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Integration of Store Layout Redesign and MySQL-Based Digital Accounting System to Improve Operational Efficiency of Retail SMEs

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ABSTRACT

This study aims to improve operational efficiency and financial management at Toko Pink 31 Surabaya by integrating two key components: store layout redesign and the development of a MySQL-based accounting system. The research uses a combination of qualitative and quantitative approaches through observations, interviews, system design, and simulations. The redesigned layout was developed using the Systematic Layout Planning (SLP) method and simulated via AnyLogic software to evaluate customer flow and service bottlenecks. The results showed significant improvements in space utilization, reduced customer congestion, and enhanced overall shopping experience. In parallel, the accounting system was developed using MySQL to automate and structure financial transactions. The system includes modules for product input, sales, purchasing, cost of goods manufactured (COGM) reporting, and daily financial summaries. The implementation of this digital accounting system reduced manual errors, streamlined transaction processing, and provided real-time access to financial data. The integration of both layout optimization and digital accounting demonstrates a comprehensive transformation model for SMEs, particularly in the retail sector. The findings emphasize that combining spatial efficiency and financial digitalization can significantly improve business performance, supporting broader efforts to digitalize micro and small enterprises in Indonesia.

INTRODUCTION

In an increasingly competitive business environment, Small and Medium Enterprises (SMEs) are required to adapt to changes in consumer behavior and technological developments [1]. One of the main challenges faced by retail SMEs is operational efficiency and competitiveness in facing digital transformation. Toko Pink 31, as a developing retail SME in Surabaya, faces problems in its sales facility layout, which is not yet optimal, and the lack of integration of its business system in a digital format.

An inefficient sales facility layout can cause ineffective workflows, limited product display space, and an uncomfortable shopping experience for customers [2]. This impacts low sales conversion and operational effectiveness. On the other hand, poorly implemented digital business systems, such as manual transaction records, absence of digital stock systems, and lack of online sales channels, become obstacles in market-oriented business development.

In today's digital era, information technology developments have brought significant changes in various fields, including accounting management Financial [3]. recording, which was previously done manually, can now be automated with the help of a database-based system. The use of this technology aims to improve efficiency, accuracy, and data security in financial management. Toko Pink 31 Surabaya is a growing retail business that requires a more effective accounting system for recording financial transactions. So far, financial recording in this store has still been done manually, often causing calculation errors, data duplication, and difficulties in preparing financial reports. Therefore, a database-based accounting system is needed to assist in more structured and systematic financial management [4].

Digital transformation in business systems does not only focus on software usage but also on data and information integration to support fast and accurate decision-making [5]. Hence, an ergonomic and efficient redesign of the sales facility layout and the development of a digital business system that supports integrated transaction recording, stock management, and online marketing is required.

Through a case study at Toko Pink 31, this research is expected to provide real solutions for similar retail SMEs in improving the efficiency of physical facility management and comprehensive digital business systems. This research also supports the digitalization efforts of MSMEs, which are a priority in national economic development based on technological transformation.

MATERIALS AND METHODS

This research is applied research using a mixed approach between quantitative and qualitative methods [6]. The main focus of this research is to analyze needs, design systems, and implement digital solutions tailored to actual field conditions. The goal is to create real solutions that can be directly applied, particularly in redesigning facility layouts and digital business systems for a small business unit [7].

The data sources in this study come from two types: primary and secondary data [8]. Primary data was obtained through interviews with the store owner and employees, direct observation of the store layout and workflow, and documentation of transaction activities. Meanwhile, secondary data was obtained through relevant literature studies, including scientific journals, articles, and books discussing facility layout design, MSME digitalization, and retail operational management.

This study was carried out through several systematic stages:

1. Field observation and problem identification stage, collecting initial data on the store's layout conditions and current sales system. Techniques used include direct observation, interviews, and visual documentation [9].
2. System and layout requirement analysis stage, covering workflow mapping, customer movement, and digital needs identification such as transaction recording, stock management, and reporting.
3. Facility layout design stage using the Systematic Layout Planning (SLP) approach. In this stage, layout design alternatives are made considering space efficiency, customer comfort, and product accessibility [10] After that, the development of a web- or desktop-based digital business system is carried out, equipped with a user-friendly UI/UX interface to facilitate store staff in operation.
4. Implementation stage, system trials are conducted, and service simulations are performed using the new layout in the store environment [11]. Evaluation is done

by collecting feedback from owners, staff, and customers on the effectiveness of the system and implemented layout.

