. TypeScript encapsulates the existing programming language from JavaScript. In other words, TypeScript is JavaScript with a few extra features. The advantages of the typescript programming language are:

1. Programs that are built will be easier to understand and change.
2. Typescript is a static programming language that can check the accuracy of data types when compiling.
3. Typescript will show errors at compile-time, which reduces the chance for errors to appear at run-time.

2.10 Data Collection and Validation Method

2.10.1 Data Collection Technique

According to Sugiyono (2018), there are three techniques or methods used for data collection, the three techniques are:

1. **Interview**

   Interviews are used as a data collection technique if researchers want to conduct a preliminary study to find problems that must be investigated. Researchers want to know things from more in-depth respondents, and the number of respondents is small. Interviews can be conducted in a structured or unstructured method.

   a. Structured interview, used as a data collection technique when the researcher or data collector already knows with certainty what information will be obtained. Therefore, in conducting interviews, data collectors have prepared research instruments in written questions.

   b. Unstructured interviews are free interviews where the researcher does not use interview guidelines that have been systematically and completely structured for data collection.

2. **Questionnaire**

   The questionnaire is a data collection technique done by giving a set of questions or written statements to respondents to answer. Questionnaires are an efficient data collection technique if the researcher knows the variables to be measured and knows what to expect from the respondents.

3. **Observation**

   Data collection through observation can be done if the research is related to human behavior and work processes. The process of collecting observation data can be divided into two, namely participant observation and non-participant observation

   a. Participant observation, researchers are involved with the daily activities of people who are being observed or used as sources of research data. While making observations, the researcher participates in doing what the data sources do and shares the joys and sorrows. So that the data obtained will be complete, sharp, and to know the level of meaning of each behavior that appears.

   b. Non-participant observation, the researcher is not involved and is only an independent observer. Data collection by non-participant observation will not get in-depth data and will not reach meaning. Meaning is the values behind visible, spoken, and written behavior.

2.10.2 Likert Scale

According to Sugiyono (2018), the Likert Scale measures attitudes, opinions, and perceptions of a person or group of people about social phenomena. The researcher has specifically defined this social phenomenon and then referred to it as the research variable. With a Likert scale, the variables to be measured are translated into variable indicators. Then the indicator is used as a starting point for compiling instrument items in the form of statements or questions. The answer to each instrument item that uses a Likert scale has a gradation from very positive to very negative, which can be in the form of criteria, including:

a. Strongly Agree
b. Agree
c. Doubtful
d. Disagree
e. Strongly Disagree

For quantitative analysis, the answers can be scored, for example:

a. Strongly Agree/always/very positive scored 5
b. Agree/often/positively scored 4
c. Indecisive/sometimes/neutral scored 3
d. Disagree/nearly disagree with a negative score of 2
e. Strongly disagree/never given a score of 1

The next stage is determining the ideal score by multiplying the highest score by the total number of respondents. The number of real scores is determined by multiplying the number of respondents for each criterion by the quantitative score. In Figure 2.15, The results will be placed in the Strongly Agree with Strongly Disagree range.
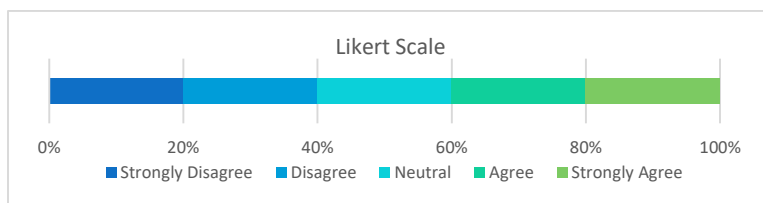
Figure 2.15 Likert Scale Range

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

This research aims to create a blockchain-based principle website simulation for business processes in logistics and purchasing at a shipyard. The steps in making this final project are to identify the problem at PT. Karya Teknik Utama, literature studies and field studies, data collection, data analysis, designing websites scenarios, design using Figma, website deployment, information system validation, and surveys. Data collection at PT. Karya Teknik Utama by focusing on the company's procurement process. The data collection step focuses on the role of each stakeholder in the procurement process. The analysis in this final project aims to optimize the procurement process by considering existing business processes. The analysis results are expected to minimize errors in the procurement process for ship repair components at PT. Karya Teknik Utama. The stage of making an information system uses Figma to simplify this process. The website development stage requires the creation of a coding model scheme and a page relation scheme. Application validation aims to reduce errors in the information system. If there are errors, then return to the development stage. However, when the validation stage is successful, the next stage is filling out a survey from relevant stakeholders in the procurement process at PT. Karya Teknik Utama.

3.2 Research Flowchart
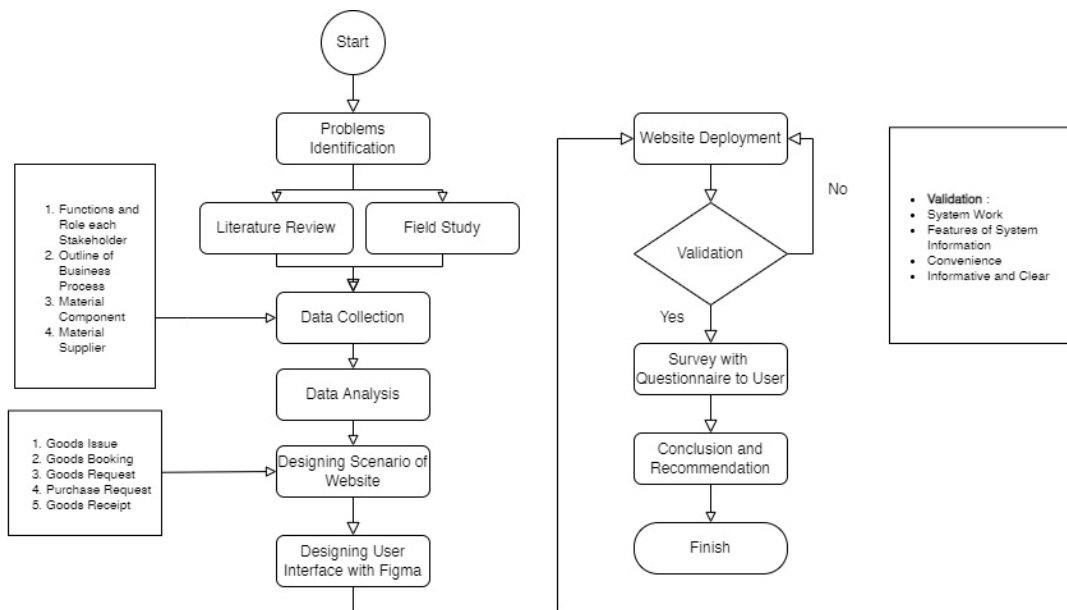
Figure 3.1 Research Flowchart

3.3 Problem Statement

The problem statement stage is the first step of this research. The purpose of this step is to know what needs to be done. For this research, there is a problem in the shipyard. Namely, there is less than optimal information in implementing purchasing and logistics activities or procurement of goods. For this reason, it is necessary to research procedures for solving problems in shipyards by making information systems.

Based on the literature study from Anderson, H (2006), each material and logistics activity has different problems. This problem must be addressed through the observation method described in Sugiono's study. The observations made are based on observations through practical observations. Observations were made at PT. Karya Teknik Utama to find problems in logistics and purchasing process activities.

The output of practical observation problems are problems related to procurement activities and problems with the company's system. The problems encountered will be supported by existing literature and analyzed next. The existing problems need to be resolved by explaining the procurement process within the company.

3.4 Literature Study

Literature study is a process in research methodology related to this thesis. The information collected is taken from books, journals, articles, and the internet. This process explains and provides the theoretical basis related to the theme of this final project. Literature study is supported in this research activity. Every problem that exists will be analyzed and researched with the limitations of the existing literature.

The literature study used discusses purchasing logistics activities in general from the book Anderson, H (2006). The responsibilities of each purchasing and logistics activity will be supported in the literature on the supply chain and the role of each stakeholder in the shipyard. The literature used to support the knowledge of the responsibilities and roles of each stakeholder are problems with the supply chain, management, and parties involved in the journal Vlachakis, N (2016). For problems in the system, it is taken from some literature on common problems in ERP systems.

3.5 Data Collection

At the data collection stage, the data obtained will be used as a reference for making websites with blockchain technology. The data taken relates to the fundamental business processes of logistics and purchasing at the shipyard, stakeholders in the business process, the role of each stakeholder, material component, and material supplier. Data retrieval is done by observation in the company PT. Karya Teknik Utama – Tanjung riau. As stated in the Sugiono literature study (2018), the observation process is used to engage in practical observation.

The details of collecting business process data, the role of each stakeholder, material component, and material supplier are described in Table 3.1.

Table 3.1 Expected of Data Collection

Expected Data	Name of Components
Business Process	Related Parties Business Process
	Logistics Business Process
	Purchasing Business Process
Role of Stake Holder	Project Role in Related Shipyard
	Logistics Role in Related Shipyard
	Purchasing Role in Related Shipyard
Material Component	Available Material in Warehous of Related Shipyard
Material Supplier	Related Supplier of Material in Related Shipyard

3.6 Data Analysis

The process of data analysis is a processing activity of data that has been collected in accordance with the research conducted. Data analysis was taken from the participant observation process from PT. Karya Teknik Utama. Data that has been obtained from the previous process will be analyzed in more detail and for business processes will be analyzed based on BPMN standards to facilitate the system creation process.

3.7   Designing Scenario of Website

After getting data from the business processes and each stakeholder's role, the scenario design of the website needs to be made as to the basis for the flow of the information system. The results of the scenario design of this website are Goods Issue, Goods Booking, Goods Request, Purchase Request, and Goods Receipt scenarios. The scenario is based on the basis from the BPMN business process. The scenario from the website design is used as the basis for creating a website with Figma

3.8   Designing User Interface with Figma

The development of the user interface can be used with the Figma software. This software simplifies the prototyping by adjusting the scenario results based on the shipyard's business process flow. The stage in making this website is to create a website skeleton from each page for the business processes that exist at PT. Karya Teknik Utama. This stage aims to provide a visualization of the actual form. So that in the website development stage, it will provide convenience.

3.9   Website Development

In website development, data correlation must be able to apply the principles of decentralization and transparency. From the results of making the user interface on Figma, the next stage is the development of website. Website development using visual studio code with Typescript Language. In this case, it is necessary to make a coding model scheme and page scheme relations.

3.10   Website Trial

The website trial process is carried out to prevent bugs and errors in the information system website flow. This stage can have two outputs; if there are errors or bugs on the website, it is necessary to re-do the website development stage. If there are no errors, it can be continued to give the questionnaire.

3.11   Survey with Questionnaire to User

The Survey with Questionnaire to User stage is where the use of the developed website gets a response from its users. Users will be given a questionnaire related to the assessment of the website. The assessment that the respondent has given will be analyzed. After being analyzed, if the functionality value of the website is as expected, the research can proceed to the next stage. and vice versa; if the value is less than expected, then object development will be carried out again to correct existing deficiencies

3.12 Conclusion

When the website is running by the functions, assessments, expectations for decentralized data, the author will proceed to the conclusion stage and finding of deficiency of the research to write down in the recommendation.

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CHAPTER 4
RESULTS AND DISCUSSION

4.1   Introduction

The activities that become the website model with the blockchain system in this final project are logistics and purchasing activities at PT. Karya Teknik Utama, in the process of requesting components for a ship repair project. PT. Karya Teknik Utama is a shipyard in Batam that runs shipbuilding projects, ship repairs, and offshore rigs. There are tugboats, barges, cement carriers, tankers, and crane barges for the types of ships built and repaired here.

4.2   Data Collecting

To develop the website based on a blockchain principle system, some of the data needed include the following functions and role of each stakeholder involved, business process, components list, and supplier list. The data were taken from the practitioner observation activities at PT. Karya Teknik Utama.

4.2.1   Functions and Role of Each Stakeholder Involved

Each stakeholder's function is a reference for the website development carried out. Several things that need to be obtained are the activities of each stakeholder, the scope of work, and the role in requesting goods for ship repair. Related stakeholder for procurement of ship reparation ship components are Project , Material Logistics Division, and Purchasing Division.

Stakeholders in the component procurement business process for the ship repair process include the Project Division, Materials and Logistics Division, and the Purchasing Division. The roles of each Division can be seen in the Figure 4.1.
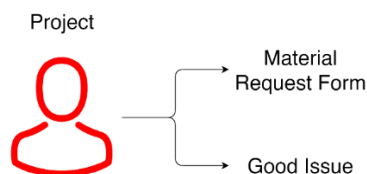
Figure 4.1 Role of Project Division

The role of the Project Division are making material request forms and making good issues. The Project Division becomes the earliest role to make the business process of

requesting goods running. The reason is the Project Division understands the ship repair project in terms of the types of components needed, quantities, and specifications clearly.
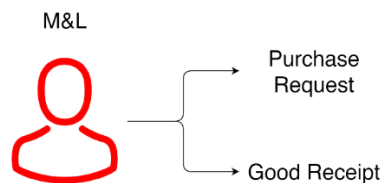
Figure 4.2 Role of Material and Logistics Division

The role of the Material and Logistics Division in the business process is procuring goods components at PT. Karya Teknik Utama includes Purchase Requests and the making of Goods receipts. The Materials and Logistics Division has the role of connecting the Project Division with the Purchasing Division. However, Material and Logistics can issue goods from stock if the requested goods are available in the inventory. In addition, the Material and Logistics Division has the control to check the purchased goods through the Purchasing Division. It is also included in making good receipts to ensure that the goods that arrive are the same as in the Purchase Order and Delivery Order notes.
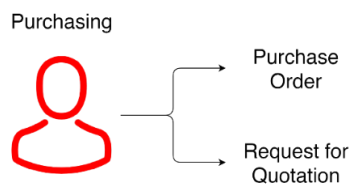
Figure 4.3 Role of Purchasing Division

The Purchasing Division has a role in following up on the Purchase Request (PR) process asked from the Materials and Logistics Division by conducting several selections and negotiating with existing suppliers. The Purchasing Division can see the supplier data and re-contact to purchase. And the procedure at PT. Karya Teknik Utama, the Purchasing Division, is required for providing Request for Quotation (RFQ) to prospective suppliers for comparison. After getting the best price, quality, and delivery time, the Purchasing Division will provide a Purchase Order to the supplier.
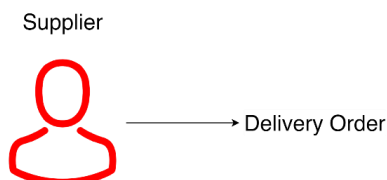
Figure 4.4 Role of Supplier

Suppliers are stakeholders from outside the PT. Karya Teknik Utama. However, the supplier has a close relationship with the business process in procuring goods components for ship repair. The focus of the supplier's activity is only to send goods from the supplier's warehouse to the PT. Karya Teknik Utama. The supplier must ensure that the goods can be delivered smoothly and without any problems. Things that need to be attached by the supplier when sending goods are Copy Purchase Orders given by the Purchasing Division and Delivery Orders. The Materials and Logistics Division will check the two documents to ensure the goods sent and ordered are the same.

4.2.2 Outline of Business Process

The business process is taken through a practical observation process at PT. Karya Teknik Utama – Tanjung Riau. Figure 4.5 the relationship between each role and the responsibilities of each division. Data collection uses the use of a Use Case Diagram. In the internal procurement process, three divisions are involved, namely the Project Division, Material Logistics Division and Purchasing Division.
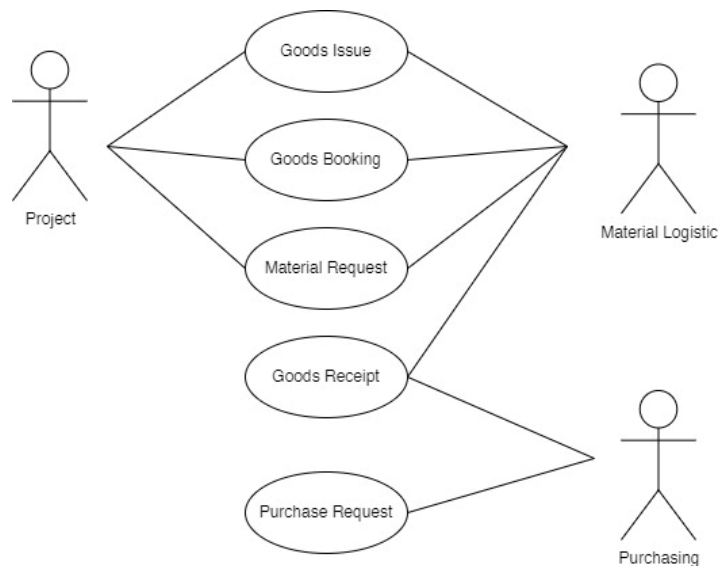
Figure 4.5 Use Case Diagram of Business Process

Goods Issue is a process carried out by Project Division to issue goods to the warehouse. In addition, this division can also make Goods bookings to request so that goods can be held for future project needs. And the material request is a request process for the supply of goods for ship repair projects. The Material Logistics Division has the authority over the continuity of these three business processes. In addition, the Material Logistics division has the authority to carry out Goods receipts and relate them to purchase requests. The Purchasing Division has the authority to respond to purchase requests sent. In response to this, purchasing will carry out selecting vendors and purchasing goods.

4.2.3 Components List

Table 4.1 shows the existing component list in PT. Karya Teknik Utama warehouse. The material logistics division uses the components list to record the types of goods available and the specific quantities in the inventory with certain units. A components list will be useful when the project division requests goods. When a request for goods is made, the material logistics division will see the goods in inventory. So that the material and logistics division can decide whether the requested goods can be supplied from the existing stock in the inventory or they needs to submit a purchase request to the purchasing division.

Table 4.1 Sample of Component List

Type of Components	Name of Components	Quantity in Warehouse	Unit
Pipe	Pipe Seamless 40A C.Steel Sch.40	31	Meter(s)
	Pipe Seamless 80A C.Steel Sch.40	2	
	Pipe Seamless 150A C.Steel Sch.40	45	
	Pipe Seamless 200A C.Steel Sch.40	16	
	Pipe Seamless 250A C.Steel Sch.40	2	
Fittings	Reducer 150A/80A C.Steel Sch.40	1	Piece(s)
	Reducer 200A/150A C.Steel Sch.40	21	
	Reducer 250A/150A C.Steel Sch.40	3	
Fittings	Gasket 40A Rubber JIS 5K	103	Piece(s)
	Gasket 80A Rubber JIS 5K	4	
	Gasket 200A Rubber JIS 5K	72	

Data sample materials obtained from the checking process at the warehouse PT. Karya Teknik Utama. The sample data will be used for the prototype of the information system in this research. Complete data of the selected component can be seen in Attachment 1.