5. Evaluation and refinement stage, researchers assess the impact of the new system on work effectiveness, service time, and customer service quality [12].

The object of this research is Toko Pink 31, a small and medium-sized enterprise (SME) engaged in basic food and snacks. Data collection techniques include direct interviews, observations of service processes and financial recording, as well as literature studies to strengthen theoretical foundations and system design [13].

Data is analyzed using qualitative and quantitative descriptive methods. Layout evaluation is done using the Systematic Layout Planning method, while the digital system is evaluated by comparing recording performance before and after implementing the MySQL-based database system [14]. With this method, the research results are expected to provide effective solutions to improve operational efficiency and quality at Toko Pink 31 Surabaya.

To illustrate the system workflow, a Context Diagram (Figure 1) is proposed showing interactions between external entities (such as customers, cashiers, and owners) with the system, including data flows such as transaction inputs, selling price data, and Cost of Goods Manufactured (COGM) reports [15].

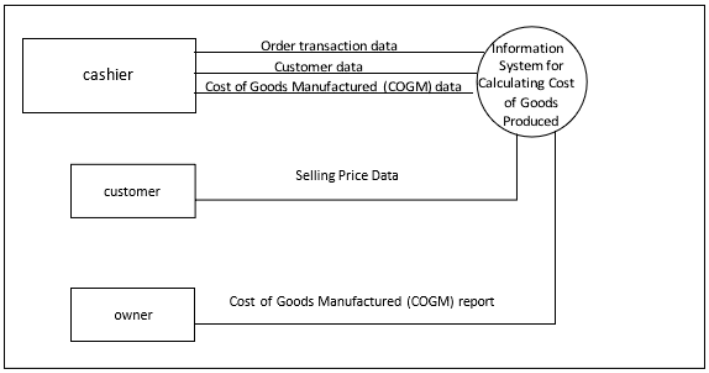


Figure 1. Context Diagram

In addition, a Research Flow Diagram (Figure 2) is also shown, describing the stages of the research process from problem identification to testing and conclusion.