The primary purpose of making this web application is to facilitate the process of purchasing and logistics of material components for ship repair at shipyards. Therefore data on what materials are commonly used for ship repair needed, especially in the ballast system. In this web application, each material has specifications and is connected to the data in the following flow until the supplier selection. Table 4.5 shows the sampled items on this website. The table contains the names of materials, pictures, and also specifications

Table 4.2 Table of List Component Material

Materials	Figures	Materials Specification
Pipe		- Pipe Seamless 40A C.Steel Sch.40 - Pipe Seamless 80A C.Steel Sch.40 - Pipe Seamless 150A C.Steel Sch.40 - Pipe Seamless 200A C.Steel Sch.40 - Pipe Seamless 250A C.Steel Sch.40
Reducer		- Reducer 150A/80A C.Steel Sch.40 - Reducer 200A/150A C.Steel Sch.40 - Reducer 250A/150A C.Steel Sch.40

Gasket		• Gasket 40A Rubber JIS 5K • Gasket 80A Rubber JIS 5K • Gasket 200A Rubber JIS 5K • Gasket 80A Rubber JIS 10K • Gasket 150A Rubber JIS 10K • Gasket 200A Rubber JIS 10K • Gasket 250A Rubber JIS 10K • Gasket 80A Rubber JIS 16K • Gasket 200A Rubber JIS 16K
Flange		• Flange 40A Mild Steel JIS 5K Slip-On • Flange 80A Mild Steel JIS 5K Slip-On • Flange 200A Mild Steel JIS 5K Slip-On • Flange 80A Mild Steel JIS 10K Slip-On • Flange 150A Mild Steel JIS 10K Slip-On • Flange 200A Mild Steel JIS 10K Slip-On • Flange 250A Mild Steel JIS 10K Slip-On • Flange 80A Mild Steel JIS 16K Slip-On • Flange 200A Mild Steel JIS 16K Slip-On

Plate Penetration		• Plate Penetration 40A Mild Steel JIS 10K • Plate Penetration 150A Mild Steel JIS 10K • Plate Penetration 200A Mild Steel JIS 10K • Plate Penetration 250A Mild Steel JIS 10K
Elbow		• Elbow 150A C.Steel Sch.40 30 Deg. • Elbow 200A C.Steel Sch.40 30 Deg. • Elbow 80A C.Steel Sch.40 45 Deg. • Elbow 150A C.Steel Sch.40 45 Deg. • Elbow 200A C.Steel Sch.40 45 Deg. • Elbow 80A C.Steel Sch.40 90 Deg. • Elbow 150A C.Steel Sch.40 90 Deg. • Elbow 200A C.Steel Sch.40 90 Deg. • Elbow 250A C.Steel Sch.40 90 Deg.

Sounding Cap		• Sounding Cap 40A Bronze
Vent Head		• Vent Head 200A Mild Steel Galv. JIS 5K
Butterfly Valve		• Butterfly Valve 150A Cast Iron JIS 10K Flange Type • Butterfly Valve 250A Cast Iron JIS 10K Water Type
Check Valve		• Check Valve 150A Cast Iron JIS 10K Swing Type • Check Valve 250A Cast Iron JIS 10K Swing Type

4.2.4 Suppliers List

The supplier list is a list whose function is a reference in seeing several vendor names used to purchase components. This supplier is a party that has been trusted by PT. Karya Teknik Utama delivers and provides goods needed in the company, starting from essential activities such as shipbuilding and repairs and non-essentials such as office stationery and other accessories. The purchasing division owns this supplier list for database purposes and records historical data from purchasing activities passed.

Table 4.3 Sample of Supplier List

Type of Components	Name of Components	Suppliers	Location
Pipe	Pipe Seamless 40A C.Steel Sch.40 Pipe Seamless 80A C.Steel Sch.40 Pipe Seamless 150A C.Steel Sch.40 Pipe Seamless 200A C.Steel Sch.40 Pipe Seamless 250A C.Steel Sch.40	Nam Leong & Asia Enteprises	Singapore
Fittings	Reducer 150A/80A C.Steel Sch.40 Reducer 200A/150A C.Steel Sch.40 Reducer 250A/150A C.Steel Sch.40	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Gasket 40A Rubber JIS 5K Gasket 80A Rubber JIS 5K Gasket 200A Rubber JIS 5K	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia

Table 4.3 sample was obtained from a field study at PT. Karya Teknik Utama. This data is obtained from the results of interviews with the purchasing division. This supplier data is used for supplier selection in the information system that will be made in this research. Complete data of the selected supplier can be seen in Attachment 1.

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4.3   Data Analysis

4.3.1   Analysis of Business Process

In the procurement of components for ship maintenance at the shipyard, the existing stakeholders need to be in touch with each other to supply the required goods. Each stakeholder has its role and interest. To achieve the availability of the process, all stakeholders must be corresponding at the business process flow, for example, a business process in the procurement of components for ship repair at PT. Karya Teknik Utama is as shown in the flowchart below:
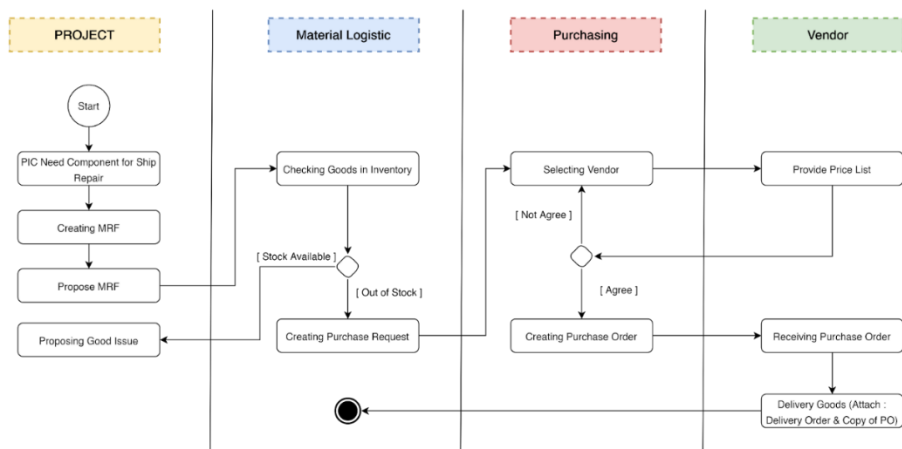
Figure 4.6 Business Process from Requesting Until Delivering Goods

Figure 4.6 explains that the business process starts from a request for goods. The flow above focuses on-demand activities to the delivery of goods. The Project Division that requires components for ship repair can fill out an MRF memorandum and give it to the Materials and Logistics Division. The Materials and Logistics Division will describe the component requirements of the Project Division. Before being given to the Purchasing Division, the Materials and Logistics Division will match the data on the items in the store with the items needed by the Project Division. Suppose the requested item is available in the storage. In that case, Project Division only needs to fill in the Good Issue and give it to Material Logistics to release the items in the Inventory.

However, if the goods are not available, the material logistics division must fill out a Purchase Request form to the Purchasing Division. This step is needed because the Purchasing Division will search for potential suppliers for items the Project Division needs. The Purchasing Division will provide an RFQ and carry out a series of negotiations to find a middle point between the Supplier and the shipyard. If the price of the components does not match, the purchasing division will look for other suppliers until the price is appropriate.

If it is under the things needed by the shipyard, then The Purchasing Division will give the Purchase Order, and the Supplier will continue sending components.
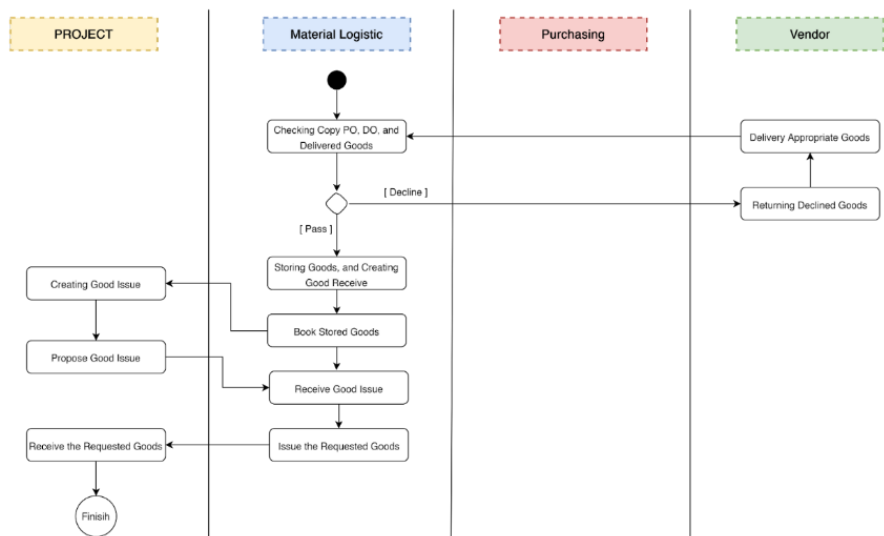
Figure 4.7 Business Process from Receiving Goods until Issuing Goods

Figure 4.7 explains how the business process from shipping goods to receiving goods. The supplier carries out the delivery of the components by attaching a copy of the PO and DO. Components sent will be delivered to the warehouse PT. Karya Teknik Utama. The Material Logistics Division will match the Copy of PO, DO, and the delivered goods. The Material Logistics will be considered in all aspects, starting from the amount, type of goods, material details to the quality that has been agreed upon when making a purchase. If the goods do not match the attachments made, the goods will be returned to the supplier and not received at the PT. Karya Teknik to reduce the risk of deviation of the incorrect goods.

The Materials and Logistics Division will receive the components suitable with the attachments, and data collecting will be carried out on the goods. The data collection process is carried out through good receipts. after the goods have been stored, the Project Division will request the release of the goods that have been ordered at the beginning of the business process. The Project Division must fill out the Goods Issue form to issue goods. The Project Division will give the Materials and Logistics Division the form to prove the release of goods in the store. After the form is received, the ordered goods will be issued and received by the project division, and The Project Division can continue ship repair activities.

4.3.2   Procedures of Making Requests for Procurement Repair Components

In the procurement of goods for reparation, each stakeholder must go through several stages of procedures in the procurement activities of PT. Karya Teknik Utama, several procedures have not been entered into the system to facilitate this process. The following is a discussion of the procedures and data generated by each transaction process that is passed.

Figure 4.8 Activity Giving Material Requisition Form (MRF)

In the activity of requesting components of goods, there are several stages of the procedure, including:

- **Procurement requisition procedure**
  The Project Division will request goods by filling out the Material Request Form (MRF). The form contains a table to fill in the name of the component needed, the amount, and a description of its use. The paper will be given to the Materials and Logistics Division.

Figure 4.9 Material Requisition Form Note

- **Purchase request procedure**

  After receiving the application for procurement of goods, the Materials and Logistics Division will create an application form for the purchase of goods. The paper is called Purchase Request (PR). This form will be given to the Purchasing Division to continue in the process of purchasing the required goods
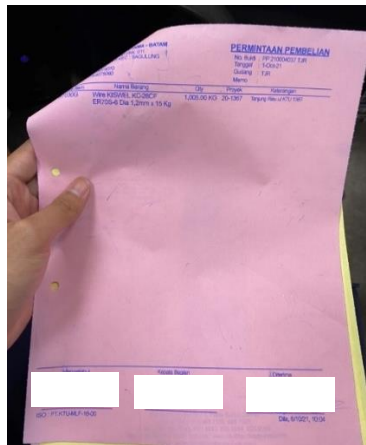
Figure 4.10 Purchase Request Note

- **Goods purchase procedure**

  The Purchasing Division will receive an application to purchase goods and select a supplier that suits your needs. in the company. It takes at least three companies that can supply goods to PT. Karya Teknik Utama to be used as a comparison. Things that must be considered include technical grade, lead time delivery, quality of goods, and the last is price. After it has been considered, the Purchasing Division will provide a Purchase Order (PO) to the selected supplier.
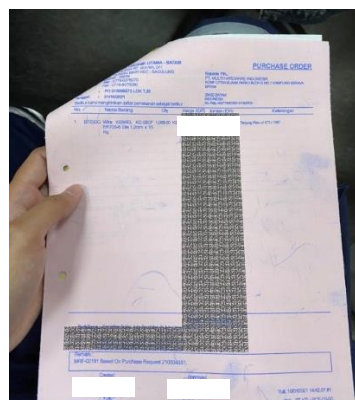
Figure 4.11 Purchase Order Note

- **Goods receipt procedure**

The Purchasing Division has purchased goods that will be sent by the vendor or supplier with the same specifications and details as stated in the Purchase Order. The goods sent will be received by the Materials & Logistics Division. The Supplier will be asked to copy the Purchase Order (Copy- PO) and the Delivery Order (DO) form prepared before shipping the goods. Components that meet the specifications in the Purchase Order will be received, and the Materials and Logistics Division will create a Goods Receipt form.
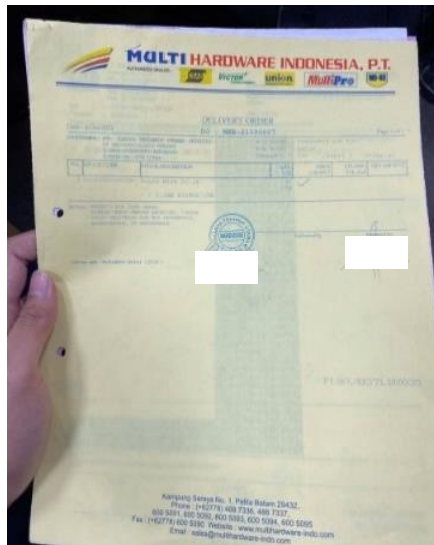
Figure 4.12 Delivery Order Note

Figure 4.13 Goods Receipt Notes

- **Goods issue procedure**

The Project Division that has requested goods will ask the Materials and Logistics Division to release the goods that have been ordered in the initial process of requesting the procurement of goods. The Project Division and the Materials and Logistics Division will fill out a form called Goods Issue as evidence for the goods issued to be used according to the work to be carried out and as a data collection of goods that have been out of inventory.

Figure 4.14 Good Issue Note

4.3.3 Business Process for Designed System

After analyzing the business processes in detail and existing procedures, creating a business process for the designed system is necessary. In this stage, three main things are analyzed. The analysis of this stage includes the Goods Issue Process, Goods Request Process, and Goods Book Process. This analysis is done by making Business Process Modeling Notation (BPMN).

Figure 4.15 is the ongoing Goods Issue process. In the process of the system, there are two stakeholders involved, namely the Project Division and the Material Logistics Division. The project party is asked to fill out a form first to start the goods issue process in the system. The availability of materials in the warehouse will affect the process of the goods issue. If the goods are available, the goods issue process can be carried out to the goods release process involving the Materials and Logistics Division. However, the condition of the not available goods will lead to the goods request process.
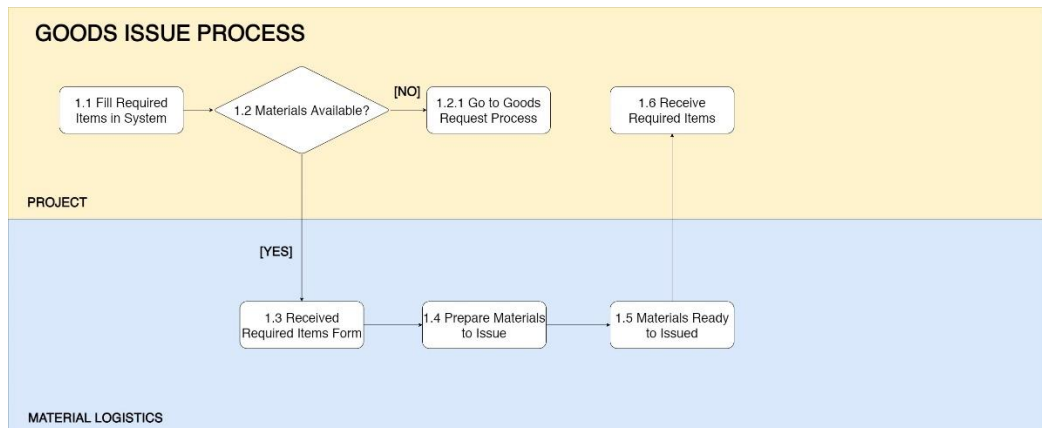
Figure 4.15 Goods Issue Process for Designed System

Figure 4.16 is a process goods request. In this process, all parties will be involved. The Project Division will start by filling out a form to provide items. And then, Materials and Logistics will be notified. The process will be continued until the purchase request of goods. The Purchasing Division will select suppliers for related goods. The Material Logistics Division will be responsible for receiving goods that the Purchasing Division has purchased. After the goods are received, the Project Division can take the goods that have been received in the warehouse.
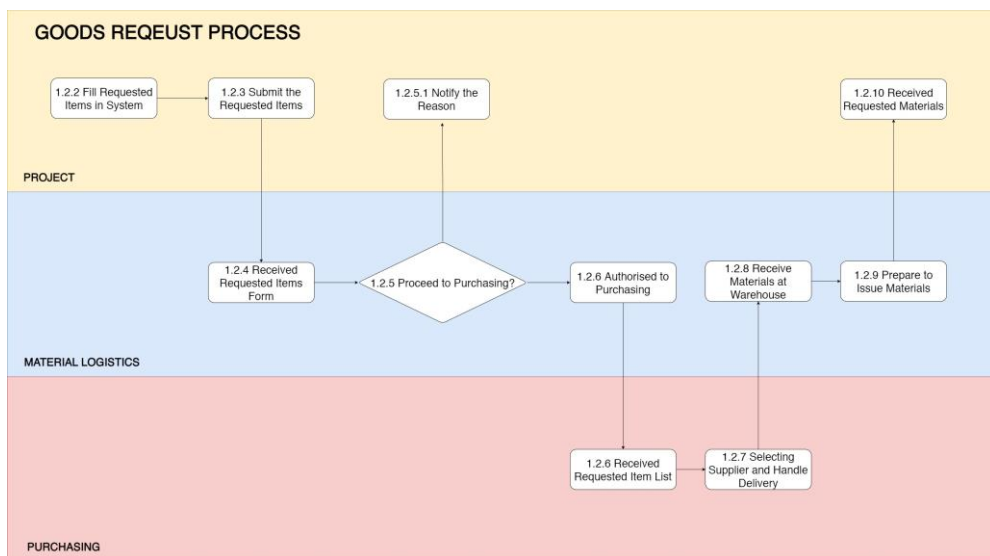
Figure 4.16 Goods Request Process for Designed System

Figure 4.17 is the goods book process. The divisions involved are the Project Division and the Materials and Logistics Division. Selection of goods for booking can only be done if the goods are available in the warehouse. Goods that have been selected for booking can be informed to the Material Logistics Division. The Project Division controls the cancellation of the booking of goods. However, if the goods that have been booked need to be removed, the material can be picked up at the warehouse.
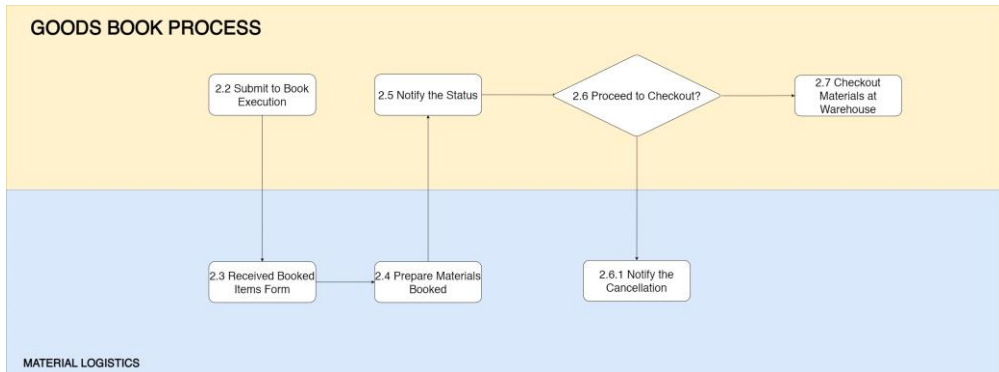
Figure 4.17 Goods Book Process for Designed System

4.4   Designing Scenario Website Scenario

After developing the business processes that have been created, scenario development on the website needs to be done to simplify the procurement process. There are three groups of scenarios for the procurement process on the website flow, including the process of releasing goods from the warehouse or called the Good Issue process, reserving goods in the warehouse so that they are not mixed with other projects, or called the Book process, and the last is the purchasing process. Goods or called the Material Request process.

4.4.1   Good Issue Process

In Good Issue, the project party carries out the process to issue goods available in the warehouse. Items used for ballast system repair projects by the project. The process is a request to release goods from the warehouse by the Project Division to the Material Logistics Division. Here is the flow of the process:

- **Request for Issue Goods from Warehouse Website Flow**

Two stakeholders carry this flow, namely the Project Division and the Material Logistics Division. Each party must log in to run the process on the website. The Project Division must fill out the Good Issue form on the website by filling in the existing requirements and submitting the form by clicking the "Send" button. It will send the transaction status to the Material Logistics Division. After that, the Material Logistics Division selects the items to be checked out on the material checkout page. After selecting the goods issued, the data will be sent, the status will be completed, and the goods can be retrieved from the warehouse after the warehouse has prepared the goods.
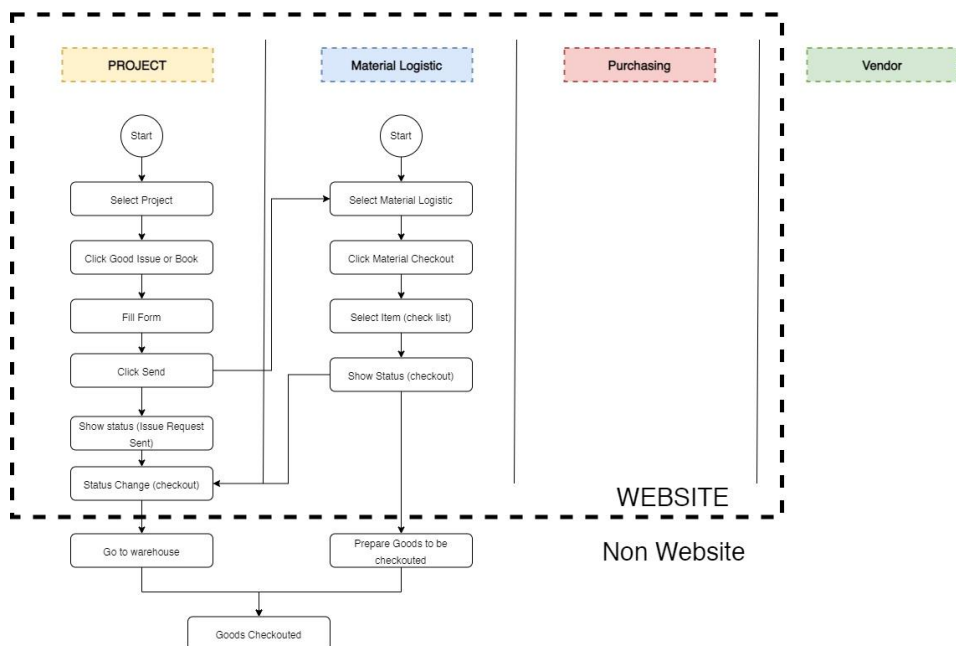
Figure 4.18 Request for Issue Goods from Warehouse Website Flow

4.4.2   Good Book Process

In the process of booking goods in the Warehouse, the project party requests an order from the Material Logistics Division to reserve the goods in the Warehouse so that the reserved goods are not transferred to another project. It is helpful so that the ballast system maintenance process on the ship can run efficiently and does not take time because goods with very high urgency do not run out of stock in the Warehouse. In this process, several flows are passed, namely filling out forms for booking goods, taking goods from the Warehouse through the website, and cancelling bookings of goods that have been made.

- **Book Items from Warehouse Website Flow**

The flow of filling out the goods booking form on the website for a project can be done by the Project Division. The Project Division needs to fill in the items required, the amount, and what activities need to be done. The data that has been filled in will be sent to the Material Logistics Division for separation of the goods that have been booked. The status of the goods that have been booked can be seen on the "Availability Goods" page to view the log of transactions that have been made.
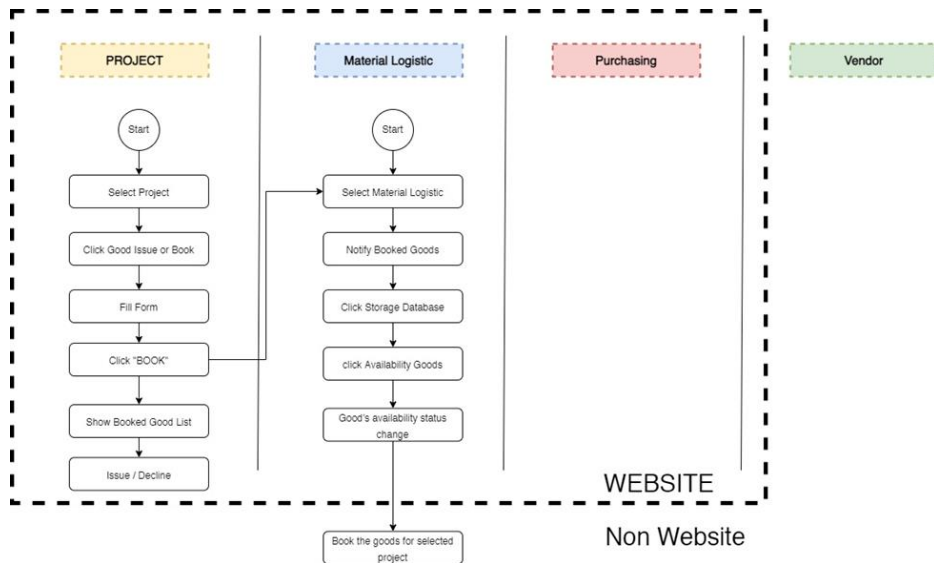
Figure 4.19 Book Items from Warehouse Website Flow

- **Issue Booked Items Website Flow**

The Project Division can carry out the flow of picking up the goods that have been booked by pressing the "ISSUE" button on the booked good list page. Data will be sent to the Material Logistics Division to prepare goods booked to be released from the Warehouse from the material selected and executed. The Project Division can immediately pick up the items that have been prepared at the Warehouse.
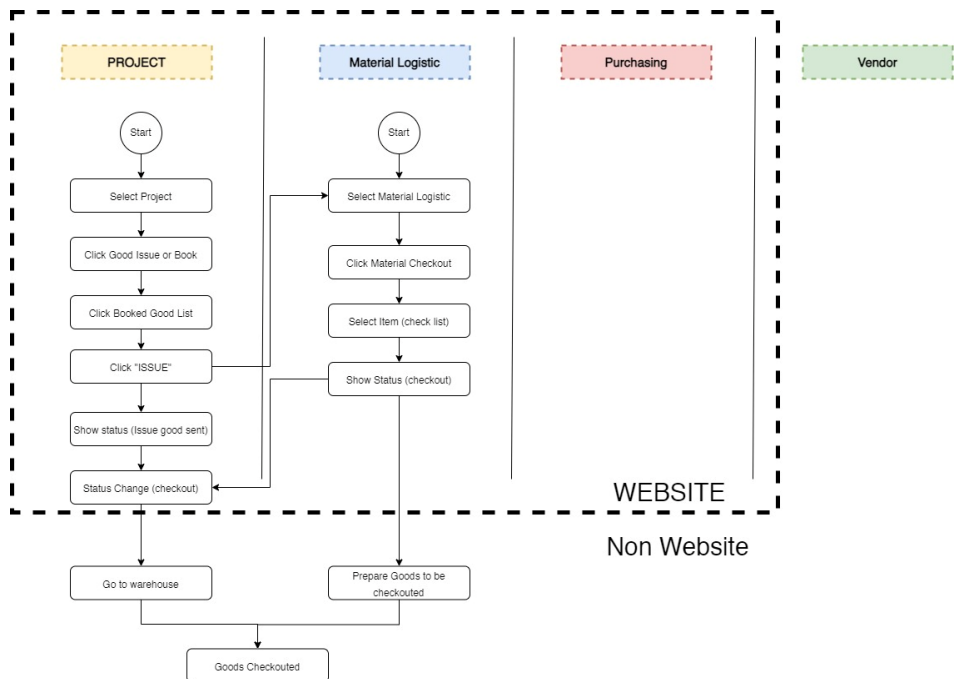
Figure 4.20 Issue Booked Items Website Flow

- **Cancel Booked Items Website Flow**

The flow of canceling the booking of goods can occur if the goods that the Project Division has ordered are not continued because of things that cause the ballast system repair project to be canceled. This flow makes it easier for the Project Division and the Material Logistics Division to save time and activities so that goods are not stuck in the Warehouse and can be carried out on other projects. To cancel an item that has been booked, the Project Division can press the "cancel" button on the Booked Good List page. So that the data that the Project Division has filled in will be canceled, and the Project user can cancel the ordering process and booking of goods.
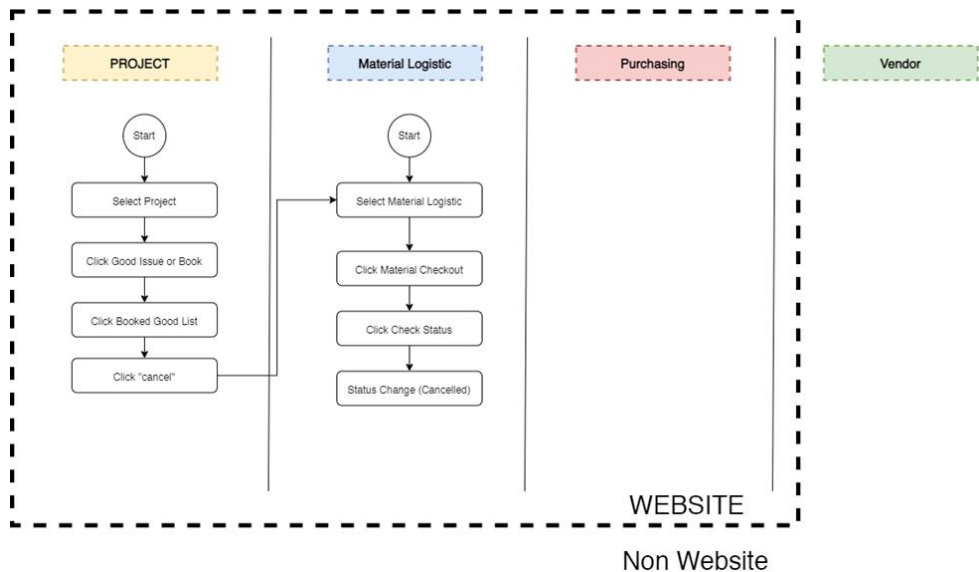
Figure 4.21 Cancel Booked Items Website Flow

4.4.3 Good Request and Purchase Process

The Goods Request Process and Goods Purchase on the website are carried out by all existing Stakeholders, namely the Project Division, Material Logistics Division, Purchasing Division, and vendors required to send goods that have passed various agreements with the company's internal parties. This process is given if the goods in the warehouse are not sufficient in quantity or availability to meet the needs of the project division on ballast system repair on ships. In this process, several flows on the website must be passed by the company's internal stakeholders, including filling out a material purchase request form, making an application to the Purchasing Division, and making a purchase order by the Purchasing Division to the Supplier. The last one is receiving goods to complete the request flow—goods and purchases of goods.

- **Request for Material Purchase Website Flow**

The flow of material purchase requests can be done if the amount of material or availability in the warehouse is not sufficient to meet the needs of a project. The Project Division needs to open the Material Request page to fill out an item purchase request form to meet the material needs for the ballast system repair project. The project division can fill out the form listed on the website by attaching the data needed for the goods, the amount, and the purpose. The data is sent to the Material Logistics Division, and the purchase request will be checked from the data. The data will be forwarded on the website to the Purchasing Division to continue the following flow.
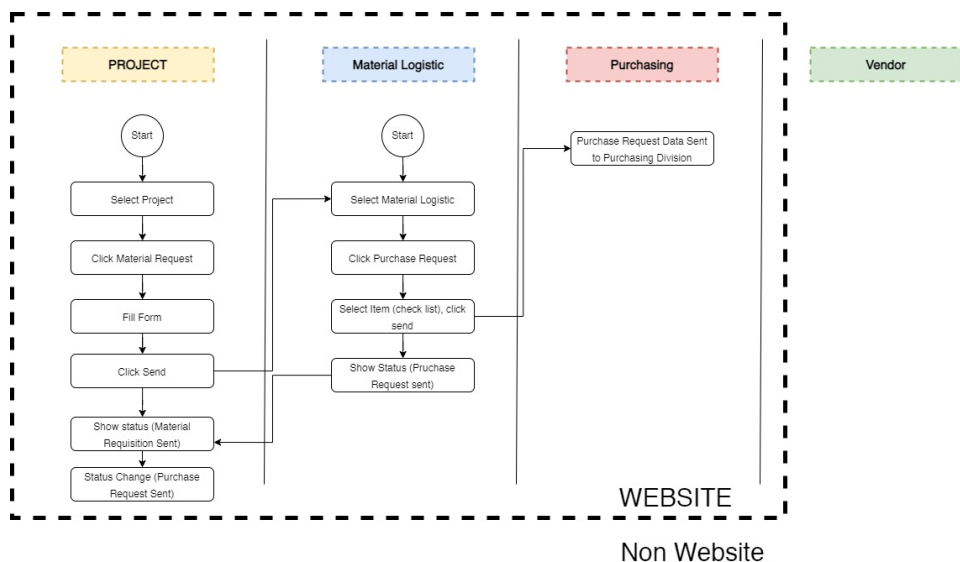
Figure 4.22 Request for Material Purchase Website Flow

- **Create a Request to the Purchasing Division Website Flow**

Users can follow the request flow to the Purchasing Division if the material requested for the purchasing process by the Project Division is received and approved by the Material Logistics Division. The data received by the Purchasing Division will be reviewed and continued in preparing to purchase the Purchasing Division. The requested items will be selected on the Purchase List page and followed by changes to the transaction data status for each division. The Purchasing Division will negotiate with suppliers outside the flow on the website. After the negotiation process is reached, the Purchasing Division will continue the data to the following flow.
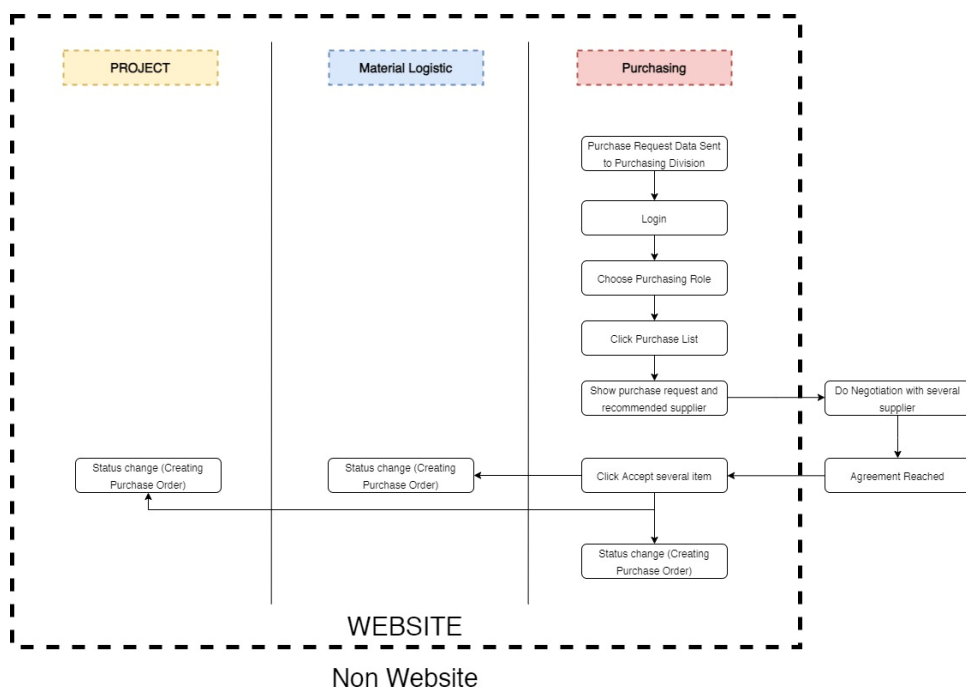
Figure 4.23 Create a Request to the Purchasing Division Website Flow

- **Create Purchase Orders Website Flow**

The flow of making a Purchase Order can be done if the Purchasing Division has reached an agreement and selects a supplier to send goods to the warehouse. The Purchasing Division controls converting data into a "delivery process" if the Purchasing Division has received information that the supplier has sent the goods. After the transaction status changes and the goods are shipped, all parties will receive the same information.
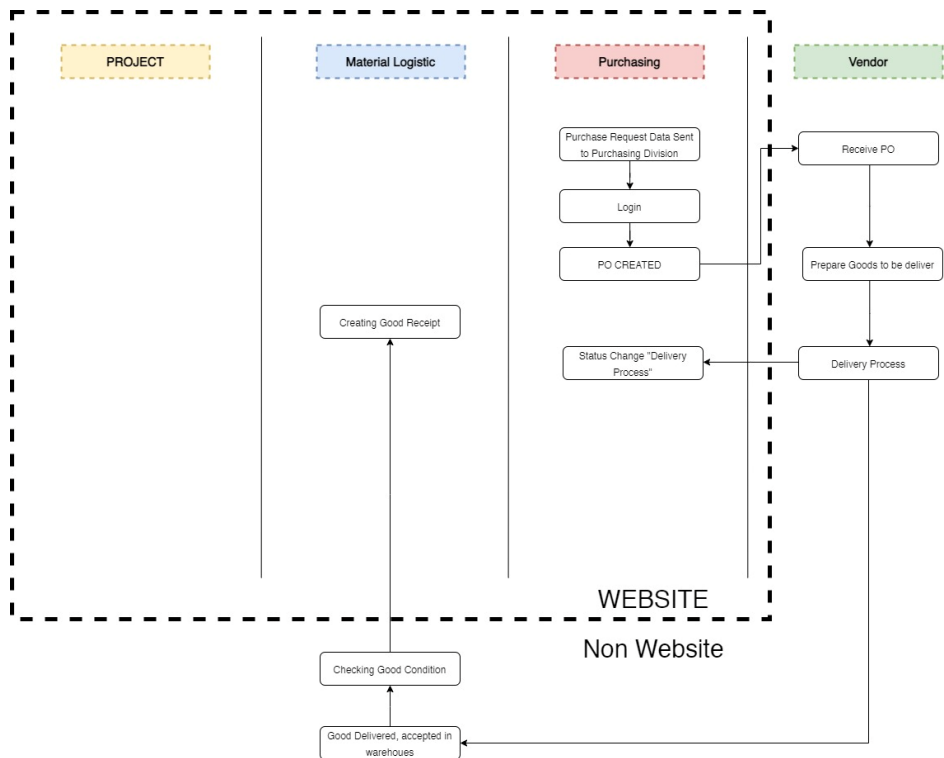
Figure 4.24 Create Purchase Orders Website Flow

- **Goods Receipt Website Flow**

   The Goods Receipt Flow is the final flow of the entire process of requesting and purchasing materials. This flow can be done if the material sent by the Supplier has arrived at the warehouse. The Material Logistics Division will carry out the entire process of checking manually by matching the goods received with the Purchase Order and Delivery orders made. If all the materials are appropriate, the Material Logistics Division will fill in the data on the website regarding the goods that have been received. All Divisions will receive status data related to the transaction, and the purchase process has ended. The Project Division can take goods that have been requested from the warehouse for the ship ballast system repair.
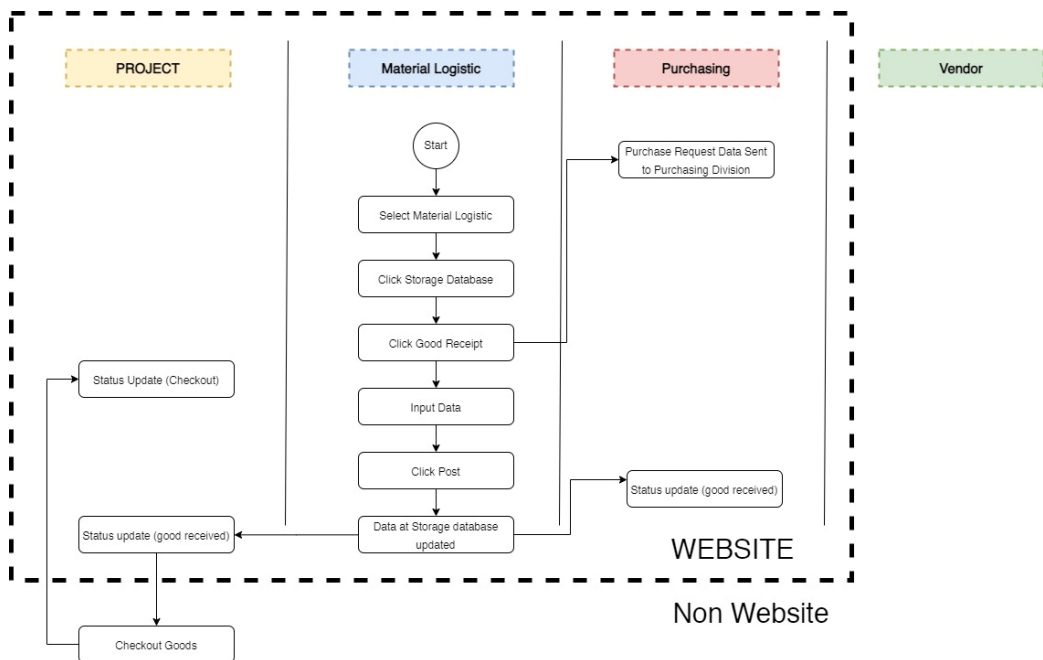
Figure 4.25 Goods Receipt Website Flow

4.5 Designing User Interface with Figma

Web application development can be done when the flow of each existing process has been made to meet the objectives of this final project. The initial stage for developing a web application is to create a prototype in the Figma application. In building a prototype, the thing that needs to be done is to create a user role selection page at the shipyard, then make a good issue and booking page, material requests, purchase requests, purchase lists, and goods receipt pages.