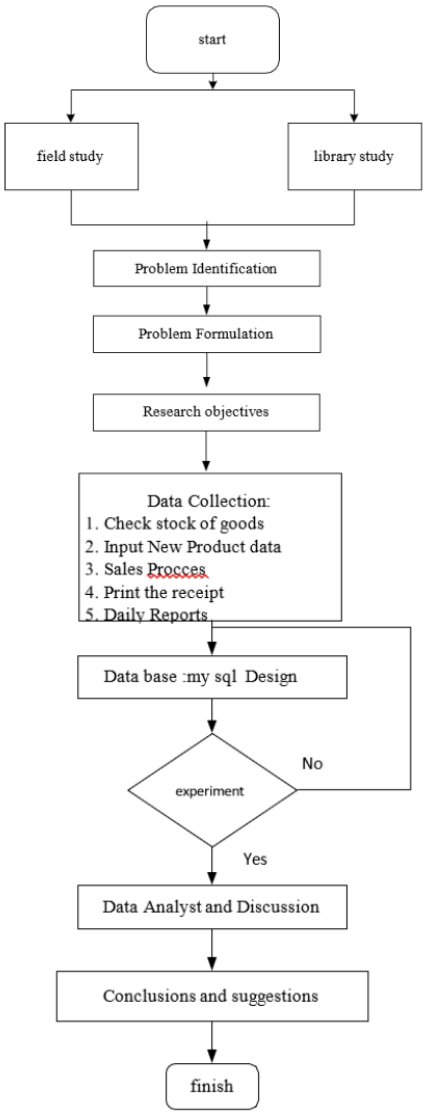


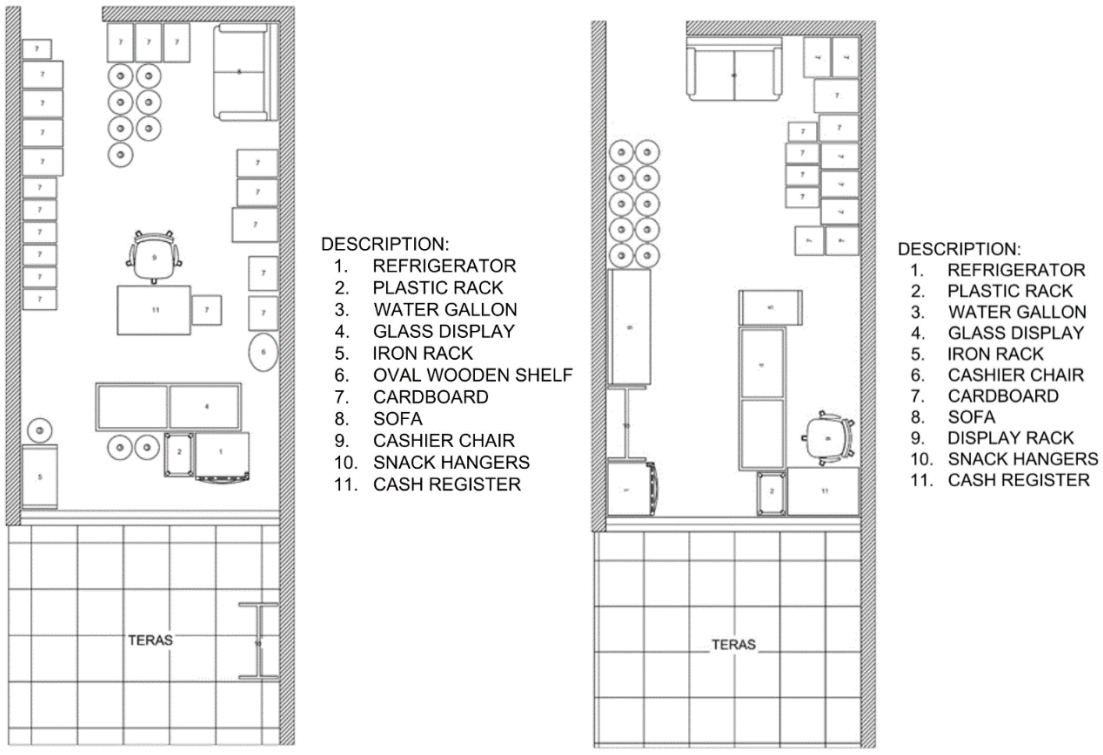
Figure 2. Research Flow Diagram

RESULTS AND DISCUSSIONS

Results

This study identified and designed strategic solutions to the operational problems faced by Toko Pink 31, an SME in the retail sector focusing on groceries and snacks in Surabaya. Field studies revealed that inefficient sales space and a still-manual business system were the main obstacles in store management, particularly in transaction recording, stock management, and customer comfort.

Therefore, a Layout Redesign was created and compared with the Existing Layout to test the effectiveness of the redesign in reducing customer congestion in certain areas of the store and increasing customer satisfaction.



(a) (b)

Figure 3. (a) Layout Existing, (b) Layout Redesign

Figure 3 shows two layout schemes of Toko Pink 31, where the left layout is the current (existing) layout, while the right is the redesigned version recommended based on the Systematic Layout Planning (SLP) method. In the existing layout, the placement of displays, cashier desk, and various furnishings is still poorly organized, resulting in limited movement space, inefficient customer flow, and frequent overlap of staff and customers in the central area. This condition also hampers work efficiency and customer shopping comfort.

Conversely, in the redesigned layout, all room elements are systematically rearranged to create smoother customer flow and more functional zoning. The cashier desk is moved to the front area to open up the middle space, while display racks and other accessible components are placed closer along the walls to maximize display space without disrupting circulation. This new layout not only improves the store's operational efficiency but also creates a more comfortable shopping environment and supports the integration of the digital business system designed for real-time transaction recording and stock management.