4.5.1 User Role Page

This page is created for the initial stage of the user using the purchasing logistics web application. The user will choose a role that corresponds to the shaded division. The available positions include Project, Material Logistics, and Purchasing. Each selected role has different functions and tasks to fulfil the flow of ballast system repair activities on ships.
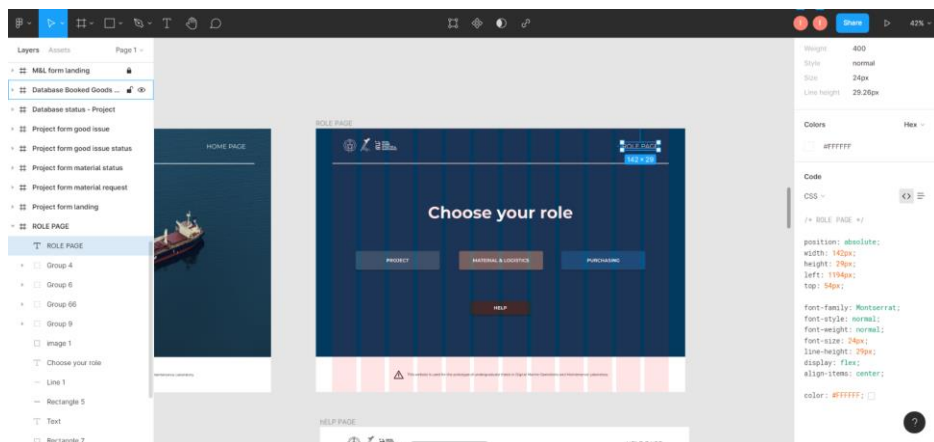
Figure 4.26 User Role Page

4.5.2 Good Issue and Booking Page

The Good Issue page is available on the user project. This page fulfills the flow of requests for the expenditure of goods by the Project division. On this page, the project user is asked to fill in the form of items needed for ballast system repair. The project user is required to fill in the identity, approved by whom, the items required, the amount, and the purpose of use. It can be selected via the "send" or "booking" for good issues or booking. Thus, the execution for the next flow can be distinguished by setting the button.
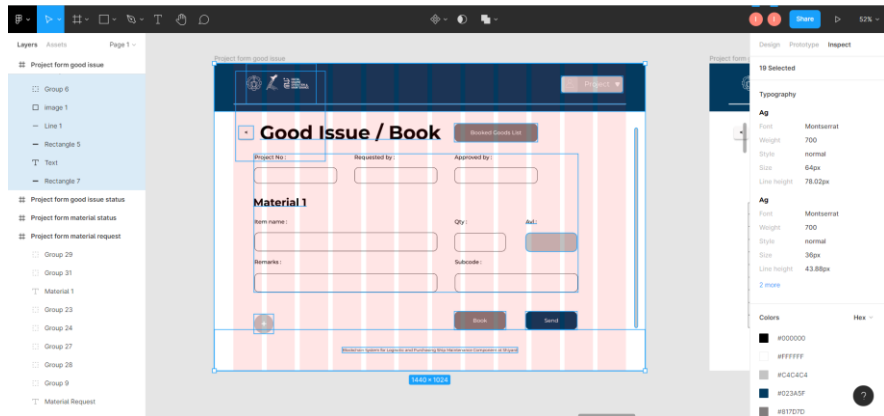
Figure 4.27 Good Issue and Booking Page

4.5.3 Material Request Page

The Material Request page allows project users to request activities to supply goods needed for ballast system repair. On this page, the project user must fill out a form, provided that the material components available in the warehouse for ballast system repair activities are not sufficient. The form on this page has the same appearance as the good issue and booking pages. Still, the project user must fill in the number of material components that exceed the number of items available in the warehouse.
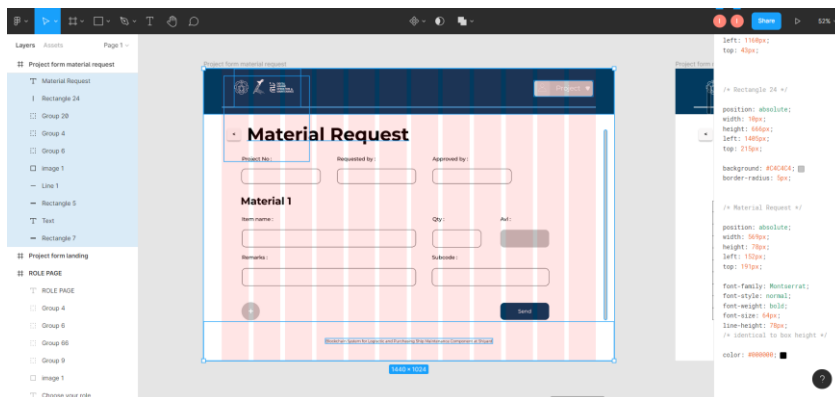
Figure 4.28 Material Request Page

4.5.4   Purchase Request Page

Material logistics users can only use the Purchase Request page to select materials the project user has ordered in the material request flow. The material logistics user can approve the goods that the project user has ordered to purchase goods by the purchasing user. On this page, there is data on the goods ordered and the column for selecting the list of data to be received to proceed to the next flow.
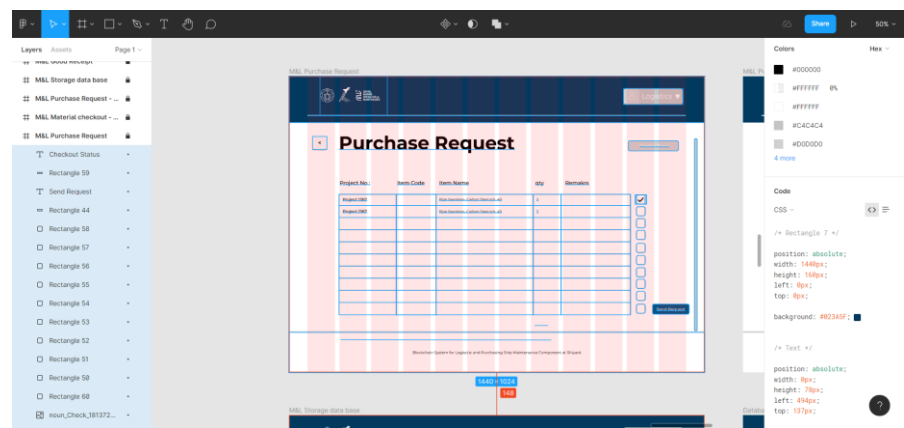
Figure 4.29 Purchase Request Page

4.5.5   Purchase List Page

The Purchase List page can be accessed by purchasing users to select related suppliers of the goods requested for supply in the previous flow. On this page view, purchasing users can see recommendations from historically existing suppliers. Purchasing users can select a list of items that have been inputted by the material logistics user by filling in the checklist column available on the Purchase List page.
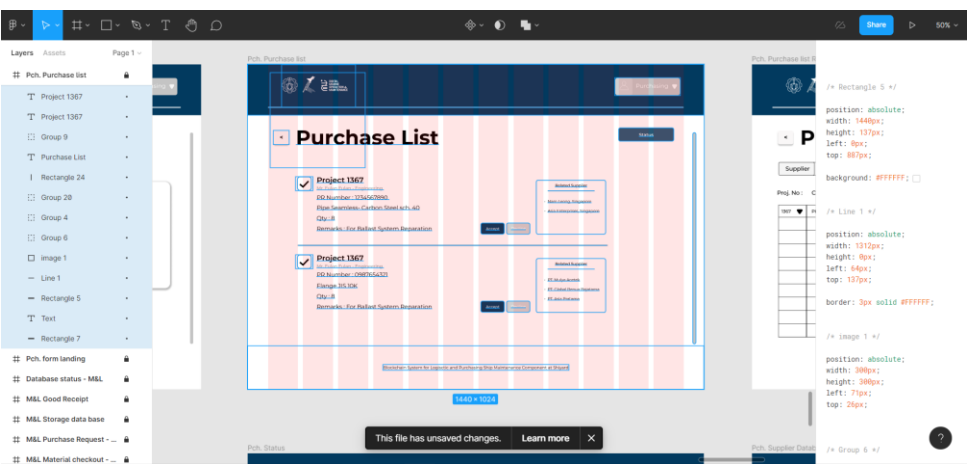
Figure 4.30 Purchase List Page

4.5.6 Good Receipt Page

The goods receipt page is a page that can be filled in by the material logistics user to end all flows on the website by recording the suitability of goods that the Supplier has sent. Data on the purchase of goods to suppliers who have been forwarded by the purchasing user on the flow of goods purchases will appear on this page to be matched with the suitability of goods arriving at the warehouse. After the goods are matched and the purchase data, the Material Logistics user can fill in the checklist column to complete the material request transaction. The number of goods in the warehouse will increase according to the amount ordered by the project user in the previous flow, namely the purchase request for goods.
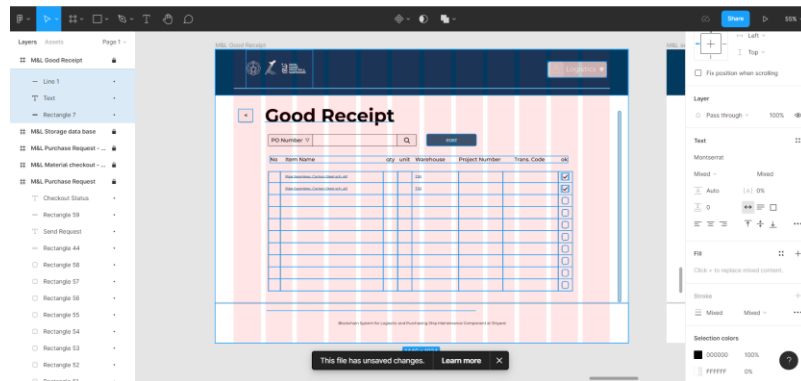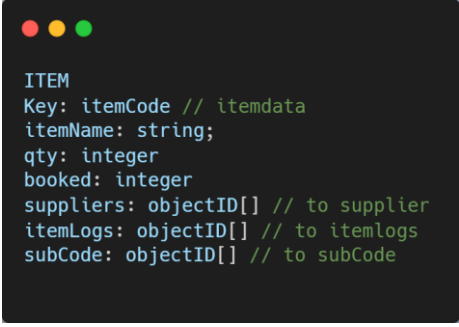
Figure 4.31 Good Receipt Page

4.6   Website Development

The software used for information system development is Visual Studio Code. This development produces an information system that users can use at the shipyard to carry out the logistics and purchasing processes at the shipyard.

4.6.1   Coding Model Scheme

In designing the correlation of the data in the transaction, it is necessary to design an initial schema model using typescript. The schema model has several functions and meanings. In typescript, there are properties and values. The properties are written first, then continued with the expected value for writing. Here are some explanations related to the scheme model.

Figure 4.32 Example of Coding Model Scheme

Each algorithm has a different command. Table 4.4 will explain details of the function in the algorithm.

Table 4.4 Table of Model Scheme Description

Algorithm	Description
Key, booked ItemName,qty, etc.	Properties of algorithm
Itemcode	Value of item code
string	Value for alphabetic writing
integer	Value for numerical writing
objectID[]	Value to retrieve data on an object
objectID[]// to supplier	which is aimed
objectID[]// to itemlogs	Value to retrieve data on the value supplier
objectID[]// to subCode	Value to retrieve data on value item logs

The coding is used for the initial model of the information system to be developed. Details of coding are attached in the Attachment 4 of this research.

4.6.2   Page and Scheme Relation

After creating a schema model from the website, it is necessary to create a relationship between the scheme model and the pages in Figma to create a flow of the required data. Each page has input data and output data. Below is the relationship data between the page and the schema model created. For the relation code can seen in Attachment 5.

Table 4.5 Table of Page and Schee Relation Description

Page Name	In	Out
Project form material request	ITEM (itemName, itemCode, qty, booked, subCode)	Create: TRANSACTION (*) ITEMLOG (item, transaction, date, qty, remarks, unit, status)
Project form good issue	ITEM (itemName, itemCode, qty, booked, subCode)	Create: TRANSACTION (*) ITEMLOG (item, transaction, date, qty, remarks, unit, status) Update: ITEM (book)

Database booked goods project	TRANSACTION (projectNumber, TransactionID, approvedBy, itemLogs=="book request")
	
	ITEMLOG (itemName, subCode, qty, unit)
		Create:
		TRANSACTION (*)
		
		Update:
		TRANSACTION (itemLogs) // pindahkan log yg di issue
		ITEMLOG(transaction, status)
		ITEM (book)

Table 4.5 shows the relation between the page and the schema for the created information system is used as the basis for developing user interface designs. This relation describes the commands for input and output that will occur on each page of the information system. Data transaction of the system can seen in Attachment 6 of this research.

4.6.3 Homepage Website

The user will be directed to the homepage to start using the prototype information system based on the Blockchain principle. The homepage displays the title of the information system, the author's name, the name of the researched company, and a button that directs to the next page. The model for the prototype website page is shown in Figure 4.33 below.
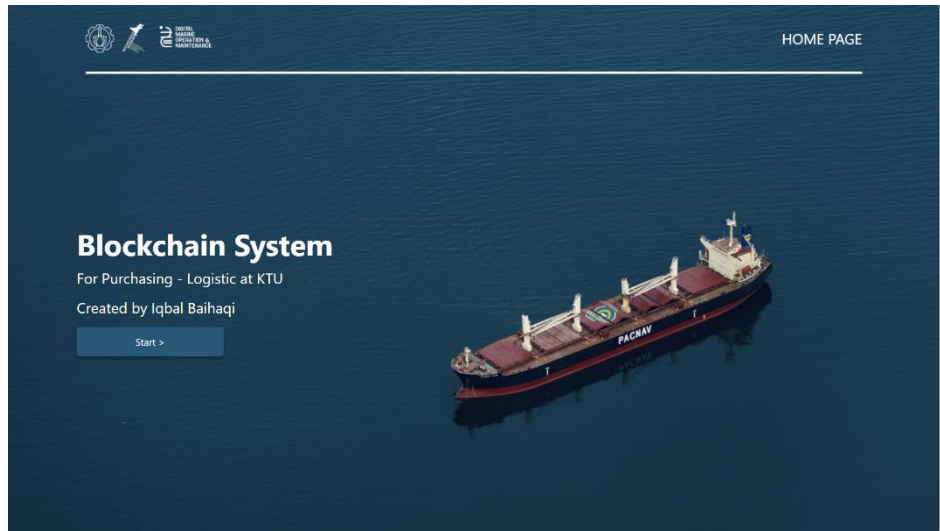
Figure 4.33 Website Home Page

After starting on the start page, the user will be directed to the role selection page. The user will choose a role that matches the existing division. Each role has a different function. The available roles are Project, Material & Logistics, and Purchasing Role.
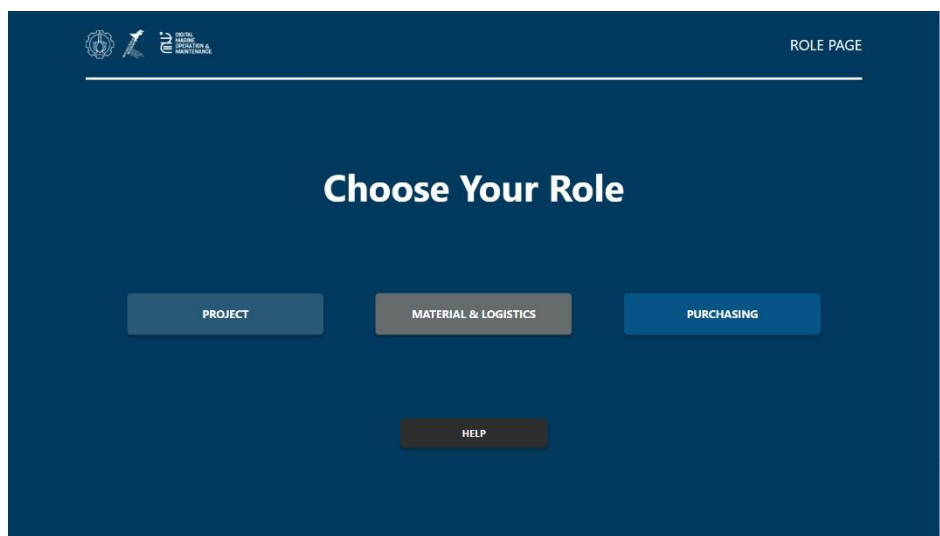
Figure 4.34 Website Role Page

4.6.4 Project Website Pages

The next stage will explain the functionality of the project role. Following the company's role, this blockchain principle-based information system provides features to facilitate the needs and needs of the project part in carrying out their duties. The features in this information system page are goods issued to the warehouse, material requests to request goods that are not available in the warehouse, and checking the status of transactions that will or have occurred. For the features on the page, see Figure 4.35
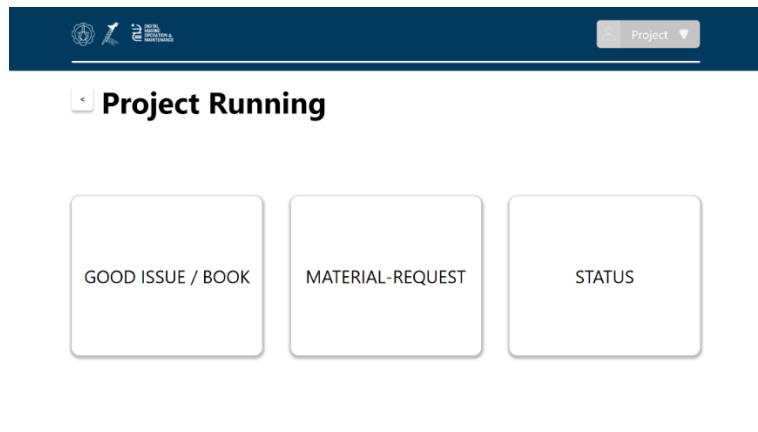
Figure 4.35 Website Project Menu Page

The project division will fill out a request form to remove goods from the warehouse in the Goods issue feature. The form contains the project number, the name of the applicant, the name of the approver, the material, which includes the name of the material, the amount, and notes for the use of the goods. Furthermore, the project party can carry out a goods issue by pressing the existing button or carry out a goods booking scenario by pressing the goods booking button. For the goods booking page, see Figure 4.36

Figure 4.36 Website Good Issue Form Page

If the project division performs a goods booking scenario, the transaction status of the goods can be seen on the booked goods list page. This page contains details of the items booked for a project with information on the item name, project number, transaction code, subcode, and the number of items ordered. For details on the booked goods list page, see Figure 4.37.
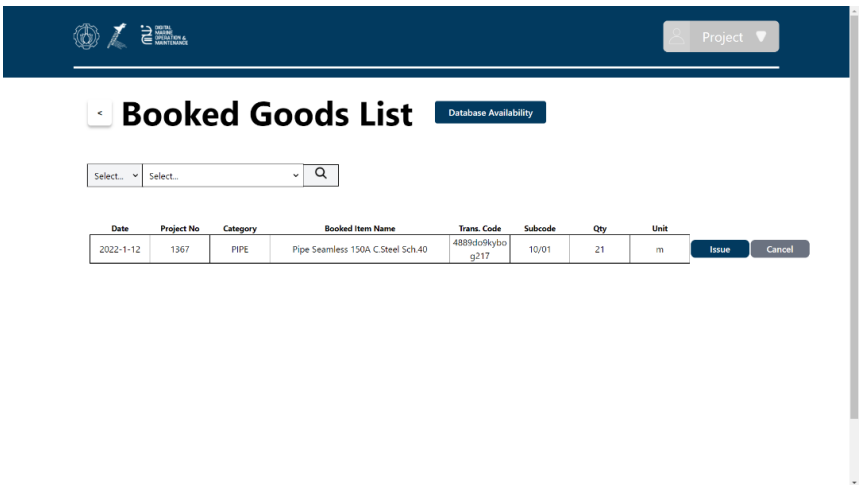
Figure 4.37 Website Booked Good List Page

Next is the availability database page, which has a function to determine the number of items removed from the warehouse. The detailed function of this page is to list the type of item, item code, number of items, and number of items that will issue from the warehouse. In addition, there are item logs that can inform all existing roles regarding the transaction status of the item. For details on the database availability page, see Figure 4.38.
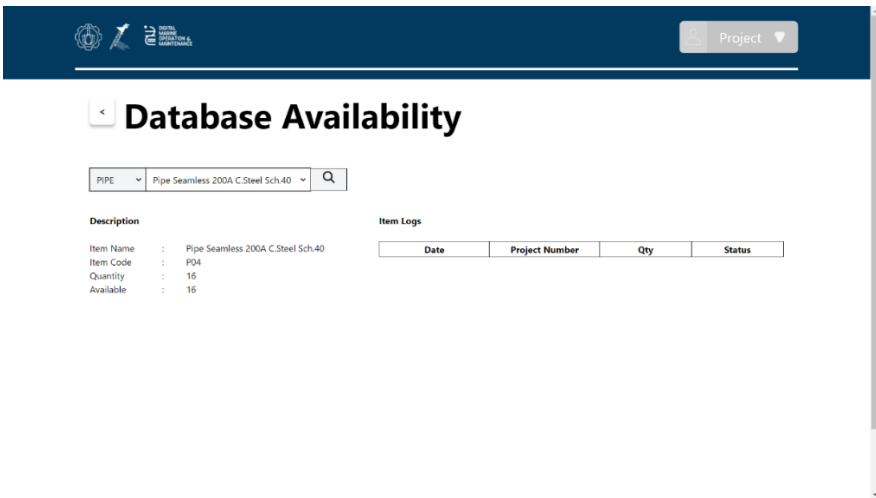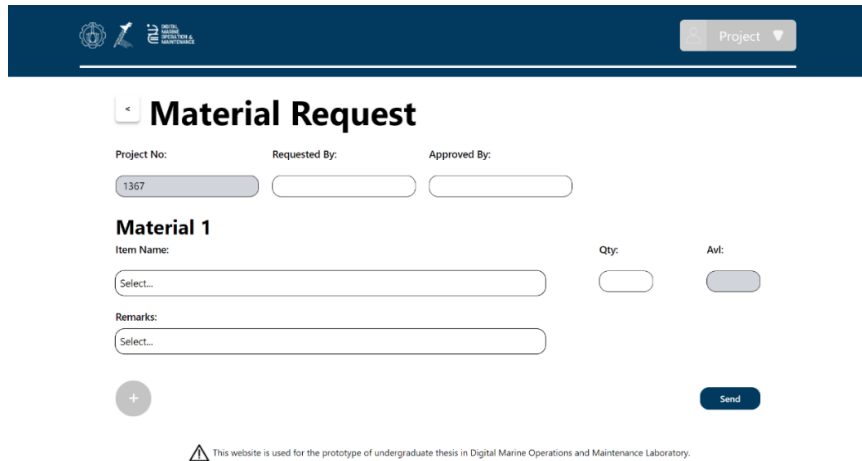
Figure 4.38 Database Availability Page

The Material Request page can be used by the project party to order goods, not in the warehouse. The form on this page has the same details as the goods issue page. Details of the material request page are shown in Figure 4.39.
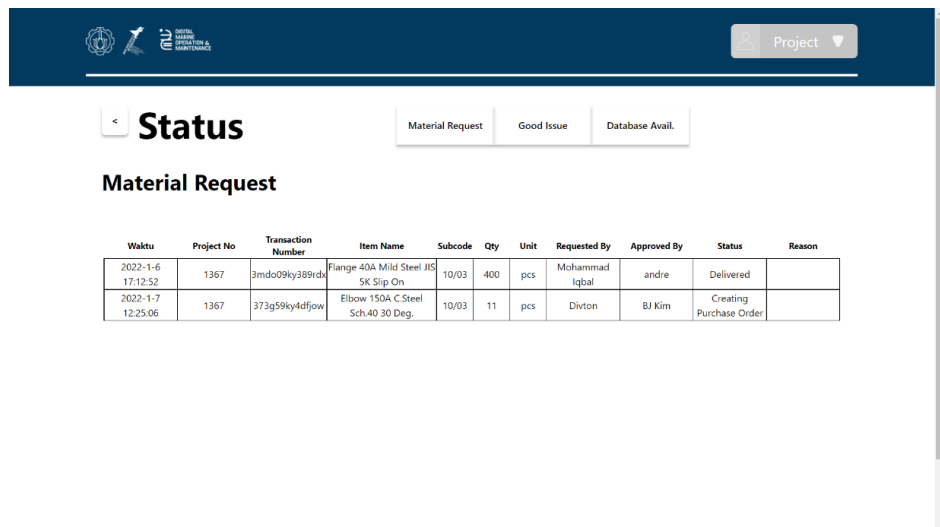
Figure 4.39 Website Material Request Page

Status pages can provide decentralized and transparent information to all parties involved in this business process. On the status page, you can see the goods that have been ordered for a goods issue or material request. Details of the project's status page can be seen in Figure 4.40.

Figure 4.40 Website Status Project Page

4.6.5 Material & Logistics Website Pages

Pages for the role of materials & logistics have different functionality. On this website, the material & logistics division can access several features that can simplify the procurement process, including selecting materials ordered by the project division on the material checkout page, selecting goods from purchase requests on the purchase request page, and database storage in the warehouse. PT. Karya Teknik Utama – Tanjung Riau. For details of the features on the functionality of the material & logistics division, see Figure 4.41.
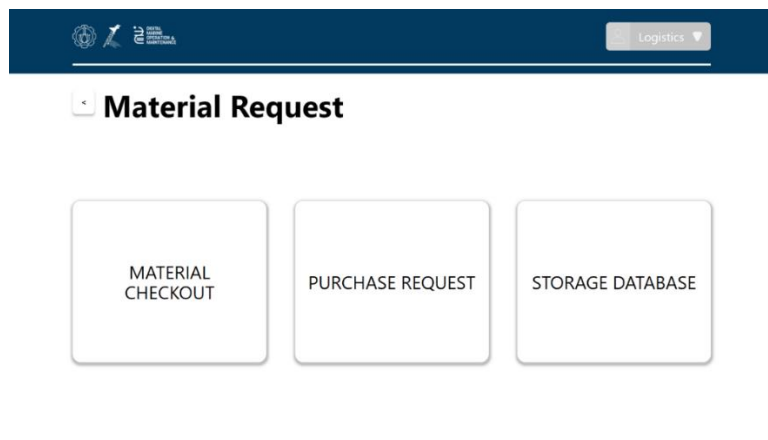
Figure 4.41 Website Material Logistics Menu Page

The material checkout page is one of the main features for the Materials & Logistics division. On this page, the material and logistics division can choose the goods that have been requested in the goods issue scenario to be prepared for the goods release process. The project division has ordered data from the goods issue process on this page. For details of the features on this page, see Figure 4.42.
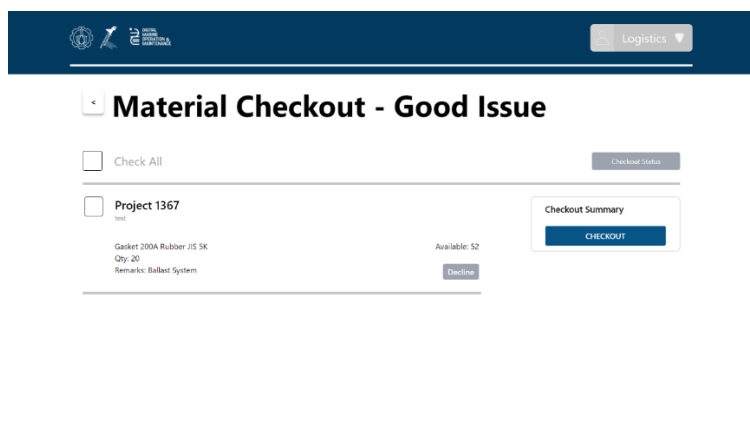
Figure 4.42 Website Page of Material Checkout Menu

For the status of the material checkout, the material and logistics division can view the transaction on the material checkout status page. Details of this page can be seen in Figure 4.43.

Figure 4.43 Website Page of Material Checkout Status

The material logistics division can access the page for the purchase request feature for purchase request scenarios. On this page, there is data from goods that have been ordered in the material request flow that has been ordered by the project division in the previous process. For details of this page, see Figure 4.44.

Figure 4.44 Website Page of Purchase Request

The Storage Database page can display item data available at the PT Karya Teknik Utama warehouse. The Materials and Logistics Division can access this page to see the goods in the warehouse. Details of this feature can be seen in Figure 4.45.
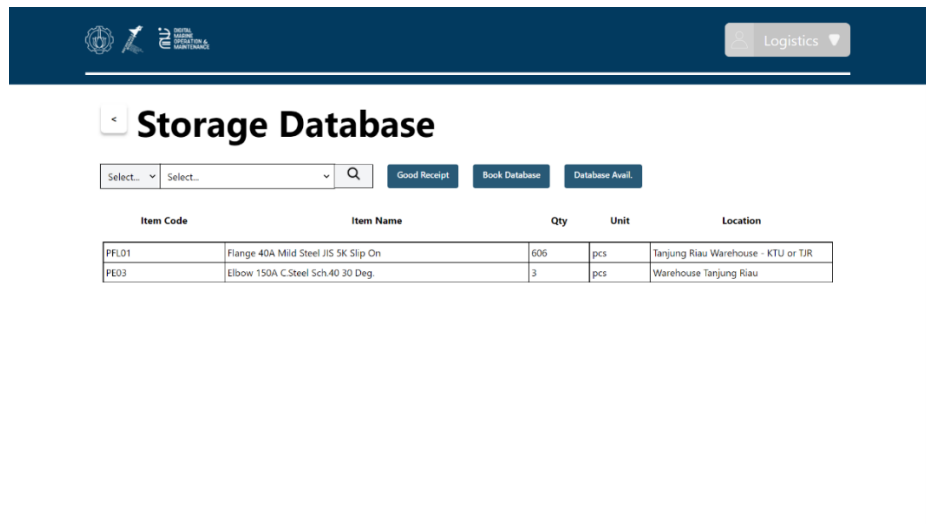
Figure 4.45 Website Page Storage Database

The Book Database page can be accessed by the material and logistics division to view the goods transactions that have been booked by the project division in the previous flow. Materials and logistics parties can cancel the transaction by inputting the reason for the canceled goods. Details of this page can be seen in Figure 4.46.
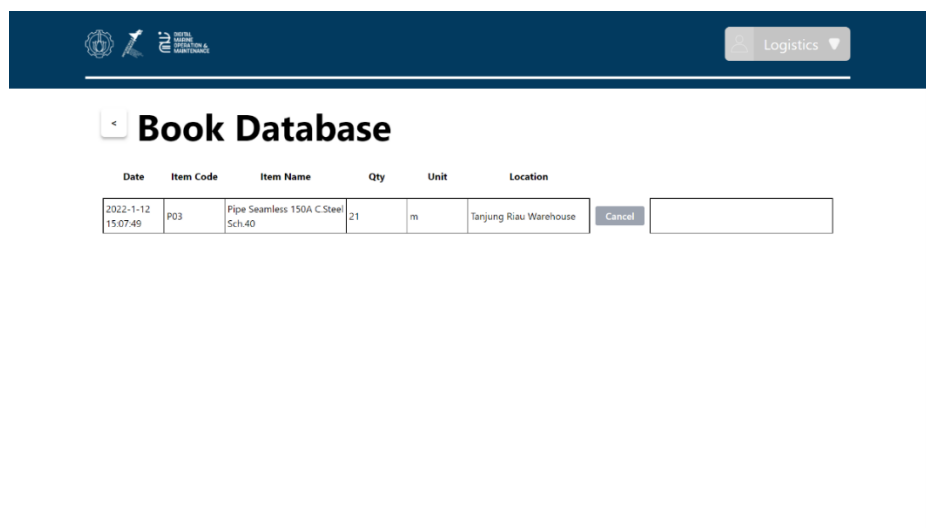
Figure 4.46 Website Book Database Page

The material & Logistics Division can use the feature for the Goods Receipt scenario on the goods receipt page. On this page, the material & logistics division can fill in data for the database of goods that the supplier has sent to the PT Karya Teknik Utama – Tanjung Riau. Details of this page can be seen in Figure 4.47.

Figure 4.47 Website Good Receipt Page

4.6.6   Purchasing Website Pages

The purchasing logistics menu page has several features, including viewing the purchase list that has been continued in the previous process, status to view the status of ongoing transactions, and finally, the supplier database to view supplier data. Details of the purchasing division menu page can be seen in Figure 4.48.

Figure 4.48 Website Purchasing Menu Pages

The purchase list page is a page for selecting items to be purchased by the Purchasing Division for the procurement process at PT. Karya Teknik Utama. On this page, there is data on goods that have been ordered by the material logistics division in the previous stage. For details on the purchase list page, see Figure 4.49.

Figure 4.49 Website Purchase List Page

Next, the Purchasing Division must fill in the details for making a purchase order for an item that has been ordered. Things that the purchasing Division must fill in for these transactions include: Delivery terms, Estimated arrival of goods, Destination for delivery of goods, Name of the supplier. Details of this page can be seen in Figure 4.50.
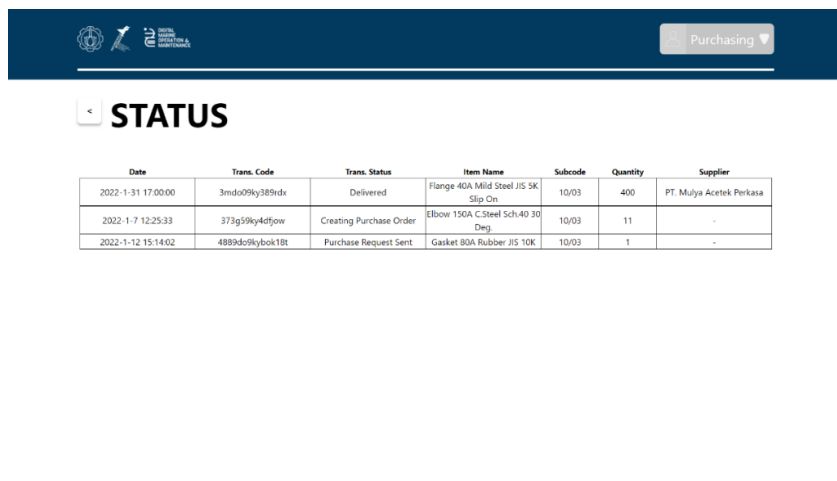
Figure 4.50 Website Pending Purchase List Page
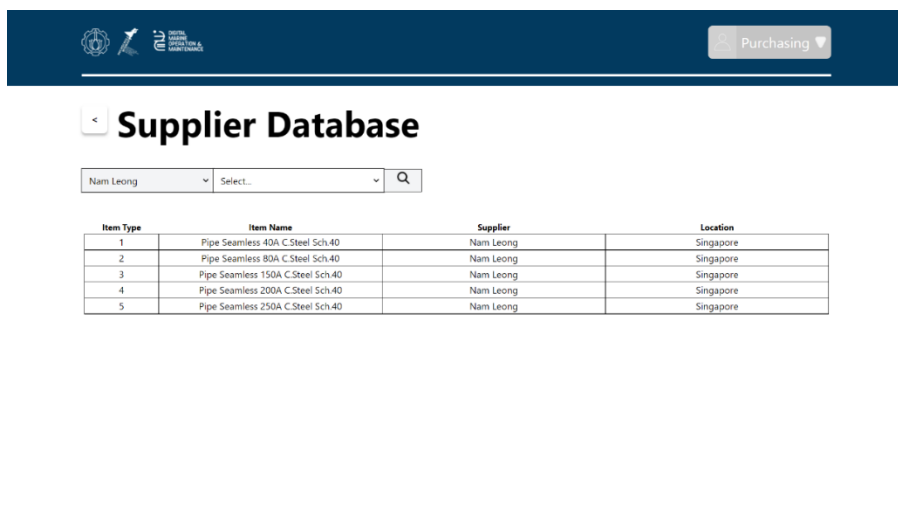
The Purchasing Division can see the transaction status on the status page listed on the purchasing page menu. There are details of each transaction carried out in the purchase request scenario on this page. Details of each item can be seen as the data on this page. Details of this page can be seen in Figure 4.51.

Figure 4.51 Website Purchasing Status Page

The Purchasing Division can use the Supplier Database page to view suppliers for procurement at PT. Karya Teknik Utama. Details of the page can be seen in Figure 4.52.

Figure 4.52 Website Supplier Database Page

4.7   User Rating Questionnaire

The Information system for procurement needs to be tested by users at the company. The purpose of the assessment of this activity is to determine whether this information system is feasible to run in the purchasing and logistics business processes for requests for goods or there is an error in this information system. If in the implementation of this stage, the user from PT. Karya Teknik Utama found that the purpose of the information system was not achieved, so there needed to be improvements to this system.

As a trial on the information system that has been created, this system will be run by five respondents who have different tasks. After the respondent runs the application, each respondent is asked to fill out an assessment on the questionnaire as an assessment or suggestion for the system that has been built. Questionnaires were distributed online to respondents. In the questionnaire distributed, there are six questions. Each question has a scale from 1 to 5, with 1 being the lowest score and five being the highest.

Table 4.6 List of Question in Questionnaire

No	Criteria	Number of Respondents				
		1	2	3	4	5
1	Is the display of the information system easy to understand?					
2	Can the information system work well?					
3	Are the features of the information system following the procurement flow in PT. Karya Teknik Utama?					
4	Can the information system provide convenience when implemented?					
5	Is the status of the transaction process in the system informative and clear to all parties?					
6	Satisfaction level for the development of Information system					

4.7.1 Result from Questionnaire

Result data from the questionnaire can be seen in Table 4.7

Table 4.7 Result of Questionnaire

No	Criteria	Number of Respondents				
		1	2	3	4	5
1	Is the display of the information system easy to understand?	0	0	0	1	4
2	Can the information system work well?	0	0	0	1	4
3	Are the features of the information system following the procurement flow in PT. Karya Teknik Utama?	0	0	0	3	2
4	Can the information system provide convenience when implemented?	0	0	0	3	2
5	Is the status of the transaction process in the system informative and clear to all parties?	0	0	0	3	2
6	Satisfaction level for the development of Information system	0	0	0	2	3

Respondents who filled out the questionnaire came from different divisions, including the Materials & Logistics Division, Facilities Division, and Purchasing Division.

4.7.2 Analysis of Questionnaire Results

The Likert scale is used to analyze the questionnaire results given to the respondents. The Likert scale has the following formula:

$$P = \frac{S}{Ideal\ Score} x\ 100\%$$

For an explanation of the formula, see the explanation below

P	:	Percentage
S	:	Frequency of answers multiplied by the score
Ideal Value	:	the highest value multiplied by the number of samples
The Highest Score	:	5
Sample	:	Five respondents
Ideal Value	:	25

The following are the results of the calculation of each question on the questionnaire, along with an explanation:

1. Is the display of the information system easy to understand?

    Table 4.8 shows the results of the questionnaire from question number 1

    Table 4.8 Result of Question Number 1

Score	Respondent	S
1	0	0
2	0	0
3	0	0
4	1	4
5	4	20
Total		24
Average value		4.8
%		96

The calculation of the results of this questionnaire is processed with the following formula:

$$P = \frac{24}{25} x\ 100\% = 96\%$$

So the result of the first question on this questionnaire is that the display of the information system is easy to understand by respondents who have different job desks.

2. Can the information system work well?

Table 4.9 shows the results of the questionnaire from question number 2

Table 4.9 Result of Question number 2

Score	Respondent	Total
1	0	0
2	0	0
3	0	0
4	1	4
5	4	20
Total		24
Average value		4.8
%		96

The calculation of the results of this questionnaire is processed with the following formula:

$$P = \frac{24}{25} x \ 100\% = 96\%$$

So the result of the second question on this questionnaire is that the information system can be used properly and suitable.

3. Are the features of the information system following the procurement flow in PT. Karya Teknik Utama?

Table 4.10 shows the results of the questionnaire from question number 3

Table 4.10 Result of Question number 3

Score	Respondent	Total
1	0	0
2	0	0
3	0	0
4	3	12
5	2	10
Total		22
Average value		4.4
%		88

The calculation of the results of this questionnaire is processed with the following formula:

$$P = \frac{22}{25} x\ 100\% = 88\%$$

The third question on this questionnaire is an information system following the business process of procurement of goods at PT. Karya Teknik Utama – Tanjung Riau.

4. Can the information system provide convenience when implemented?

   Table 4.11 shows the results of the questionnaire from question number 4

Table 4.11 Result of Question number 4

Score	Respondent	Total
1	0	0
2	0	0
3	0	0
4	3	12
5	2	10
Total		22
Average value		4.4
%		88

The calculation of the results of this questionnaire is processed with the following formula:

$$P = \frac{22}{25} x\ 100\% = 88\%$$

The fourth question on this questionnaire is whether the developed information system can provide user convenience at PT. Karya Teknik Utama – Tanjung Riau

5. Is the status of the transaction process in the system informative and clear to all parties?

Table 4.12 shows the results of the questionnaire from question number 5

Table 4.12 Result of Question number 5

Score	Respondent	Total
1	0	0
2	0	0
3	0	0
4	3	12
5	2	10
Total		22
Average value		4.4
%		88

The calculation of the results of this questionnaire is processed with the following formula:

$$P = \frac{22}{25} x \ 100\% = 88\%$$

the result of the fifth question on this questionnaire is the transaction status on the information system is clear and informative.

6. Satisfaction level for the development of Information system

   Table 4.13 shows the results of the questionnaire from question number 6

Table 4.13 Result of Question number 6

Score	Respondent	Total
1	0	0
2	0	0
3	0	0
4	2	8
5	3	15
Total		23
Average value		4.6
%		92

The calculation of the results of this questionnaire is processed with the following formula:

$$P = \frac{23}{92} x\ 100\% = 92\%$$

So that the result of the sixth question on this questionnaire is respondents from users of PT. Karya Teknik Utama – Tanjung Riau satisfied with the development of this information system.

Based on the results of the calculation analysis of each question questionnaire distributed to users for this information system prototype, the total value obtained can be seen in the following table.

Table 4.14 Total Value of Questionnaire

Question Number	Score	Percentage
1	24	96%
2	24	96%
3	22	88%
4	22	88%
5	22	88%
6	23	92%
Total Questionnaire Score	137	
Percentage of Questionnaire Score	91,33%	

To determine the overall assessment of the questionnaire results, it is necessary to categorize by knowing the largest value, smallest value, median, quartile I, and quartile III. The steps are as follows:

1. Determining the largest value can be done by multiplying the value of the largest answer score with the total number of questions and multiplying by the total number of respondents. The calculation is as follows:

$$5 \times 6 \times 5 \text{ respondents} = 150$$

2. Determining the smallest value can be done by multiplying the smallest answer value by the total number of questions and multiplying by the total number of respondents. The calculation is as follows:

$$1 \times 6 \times 5 \text{ respondents} = 30$$

3. The median value can be determined by adding the largest and smallest answer values and then dividing by two. The calculation is as follows:

$$(150 + 30)/2 = 90$$

4. Determining the value of the first quartile can be done by adding the smallest value and the median value and then dividing by two. The calculation is as follows:

$$(30 + 90)/2 = 60$$

5. Determining the value of the third quartile can be done by adding the smallest value and the median value and then dividing by two. The calculation is as follows:

$$(150 + 90)/2 = 120$$

The results of the total assessment of the questionnaire can be categorized using table 4.15 based on the category values of the largest, smallest, median, first quartile, and third quartiles.

Table 4.15 Category of Valuation

Very Good	Quartile III $\leq$ x $\leq$ Highest Value	120-150
Good	Median $\leq$ x $\leq$ Quartile III	90-120
Enough	Quartile I $\leq$ x $\leq$ Median	60-90
Less	Smallest Value $\leq$ x $\leq$ Quartile I	30-60

With the results of the total assessment with a value of 137, it can be concluded that this information system is included in the very good category because the value is between 120-150. However, the respondents provided additional comments for further development, including; the need to detail the business process at the shipyard, eliminate abbreviations in the category of materials to create clear instructions and needs to add a digital signing multi-layer purchasing approval feature and a procedure for the maximum time for ordering components to facilitate and simplify purchasing materials in the purchasing division.

4.8   Discussion

The information system that has been created can help PT. Karya Teknik Utama in running the existing business processes. The advantages of this system are that it can provide recommendations for supplier selection based on historical, provide information about incoterms, and also provide expected time arrival. However, this system does not pay attention to all the variables that exist in business processes such as multi-division signatures. So this system can work much better. The ERP system that has been run by PT. Karya Teknik Utama can be updated with the principle system information in this research.

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CHAPTER 5
CONCLUSION

5.1 Overview of the Research

There will be plenty of activities in the shipyard if the business from the shipyard is very productive. The flow of many business processes will increase the possibility of errors. These problems include communication errors between workers, purchasing errors in goods for a ship repair, and delays in the work process because the goods are mixed with other projects.

The author conducts observations and analyzes the shipyard company to retrieve data for the final project. The author made observations to find out the business processes for purchasing and logistics in the internal of a shipyard. In carrying out the analysis, the author makes a written flow for all purchasing and logistics activities, including the good booking process, good issue, material request, purchase request, and good receipt. After making the flow of each process, mockups and prototypes are made. And the end of this analysis is to conduct a review with users of information systems in related companies.

In this system, project parties involved in ship repair activities can make good bookings for goods in the warehouse to not mix them with other projects. For material logistics and purchasing parties, they can know the needs of the goods requested to be provided. In addition, business processes that are carried out using this information system can minimize purchasing errors and miscommunication between users.

5.2 Conclusion

The conclusion from this final project is the prototype information system for blockchain-based purchasing and logistics can solve the problems in the shipyard. By adjusting the actual business processes of the shipyard, this information system can be used to simplify the process of procuring goods for the repair of ballast systems on ships. This system is based on the Logistics and Purchasing process at PT. Karya Teknik Utama. This system is provided with five scenario features: Goods Issue, Goods Booking, Goods Request, Purchase Request, and Goods Receipt. To optimize information on the activities of Logistics and Purchasing material components at PT. Karya Teknik Utama, all parties get the same information for the status of the procurement process. It contains the goods ordered, the quantity, and the status of the procurement process. This system has special features that can assist the procurement process, displaying historical suppliers for materials to be purchased, finding out the availability of goods, and placing orders without going to the warehouse. This system can provided purchasing data for all

stakeholder involved. In the survey questionnaire given to the supervisor of PT. Karya Teknik Utama – Tanjung Riau, this system is categorized as "Very good". However, the respondents still provide comments for further development.

5.3   Recommendation

Recommendations from this final projects are as follows:

1. Because development is still at the prototype stage, a blockchain-based information system needs to be developed again to be more applicable to shipyard companies because it still has several shortcomings, such as the need to detail the business process at the shipyard and eliminate abbreviations in the category of goods.

2. In the prototyping process, the data taken is only from the material group from one of the systems from the ship. It is necessary to develop several systems and other repair needs on the ship

3. For further development, it needs to add a digital signing multi-layer purchasing approval feature and a procedure for the maximum time for ordering components to facilitate and simplify purchasing material in the purchasing division.

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ATTACHMENT 1 – MATERIAL LIST & SUPPLIER LIST

Type of Components	Name of Components	Quantity in Warehouse	Unit
Pipe	Pipe Seamless 40A C.Steel Sch.40	31	Meter(s)
	Pipe Seamless 80A C.Steel Sch.40	2	
	Pipe Seamless 150A C.Steel Sch.40	45	
	Pipe Seamless 200A C.Steel Sch.40	16	
	Pipe Seamless 250A C.Steel Sch.40	2	
Fittings	Reducer 150A/80A C.Steel Sch.40	1	Piece(s)
	Reducer 200A/150A C.Steel Sch.40	21	
	Reducer 250A/150A C.Steel Sch.40	3	
Fittings	Gasket 40A Rubber JIS 5K	103	Piece(s)
	Gasket 80A Rubber JIS 5K	4	
	Gasket 200A Rubber JIS 5K	72	
Fittings	Gasket 80A Rubber JIS 10K	2	Piece(s)
	Gasket 150A Rubber JIS 10K	183	
	Gasket 200A Rubber JIS 10K	8	
	Gasket 250A Rubber JIS 10K	6	
Fittings	Gasket 80A Rubber JIS 16K	1	Piece(s)
	Gasket 200A Rubber JIS 16K	1	
Fittings	Flange 40A Mild Steel JIS 5K Slip On	206	Piece(s)
	Flange 80A Mild Steel JIS 5K Slip On	8	
	Flange 200A Mild Steel JIS 5K Slip On	144	

Fittings	Flange 80A Mild Steel JIS 10K Slip On	3	Piece(s)
	Flange 150A Mild Steel JIS 10K Slip On	631	
	Flange 200A Mild Steel JIS 10K Slip On	15	
	Flange 250A Mild Steel JIS 10K Slip On	12	
Fittings	Flange 80A Mild Steel JIS 16K Slip On	1	Piece(s)
	Flange 200A Mild Steel JIS 16K Slip On	1	
Fittings	Plate Penetration 40A Mild Steel JIS 10K	36	Piece(s)
	Plate Penetration 150A Mild Steel JIS 10K	20	
	Plate Penetration 200A Mild Steel JIS 10K	35	
	Plate Penetration 250A Mild Steel JIS 10K	2	
Fittings	Elbow 150A C.Steel Sch.40 30 Deg.	3	Piece(s)
	Elbow 200A C.Steel Sch.40 30 Deg.	18	
Fittings	Elbow 80A C.Steel Sch.40 45 Deg.	2	Piece(s)
	Elbow 150A C.Steel Sch.40 45 Deg.	20	
	Elbow 200A C.Steel Sch.40 45 Deg.	36	
Fittings	Elbow 80A C.Steel Sch.40 90 Deg.	12	Piece(s)
	Elbow 150A C.Steel Sch.40 90 Deg.	79	
	Elbow 200A C.Steel Sch.40 90 Deg.	14	
	Elbow 250A C.Steel Sch.40 90 Deg.	3	
Fittings	Sounding Cap 40A Bronze	21	Piece(s)
Fittings	Vent Head 200A Mild Steel Galv. JIS 5K	21	Piece(s)
Valves	Butterfly Valve 150A Cast Iron JIS 10K Flange Type	1	Piece(s)
	Butterfly Valve 250A Cast Iron JIS 10K Water Type	13	
Valves	Check Valve 150A Cast Iron JIS 10K Swing Type	1	Piece(s)
	Check Valve 250A Cast Iron JIS 10K Swing Type	2	

Type of Components	Name of Components	Suppliers	Location
Pipe	Pipe Seamless 40A C.Steel Sch.40	Nam Leong & Asia Enteprises	Singapore
	Pipe Seamless 80A C.Steel Sch.40		
	Pipe Seamless 150A C.Steel Sch.40		
	Pipe Seamless 200A C.Steel Sch.40		
	Pipe Seamless 250A C.Steel Sch.40		
Fittings	Reducer 150A/80A C.Steel Sch.40	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
	Reducer 200A/150A C.Steel Sch.40		
	Reducer 250A/150A C.Steel Sch.40		
Fittings	Gasket 40A Rubber JIS 5K	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
	Gasket 80A Rubber JIS 5K		
	Gasket 200A Rubber JIS 5K		
Fittings	Gasket 80A Rubber JIS 10K	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
	Gasket 150A Rubber JIS 10K		
	Gasket 200A Rubber JIS 10K		
	Gasket 250A Rubber JIS 10K		
Fittings	Gasket 80A Rubber JIS 16K	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
	Gasket 200A Rubber JIS 16K		
Fittings	Flange 40A Mild Steel JIS 5K Slip On	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
	Flange 80A Mild Steel JIS 5K Slip On		
	Flange 200A Mild Steel JIS 5K Slip On		

Fittings	Flange 80A Mild Steel JIS 10K Slip On Flange 150A Mild Steel JIS 10K Slip On Flange 200A Mild Steel JIS 10K Slip On Flange 250A Mild Steel JIS 10K Slip On	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Flange 80A Mild Steel JIS 16K Slip On Flange 200A Mild Steel JIS 16K Slip On	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Plate Penetration 40A Mild Steel JIS 10K Plate Penetration 150A Mild Steel JIS 10K Plate Penetration 200A Mild Steel JIS 10K Plate Penetration 250A Mild Steel JIS 10K	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Elbow 150A C.Steel Sch.40 30 Deg. Elbow 200A C.Steel Sch.40 30 Deg.	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Elbow 80A C.Steel Sch.40 45 Deg. Elbow 150A C.Steel Sch.40 45 Deg. Elbow 200A C.Steel Sch.40 45 Deg.	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Elbow 80A C.Steel Sch.40 90 Deg. Elbow 150A C.Steel Sch.40 90 Deg. Elbow 200A C.Steel Sch.40 90 Deg. Elbow 250A C.Steel Sch.40 90 Deg.	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Sounding Cap 40A Bronze	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Fittings	Vent Head 200A Mild Steel Galv. JIS 5K	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia
Valves	Butterfly Valve 150A Cast Iron JIS 10K Flange Type Butterfly Valve 250A Cast Iron JIS 10K Water Type	PT. Mulya Acetek Perkasa, PT. Global Benua Bajatama, PT. Asia Pratama	Indonesia

Valves	Check Valve 150A Cast Iron JIS 10K Swing Type	PT. Mulya Acetek Perkasa,	Indonesia
	Check Valve 250A Cast Iron JIS 10K Swing Type	PT. Global Benua Bajatama,	
		PT. Asia Pratama	

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ATTACHMENT 2 – FIGMA PROTOTYPE
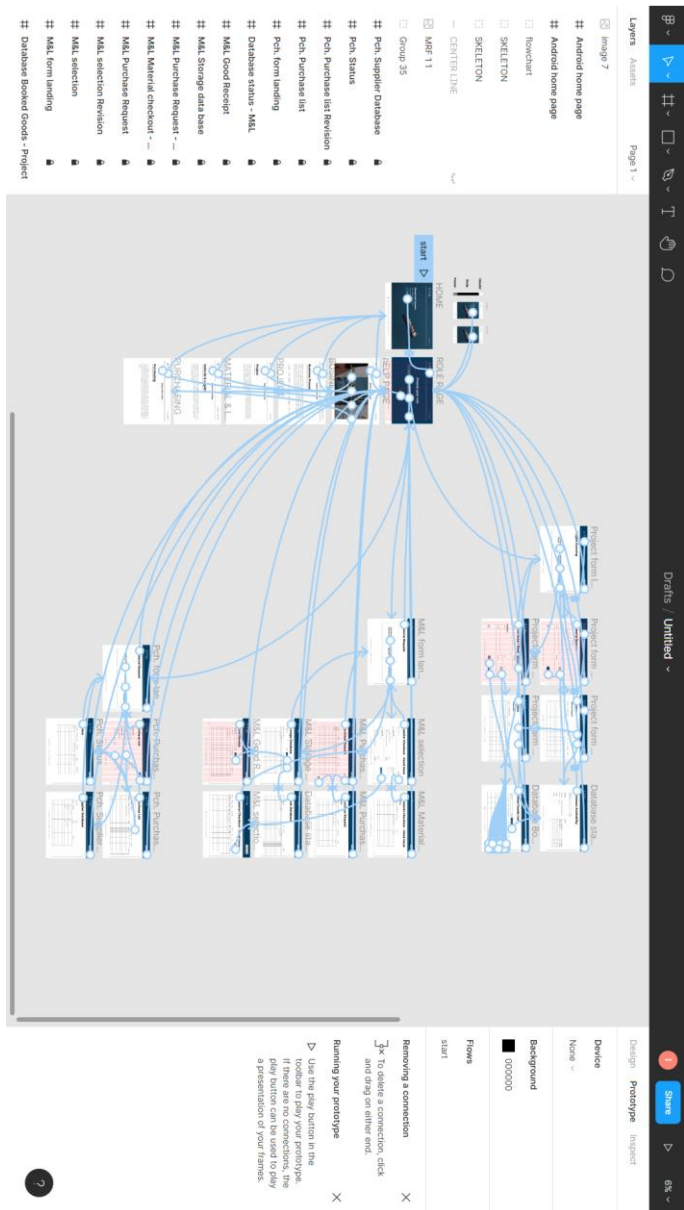
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ATTACHMENT 3 – FIGMA PAGE SKELETON
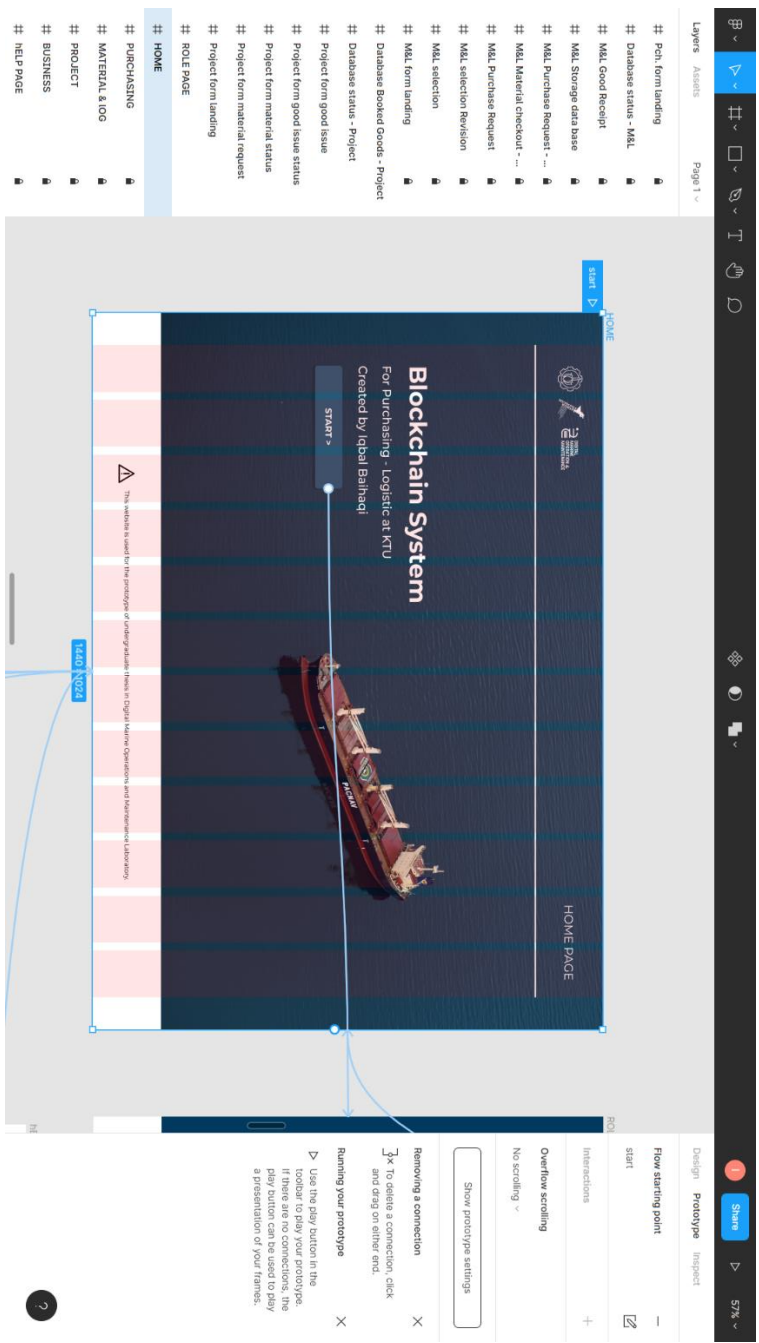
Business Process

Detail of Each Role

< BACK

BUSINESS PROCESS

Business Process for procurement activity involve three stakeholder, there are Project, Material & Logistic, and Purchasing Division. For requesting each goods for ship maintenance or ship reparation, form used for proof of request and receipt of goods. the stages of demand for goods in general are: submitting a list of goods, requisitions for purchasing goods, purchasing goods, receiving goods, and issue goods from the store.

Submitting → Requisitions → Purchasing → Receiving → Issue

Layers — Page 1

- # Pch. form landing
- # Database status - M&L
- # M&L Good Receipt
- # M&L Storage data base
- # M&L Purchase Request - …
- # M&L Material checkout - …
- # M&L Purchase Request
- # M&L selection Revision
- # M&L selection
- # M&L form landing
- # Database Booked Goods - Project
- # Database status - Project
- # Project form good issue
- # Project form good issue status
- # Project form material status
- # Project form material request
- # Project form landing
- # ROLE PAGE
- # HOME
- # PURCHASING
- # MATERIAL & lOG
- # PROJECT
- # BUSINESS
- # hELP PAGE

BUSINESS

PROJECT

1440 × 1024

Design Prototype Inspect 59%

Frame — X -1880 Y 1419 W 1440 H 1024 0° 0

Clip content

Auto layout +

Layout grid + 12 columns (auto)

Layer — Pass through — 100%

Fill + FFFFFF 100%

Stroke + FFFFFF 100%

Selection colors + 000000 100% F9F7F7 100% FFFFFF 100%

Effects +

Layers

- # Pch. form landing
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- # ROLE PAGE
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- # PROJECT
- # BUSINESS
- # hELP PAGE

PROJECT

Detail of Each Role

PROJECT

< BACK

Project

Project is the division that responsible for ship repair activities. Every activity will be controlled by working on the list given by the commercial division and the ship owner. In this business process, the role of the project is to make requests for goods to the material and logistics division and provide good issues for proof of use of goods.

MATERIAL & IOG

MATERIAL & LOGISTICS

Layers   Assets   Page 1 ∨

Pch. form landing
Database status - M&L
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M&L Storage data base
M&L Purchase Request - …
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Database Booked Goods - Project
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Project form landing
ROLE PAGE
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PURCHASING
MATERIAL & IOG
PROJECT
BUSINESS
hELP PAGE

Drafts / Untitled ∨

Design   Prototype   Inspect

Background

E5E5E5   100%

Export   +

MATERIAL & IOG

PURCHASING

Material & Logistic

Detail of Each Role

< BACK

Materials and Logistics is the division responsible for connecting two stakeholders in the procurement process. In addition to making a purchase request, the material and logistics division can also remove goods from their inventory to be given to the project department to carry out a ship repair activity.

MATERIAL & LOGISTICS

Layers panel

- # Pch. form landing
- # Database status - M&L
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- # M&L Material checkout - ...
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- # Database status - Project
- # Project form good issue
- # Project form good issue status
- # Project form material status
- # Project form material request
- # Project form landing
- # ROLE PAGE
- # HOME
- # **PURCHASING**
- # MATERIAL & IOG
- # PROJECT
- # BUSINESS
- # hELP PAGE

Canvas

PURCHASING

< BACK

Detail of Each Role

Purchasing

PURCHASING

In this business process, the purchasing division is responsible for receiving requests for purchasing goods from the logistics material division. This division has a role to make requests for quotations to vendors for the selection of goods and also the best prices. After this tender activity, the purchasing division will send a purchase order and ask the vendor or supplier to deliver the goods.

1440 × 1024

Design panel

Design Prototype Inspect

Frame ∨
X -1880   Y 4772
W 1440   H 1024
∠ 0°   ⌐ 0

☑ Clip content

Auto layout +

Layout grid +
▦ 12 columns (auto)

Layer
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☐ FFFFFF   100%

Stroke +
☐ FFFFFF   100%

Selection colors
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Effects +

Layers Assets Page 1 ∨

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Project form material request
Project form landing
ROLE PAGE
HOME
PURCHASING
MATERIAL & lOG
PROJECT
BUSINESS
HELP PAGE

Header

Body

Footer

Android home page

Blockchain System
For Purchasing - Logistic at KTH
Created by Iqbal Bahwal
START ›

HOME PAGE

Android home page

Blockchain System
For Purchasing - Logistic at KTH
Created by Iqbal Bahwal
START ›

HOME PAGE

Design **Prototype** Inspect 57% ∨

Flow starting point +

Interactions +

Overflow scrolling
No scrolling ∨

Show prototype settings

Removing a connection ×
⌐× To delete a connection, click and drag on either end.

Running your prototype ×
▽ Use the play button in the toolbar to play your prototype. If there are no connections, the play button can be used to play a presentation of your frames.

Share

Layers Assets   Page 1 ∨

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Project form material status
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Project form landing
ROLE PAGE
HOME
PURCHASING
MATERIAL & IOG
PROJECT
BUSINESS
hELP PAGE

Project form landing

Project Running

GOOD ISSUE / BOOK

MATERIAL REQUEST

STATUS

Blockchain System for Logistic and Purchasing Ship Maintenance Component at Shipyard

On Drag

1440 1024

Design **Prototype** Inspect   52% ∨

1   **Share**

Flow starting point   +

Interactions   +

Overflow scrolling

No scrolling ∨

Show prototype settings

Removing a connection   ✕

⌖✕ To delete a connection, click
    and drag on either end.

Running your prototype   ✕

▽ Use the play button in the
   toolbar to play your prototype.
   If there are no connections, the
   play button can be used to play
   a presentation of your frames.

103

Good Issue / Book

Material 1

Project No :

Item name :

Requested by :

Qty :

Subcode :

Approved by :

Avi :

Remarks :

Book

Send

Booked Goods List

Project form good issue

Blockchain System for Logistic and Purchasing Ship Maintenance Component at Shipyard

Project ▼

Layers list:

- # Pch. form landing
- # Database status - M&L
- # M&L Good Receipt
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- # ROLE PAGE
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- # PURCHASING
- # MATERIAL & IOG
- # PROJECT
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Design   **Prototype**   Inspect

Flow starting point

Interactions

Overflow scrolling
No scrolling ⌄

Show prototype settings

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Running your prototype
▽ Use the play button in the toolbar to play your prototype. If there are no connections, the play button can be used to play a presentation of your frames.

Project form good issue

Sta

Good

Project No

Layers Assets Page 1 ∨

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Project form material request
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ROLE PAGE
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MATERIAL & IOG
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Project form material status

1440 × 1024

Status
Material Request

Project No   Transaction Number   Item Name   Subcode   Qty   Unit   Approved by   Status

Material Request   Good Issue   Database Avail.

Blockchain System for Logistic and Purchasing Ship Maintenance Component at Shipyard

Project ▼

Design Prototype Inspect

Frame ∨
X 5417   Y -4251
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☑ Clip content

Auto layout +

Layout grid   +
▐▐▐ 12 columns (auto)

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See all 7 colors

52% ∨

Share

Layers   Assets   Page 1 ˅

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\# HOME
\# PURCHASING
\# MATERIAL & IOG
\# PROJECT
\# BUSINESS
\# hELP PAGE

Database Booked Goods - Project

Database status - Project

Database Availability

Pipe ▽   🔍

Item Name :   Pipe Seamless Carbon Steel Sch 40
Item Code :   xx-xxxxx

Description

Quantity   :   10
Available   :   8

Item Log :

Date	Project Number		Qty	Status
21/10/21	KTU 1367		2	Book

Blockchain System for Logistic and Purchasing Ship Maintenance Component at Shipard

1440 1024

M→ Project ▽

Design   Prototype   Inspect

48% ˅

Share

Flow starting point   +

Interactions   +

Overflow scrolling
No scrolling ˅

Show prototype settings

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and drag on either end.

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▽ Use the play button in the
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If there are no connections, the
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a presentation of your frames.

Layers Assets   Page 1 ⌄

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\# PURCHASING
\# MATERIAL & IOG
\# PROJECT
\# BUSINESS
\# hELP PAGE

M&L form landing

M&L form landing

Material Request

MATERIAL CHECKOUT

PURCHASE REQUEST

STORAGE DATABASE

Blockchain System for Logistic and Purchasing Ship Maintence Component at Drydock

1440 | 1024

Design **Prototype** Inspect   40% ⌄

Flow starting point   +

Interactions   +

Overflow scrolling
No scrolling ⌄

Show prototype settings

Removing a connection   ✕
✕ To delete a connection, click and drag on either end.

Running your prototype   ✕
▽ Use the play button in the toolbar to play your prototype. If there are no connections, the play button can be used to play a presentation of your frames.

Share

Layers   Assets   Page 1 ⌄

Pch. form landing
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M&L Purchase Request
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Project form material request
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ROLE PAGE
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PURCHASING
MATERIAL & IOG
PROJECT
BUSINESS
hELP PAGE

M&L Storage data base

M&L Purchase Request

Honduras P&F Estate System Integration

Blockchain System for Logistics and Purchasing Ship Maintenance Component at Shipyard

Purchase Request

Project No :

Project No	Item Code	Item Name	Qty	Remaks
Project 1307				
Project 1307		Pipe Seamless Carbon Steel sch. 40	2	

Send Request

Logistics ▾

Database status -

Design   **Prototype**   Inspect   ▽   47% ⌄

Flow starting point   +

Interactions   +

Overflow scrolling
No scrolling ⌄

Show prototype settings

Removing a connection   ✕
▷ To delete a connection, click and drag on either end.

Running your prototype   ✕
▷ Use the play button in the toolbar to play your prototype. If there are no connections, the play button can be used to play a presentation of your frames.

Layers   Assets   Page 1 ∨

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ROLE PAGE
HOME
PURCHASING
MATERIAL & IOG

Drafts / Untitled ∨

Design   **Prototype**   Inspect

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Background
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Flows
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Removing a connection
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Running your prototype
▽ Use the play button in the toolbar to play your prototype. If there are no connections, the play button can be used to play a presentation of your frames.

Share   54% ∨

Good Receipt

M&L Good Receipt

Blockchain System for Logistic and Purchasing Ship Maintenance Component at Shipyard

PO Number ∨

No   Item Name   qty   unit   Warehouse   Project Number   Trans. Code   ok

Pipe Seamless Carbon Steel sch. 40

Pipe Seamless Carbon Steel sch. 40

POST

Logistteer

M&L selection Revi

Proj. No:

1367 ▼

Layers   Assets   Page 1 ⌄

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Database status - M&L
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M&L Material checkout - …
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Database status - Project
Project form good Issue
Project form good issue status
Project form material status
Project form material request
Project form landing
ROLE PAGE
HOME
PURCHASING
MATERIAL & IOG

M&L selection Revision

Material Checkout - Good Issue

Proj. No :   Category   Code :   Item Name   Subcode   Qty   Unit   Remarks

1987   Piping   xxxxx   Pipe Seamless Carbon Steel sch. 40
Pipe Seamless Carbon Steel sch. 40   1081

Logistics ⌄

1440 × 1024

Design   **Prototype**   Inspect   ⌄   46% ⌄

Flow starting point   +

Interactions   +

Overflow scrolling
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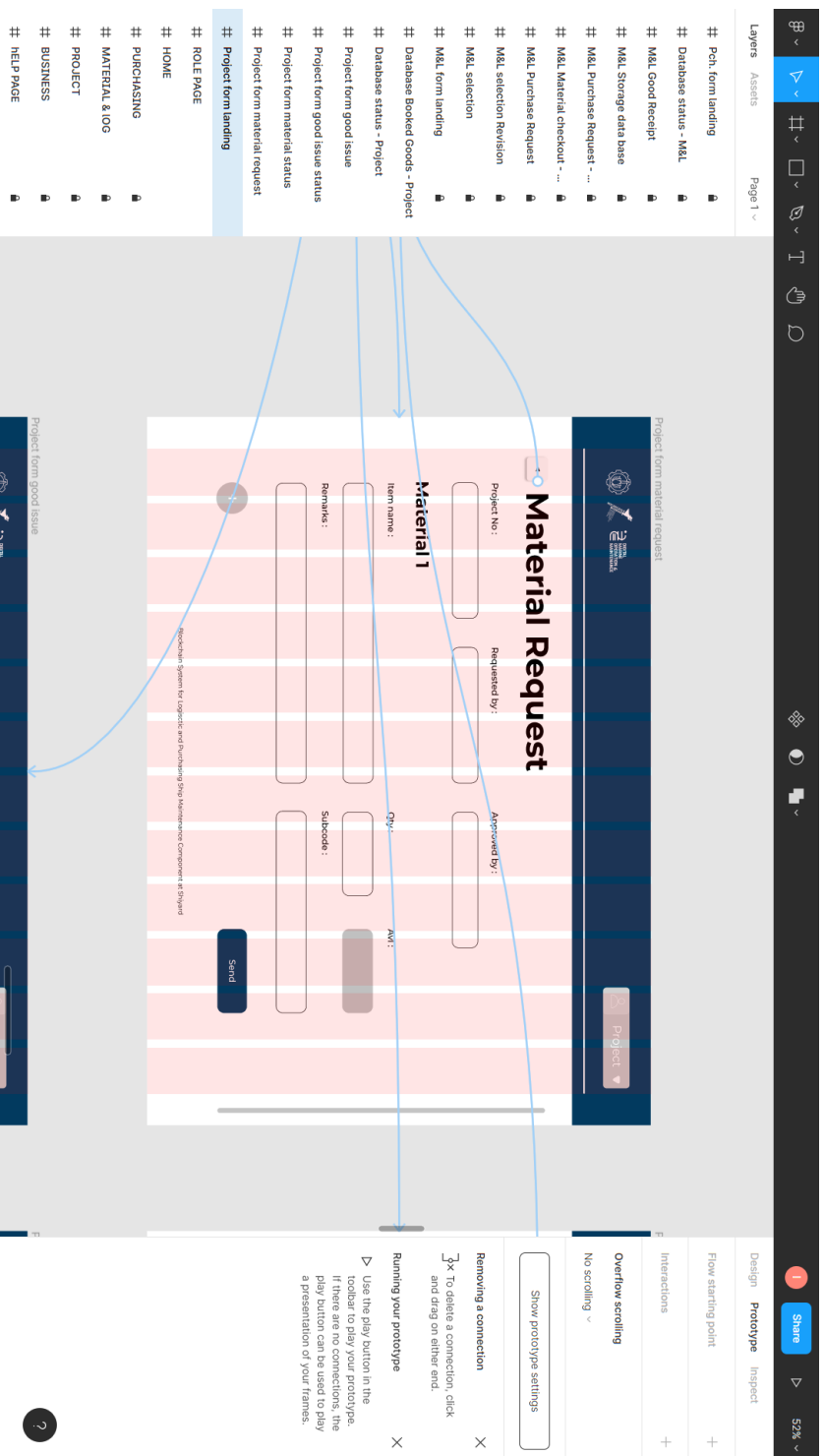⌖✕ To delete a connection, click
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toolbar to play your prototype.
If there are no connections, the
play button can be used to play
a presentation of your frames.

Share

Layers   Assets   Page 1 ⌄

Android home page
Android home page
⊞ flowchart
⊞ SKELETON
⊞ SKELETON
— CENTER LINE
⊠ MRF 11
⊞ Group 35
Pch. form landing
Pch. Purchase list
Pch. Purchase list Revision
Pch. Status
Pch. Supplier Database
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Project form good issue

Design   **Prototype**   Inspect

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Share

Flow starting point

Interactions

Overflow scrolling
No scrolling ⌄

Show prototype settings

Removing a connection
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Running your prototype
▽ Use the play button in the toolbar to play your prototype. If there are no connections, the play button can be used to play a presentation of your frames.

1440 × 1024

Pch. form landing

Material Request

PURCHASE LIST

STATUS

SUPPLIER DATABASE

Blockchain System for Logistic and Purchasing Ship Maintenance Component at Shipyard

Pch. Purchase list

Purchase

Project 1367
PR Number: 1234567890
Pipe Seamless - Carbon St
Qty: 8
Remarks: For Ballast Sys

Project 1367
PR Number: 0987654321
Flange 315 10K
Qty: 8
Remarks: For Ballast Sys

Pch. Status

Status

120

Layers Assets   Page 1 ⌄

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\# Android home page
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⌄ Group 35
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\# Database status – Project
\# Project form aood issue

Purchase List

Project 1367
PR Number: 1234567890
Pipe Seamless- Carbon Steel api 40
Qty: 8
Remarks: For Ballast System Reparation

Project 1367
PR Number: 0987654321
Flange JIS 10K
Qty: 8
Remarks: For Ballast System Reparation

SUPPLIER DATABASE

Pch. Status
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Design Prototype Inspect
45% ⌄
Share

Flow starting point
Interactions

Overflow scrolling
No scrolling ⌄

Show prototype settings

Removing a connection
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Running your prototype
Use the play button in the toolbar to play your prototype. If there are no connections, the play button can be used to play a presentation of your frames.

Layers   Assets   Page 1 ⌄

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Android home page
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Project form good issue

Drafts / Untitled ⌄

Design   **Prototype**   Inspect

Device
None ⌄

Background
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Flows
start

Removing a connection ✕
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and drag on either end.

Running your prototype ✕
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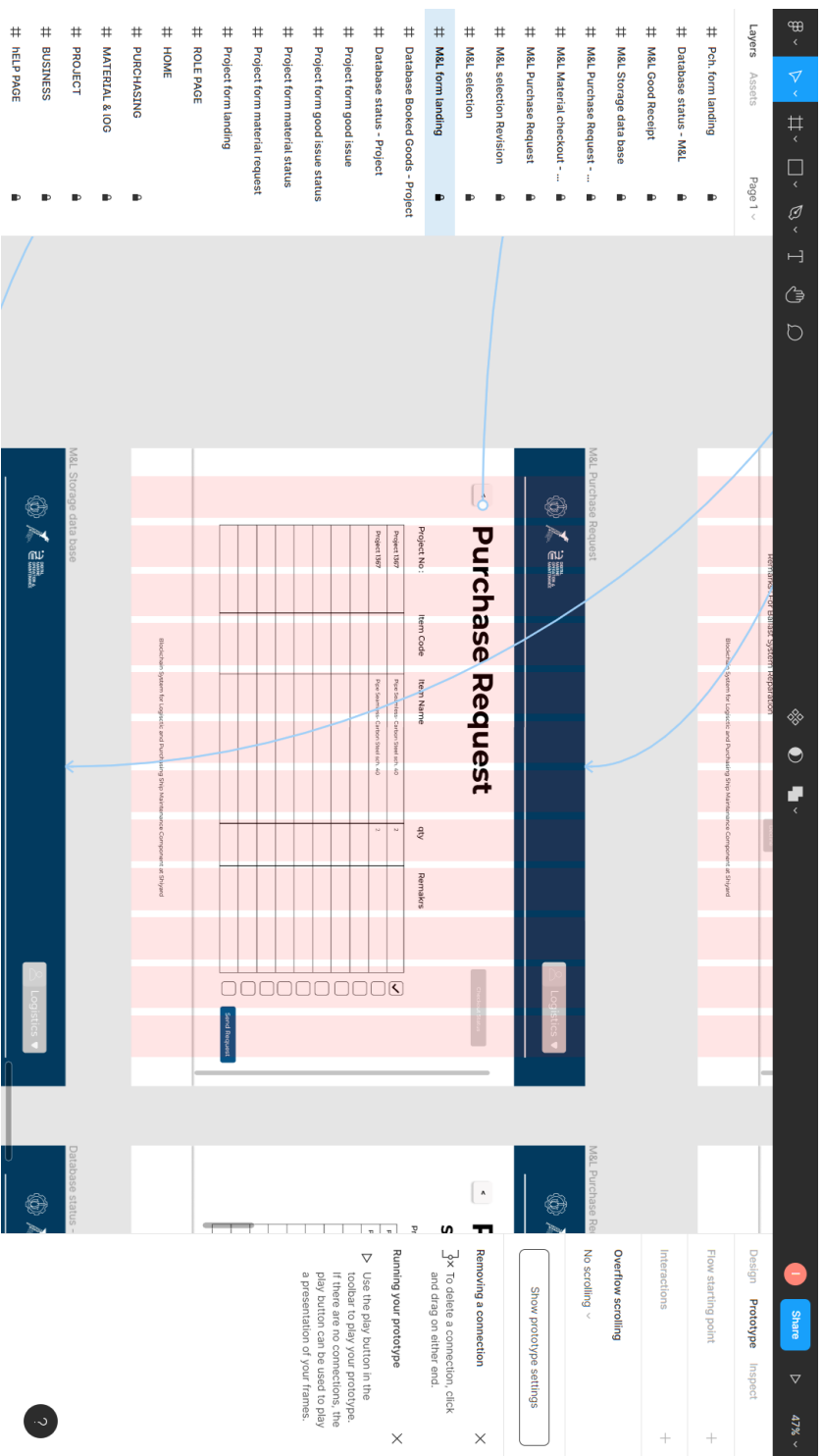play button can be used to play
a presentation of your frames.

Share   54% ⌄

Pch. Status

Status

Item type   Transaction Number   Item Name   Status   PO Number

Project 1367
Project 1367

Blockchain System for Logistics and Purchasing Ship Maintenance Component at Shipyard

Pch. Supplier

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```
ITEM
Key: itemCode // itemdata {
itemName: string;
qty: integer
booked: integer
suppliers: objectID[] // to supplier
itemLogs: objectID[] // to itemlogs
subCode: objectID []// to subCode
}

ITEMLOG
Key : logsID // autogen {
Item: objectID // to item
transaction: objectID // to transaksi
date: Date/Timestamps
qty : integer
remarks : string
unit: string
status: objectID // to logstatus
rejectedReason: string; // (if booking) reason rejected
location: objectID // (if received item from supplier)  to location
purchaseRequest: objectID // (if material request) to purchase request
}

PRITEMLOG
Key : PRlogsID // autogen {
Item: objectID // to item
transaction: objectID // to transaksi
date: Date/Timestamps
qty : integer // qty yang dipesan
unit: string
status: objectID // to logstatus

purchaseRequest: objectID // to purchase request
parentItemLog: objectID[] // to item logs
location: objectID // to lokasi
eta: Date
deliveryTerms: objectID // to incoterms
}

LOGSTATUS
Key: statusID: // autogen {
Description: string
}
```

```
TRANSACTIONSTATUS
Key: statusID: // autogen {
Description: string
}
PROJECT
Key: projectID // 1367
projectName: string
projectTransaction: objectID[] // to transaction
}

SUBCODE
Key : subcodeNumber // subcode data
subcodeName: string
Items: objectID[]
}

LOCATION
Key : locationID // autogen {
locationName: string
}

INCOTERMS
Key : incotermsID // autogen {
terms : string
}

REMARKS
Key : remarksID // autogen {
for: string
}

TRANSACTION
Key : transactionID // autogen {
date: Date
transactionStatus: objectID // to transaction status
projectNumber: objectID // to project
itemLogs: objectID[] // to item logs
requestedBy: string
approvedBy: string
}
PURCHASEREQUEST
Key : PRID // autogen {
prItemLogs: objectID[]  // to pr item logs
itemLogs: objectID  // to item logs
}
PURCHASEORDER
Key: POID // autogen {
supplier: objectID // to supplier
prItemLogs: objectID[] // to pr item log
acceptedPrItemLogs: objectID // to pr item log.
}

SUPPLIER
Key: supplierID // autogen {
name: string
category: string[]

}
```

ATTACHMENT 5 – DATABASE RELATION CODE

```
Table Item {
  id Int [pk, increment]
  code String [unique, not null]
  name String [not null]
  quantity Int [not null]
  avl Int [not null]
  booked Int [not null, default: 0]
  category Category [not null]
  ItemsOnSuppliers ItemsOnSuppliers [not null]
  Subcode Subcode [not null]
  subcodeValue String [not null]
  ItemLog ItemLog [not null]
}


Table ItemLog {
  id Int [pk, increment]
  itemId Int [not null]
  item Item [not null]
  status Status [not null]
  unit String [not null]
  quantity Int [not null]
  rejectedReason String
  date DateTime [default: `now()`, not null]
  remarkId Int [not null]
  remark Remark [not null]
```

```
  locationId Int

  location Location

  transactionId String [not null]

  transaction Transaction [not null]

  PriItemLog PriItemLog [not null]

}


Table Transaction {

  id String [pk]

  requestedBy String [not null]

  approvedBy String

  status Status [not null]

  ItemLog ItemLog [not null]

  projectId Int [not null]

  project Project [not null]

}


Table PriItemLog {

  id Int [pk, increment]

  status Status [not null]

  unit String [not null]

  quantity Int [not null]

  date DateTime [default: `now()`, not null]

  incoterm Incoterms [not null]

  supplierId Int
```

```
    supplier Supplier

    purchaseRequestId Int [not null]

    purchaseRequest PurchaseRequest [not null]

    parentItemLogId Int [not null]

    parentItemLog ItemLog [not null]

}


Table ItemsOnSuppliers {

    id Int [pk, increment]

    itemId Int [not null]

    supplierId Int [not null]

    item Item [not null]

    supplier Supplier [not null]

}


Table Supplier {

    id Int [pk, increment]

    name String [not null]

    country String [not null]

    category Category [not null]

    ItemsOnSuppliers ItemsOnSuppliers [not null]

    PurchaseOrder PurchaseOrder [not null]

    PriItemLog PriItemLog [not null]

}


Table Project {

    id Int [pk, increment]
```

```
 name String [not null]
 Transaction Transaction [not null]
}

Table Location {
 id Int [pk, increment]
 name String [not null]
 ItemLog ItemLog [not null]
}

Table Remark {
 id Int [pk, increment]
 name String [not null]
 ItemLog ItemLog [not null]
}

Table Subcode {
 value String [pk]
 items Item [not null]
}

Table PurchaseRequest {
 id Int [pk, increment]
 PriItemLog PriItemLog [not null]
}
```

```
Table PurchaseOrder {
 id Int [pk, increment]
 supplierId Int [not null]
 supplier Supplier [not null]
}

Enum Category {
 PIPE
 FITTING
 VALVES
}

Enum Status {
 ISSUE_REQUEST_SENT
 MATERIAL_REQUEST_SENT
 PURCHASE_REQUEST_SENT
 CHECKOUT
 CREATING_PURCHASE_ORDER
 PURCHASE_ORDER_SENT
 DELIVERY
 DELIVERED
 ISSUE_GOOD_SENT
 CANCELLED
 SELECTED_FOR_CHECKOUT
 BOOK_REQUEST
 DECLINED
```

```
  BOOK_CANCELLED
}

Enum Incoterms {
 FCA
 CIF
 DEP
}

Ref: Item.subcodeValue > Subcode.value

Ref: ItemLog.itemId > Item.id

Ref: ItemLog.remarkId > Remark.id

Ref: ItemLog.locationId > Location.id

Ref: ItemLog.transactionId > Transaction.id

Ref: Transaction.projectId > Project.id

Ref: PriItemLog.supplierId > Supplier.id

Ref: PriItemLog.purchaseRequestId > PurchaseRequest.id
```

Ref: PriItemLog.parentItemLogId > ItemLog.id

Ref: ItemsOnSuppliers.itemId > Item.id

Ref: ItemsOnSuppliers.supplierId > Supplier.id

Ref: PurchaseOrder.supplierId > Supplier.id

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ATTACHMENT 6– DATA TRANSACTION CODE

```
export * from './items';

export * from './subcodes';

export * from './locations';

export * from './remarks';

export * from './suppliers';

export * from './projects';


export const items = [
  {
    code: 'P01',
    quantity: 31,
    avl: 31,
    name: 'Pipe Seamless 40A C.Steel Sch.40',
    category: Category.PIPE,
    subcodeValue: '10/01',
  },
  {
    code: 'P02',
    quantity: 2,
    avl: 2,
    name: 'Pipe Seamless 80A C.Steel Sch.40',
    category: Category.PIPE,
    subcodeValue: '10/01',
  },
  {
```

```
    code: 'P03',

    quantity: 45,

    avl: 45,

    name: 'Pipe Seamless 150A C.Steel Sch.40',

    category: Category.PIPE,

    subcodeValue: '10/01',

  },

  {

    code: 'P04',

    quantity: 16,

    avl: 16,

    name: 'Pipe Seamless 200A C.Steel Sch.40',

    category: Category.PIPE,

    subcodeValue: '10/01',

  },

  {

    code: 'P05',

    quantity: 2,

    avl: 2,

    name: 'Pipe Seamless 250A C.Steel Sch.40',

    category: Category.PIPE,

    subcodeValue: '10/01',

  },

  {

    code: 'RD01',
```

```
  quantity: 1,

  avl: 1,

  name: 'Reducer  150A/80A C.Steel Sch.40',

  category: Category.FITTING,

  subcodeValue: '10/03',

},

{

  code: 'RD02',

  quantity: 21,

  avl: 21,

  name: 'Reducer  200A/150A C.Steel Sch.40',

  category: Category.FITTING,

  subcodeValue: '10/03',

},

{

  code: 'RD03',

  quantity: 3,

  avl: 3,

  name: 'Reducer  250A/150A C.Steel Sch.40',

  category: Category.FITTING,

  subcodeValue: '10/03',

},

{

  code: 'GA01',

  quantity: 103,

  avl: 103,

  name: 'Gasket 40A Rubber JIS 5K',
```

```
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'GA02',
  quantity: 4,
  avl: 4,
  name: 'Gasket 80A Rubber JIS 5K',
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'GA04',
  quantity: 72,
  avl: 72,
  name: 'Gasket 200A Rubber JIS 5K',
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'GA02A',
  quantity: 2,
  avl: 2,
  name: 'Gasket 80A Rubber JIS 10K',
  category: Category.FITTING,
```

```
   subcodeValue: '10/03',
  },
  {
   code: 'GA03A',
   quantity: 183,
   avl: 183,
   name: 'Gasket 150A Rubber JIS 10K',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'GA04A',
   quantity: 8,
   avl: 8,
   name: 'Gasket 200A Rubber JIS 10K',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'GA05A',
   quantity: 6,
   avl: 6,
   name: 'Gasket 250A Rubber JIS 10K',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
```

```
    code: 'GA02B',
    quantity: 1,
    avl: 1,
    name: 'Gasket 80A Rubber JIS 16K',
    category: Category.FITTING,
    subcodeValue: '10/03',
  },
  {
    code: 'GA04B',
    quantity: 1,
    avl: 1,
    name: 'Gasket 200A Rubber JIS 16K',
    category: Category.FITTING,
    subcodeValue: '10/03',
  },
  {
    code: 'PFL01',
    quantity: 206,
    avl: 206,
    name: 'Flange 40A Mild Steel JIS 5K Slip On',
    category: Category.FITTING,
    subcodeValue: '10/03',
  },
  {
    code: 'PFL02',
```

```
   quantity: 8,
   avl: 8,
   name: 'Flange 80A Mild Steel JIS 5K Slip On',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'PFL04',
   quantity: 144,
   avl: 144,
   name: 'Flange 200A Mild Steel JIS 5K Slip On',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'PFL02A',
   quantity: 3,
   avl: 3,
   name: 'Flange 80A Mild Steel JIS 10K Slip On',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'PFL03A',
   quantity: 631,
   avl: 631,
   name: 'Flange 150A Mild Steel JIS 10K Slip On',
```

```
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'PFL04A',
  quantity: 15,
  avl: 15,
  name: 'Flange 200A Mild Steel JIS 10K Slip On',
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'PFL05A',
  quantity: 12,
  avl: 12,
  name: 'Flange 250A Mild Steel JIS 10K Slip On',
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'PFL02B',
  quantity: 1,
  avl: 1,
  name: 'Flange 80A Mild Steel JIS 16K Slip On',
  category: Category.FITTING,
```

```
    subcodeValue: '10/03',
  },
  {
    code: 'PFL04B',
    quantity: 1,
    avl: 1,
    name: 'Flange 200A Mild Steel JIS 16K Slip On',
    category: Category.FITTING,
    subcodeValue: '10/03',
  },
  {
    code: 'PP01A',
    quantity: 36,
    avl: 36,
    name: 'Plate Penetration 40A Mild Steel JIS 10K',
    category: Category.FITTING,
    subcodeValue: '10/03',
  },
  {
    code: 'PP03A',
    quantity: 20,
    avl: 20,
    name: 'Plate Penetration 150A Mild Steel JIS 10K',
    category: Category.FITTING,
    subcodeValue: '10/03',
  },
  {
```

```
    code: 'PP04A',

    quantity: 35,

    avl: 35,

    name: 'Plate Penetration 200A Mild Steel JIS 10K',

    category: Category.FITTING,

    subcodeValue: '10/03',

  },

  {

    code: 'PP05A',

    quantity: 2,

    avl: 2,

    name: 'Plate Penetration 250A Mild Steel JIS 10K',

    category: Category.FITTING,

    subcodeValue: '10/03',

  },

  {

    code: 'PE03',

    quantity: 3,

    avl: 3,

    name: 'Elbow 150A C.Steel Sch.40 30 Deg.',

    category: Category.FITTING,

    subcodeValue: '10/03',

  },

  {

    code: 'PE04',
```

```
  quantity: 18,

  avl: 18,

  name: 'Elbow 200A C.Steel Sch.40 30 Deg.',

  category: Category.FITTING,

  subcodeValue: '10/03',

 },

 {

  code: 'PE02A',

  quantity: 2,

  avl: 2,

  name: 'Elbow 80A C.Steel Sch.40 45 Deg.',

  category: Category.FITTING,

  subcodeValue: '10/03',

 },

 {

  code: 'PE03A',

  quantity: 20,

  avl: 20,

  name: 'Elbow 150A C.Steel Sch.40 45 Deg.',

  category: Category.FITTING,

  subcodeValue: '10/03',

 },

 {

  code: 'PE04A',

  quantity: 36,

  avl: 36,

  name: 'Elbow 200A C.Steel Sch.40 45 Deg.',
```

```
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'PE02B',
   quantity: 12,
   avl: 12,
   name: 'Elbow 80A C.Steel Sch.40 90 Deg.',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'PE03B',
   quantity: 79,
   avl: 79,
   name: 'Elbow 150A C.Steel Sch.40 90 Deg.',
   category: Category.FITTING,
   subcodeValue: '10/03',
  },
  {
   code: 'PE04B',
   quantity: 14,
   avl: 14,
   name: 'Elbow 200A C.Steel Sch.40 90 Deg.',
   category: Category.FITTING,
```

  subcodeValue: '10/03',
 },
 {
  code: 'PE05B',
  quantity: 3,
  avl: 3,
  name: 'Elbow 250A C.Steel Sch.40 90 Deg.',
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'SC01',
  quantity: 21,
  avl: 21,
  name: 'Sounding Cap 40A Bronze',
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {
  code: 'PVH04',
  quantity: 21,
  avl: 21,
  name: 'Vent Head 200A Mild Steel Galv. JIS 5K',
  category: Category.FITTING,
  subcodeValue: '10/03',
 },
 {

```
  code: 'BV03A-FT',

  quantity: 1,

  avl: 1,

  name: 'Butterfly Valve 150A Cast Iron JIS 10K Flange Type',

  category: Category.VALVES,

  subcodeValue: '10/02',

 },

 {

  code: 'BV05A-WT',

  quantity: 13,

  avl: 13,

  name: 'Butterfly Valve 250A Cast Iron JIS 10K Water Type',

  category: Category.VALVES,

  subcodeValue: '10/02',

 },

 {

  code: 'CV03A-ST',

  quantity: 1,

  avl: 1,

  name: 'Check Valve 150A Cast Iron JIS 10K Swing Type',

  category: Category.VALVES,

  subcodeValue: '10/02',

 },

 {

  code: 'CV05A-ST',
```

```
    quantity: 2,

    avl: 2,

    name: 'Check Valve 250A Cast Iron JIS 10K Swing Type',

    category: Category.VALVES,

    subcodeValue: '10/02',

  },

];

export const locations = [

  { name: 'Tanjung Riau Warehouse  - KTU or TJR' },

  { name: 'Sagulung Warehouse  - KTU or TJR' },

  { name: 'Jurong Singapore - Buana' },

];

export const projects = [{ id: 1367, name: 'Gearless 4400DWT' }];

export const remarks = [

  { name: 'Ballast System' },

  { name: 'Fire Fighting System' },

  { name: 'Bilge System' },

  { name: 'Fuel System' },

  { name: 'Cooling Water System' },

  { name: 'Fresh Water System' },

  { name: 'Drainage System' },

  { name: 'Lubrication Oil System' },

  { name: 'Dirty Oil System' },

  { name: 'Exhaust System' },

  { name: 'Starting Air' },

];

export const subcodes = [
```

```
  { value: '10/01' },

  { value: '10/02' },

  { value: '10/03' },

];

import { Category } from '@prisma/client';


export const suppliers = [

  { id: 1, category: [Category.PIPE], name: 'Nam Leong', country: 'Singapore' },

  {

   id: 2,

   category: [Category.PIPE],

   name: 'Asia Enterprises',

   country: 'Singapore',

  },

  {

   id: 3,

   category: [Category.FITTING, Category.VALVES],

   name: 'PT. Mulya Acetek Perkasa',

   country: 'Indonesia',

  },

  {

   id: 4,

   category: [Category.FITTING, Category.VALVES],

   name: 'PT. Global Benua Bajatma',

   country: 'Indonesia',
```

```
    },
    {
      id: 5,
      category: [Category.FITTING, Category.VALVES],
      name: 'PT. Asia Pratama',
      country: 'Indonesia',
    },
  ];
```