A simulation was then conducted on the two layouts Existing and Redesigned using the AnyLogic simulation software to evaluate the effectiveness of the redesign in addressing the existing problems.

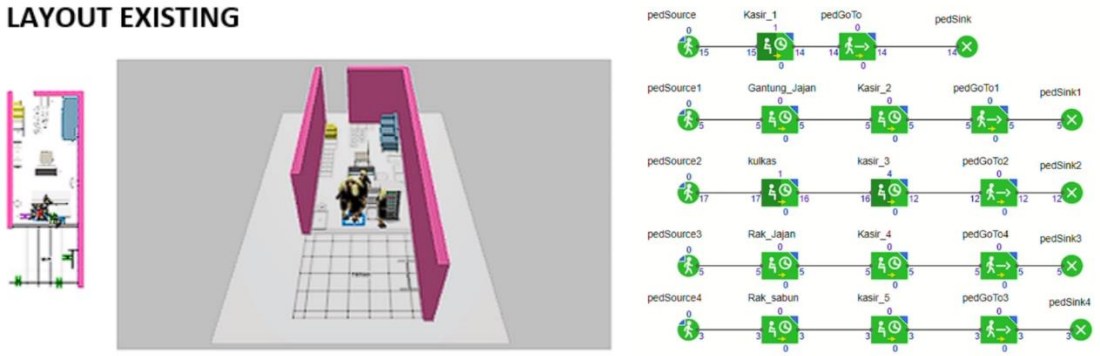


Figure 4. Existing Layout Simulation

The operational simulation of Pink 31 Store in AnyLogic application is designed to represent the flow of customer activities from arrival to payment process and exit from the system. The model is divided into several main zones, namely the entrance area, shopping shelves, cashier queue, cashier service, and exit area. Customers are modeled as agents who enter randomly using an exponential distribution, for example exponential (5), which reflects the average arrival of one customer every five minutes. In the shopping shelf area, customers spend time choosing products using a triangular distribution (3,7,10), according to the variation of common shopping behavior. After that, they enter the cashier queue (Queue) and are served in the Service block, with service time depending on the number of items, using logic such as: if (items <= 5) return uniform (1,2); else return triangular (3,5,7).

After the payment process, customers exit the system through the Sink block. During the simulation, attributes such as time Entered Queue and time Exited Queue are recorded to evaluate waiting time, service time, and total time in the system. When using the Pedestrian Library, customer movement is made more realistic with path arrangement and collision avoidance. This model allows visual and numerical observation of bottlenecks, cashier utilization, and service flow efficiency. With this approach, the simulation provides important insights for data-driven decision making to improve the operational performance of Toko Pink 31.

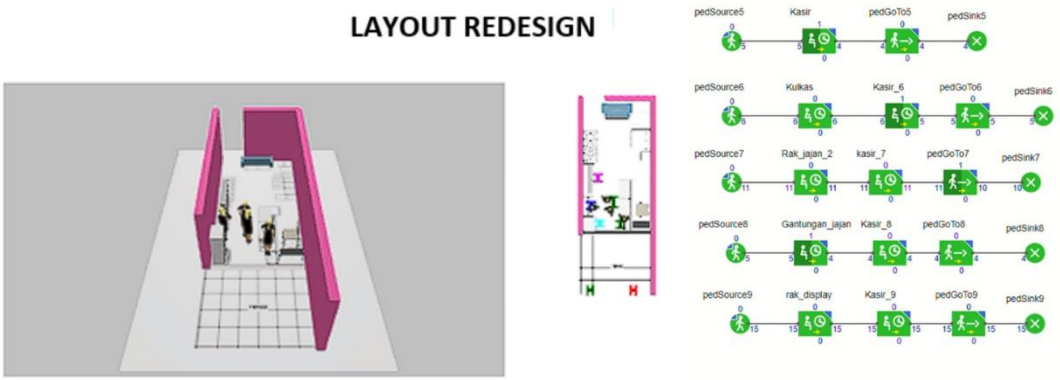


Figure 5 Redesign Layout Simulation

The redesigned layout simulation of Toko Pink 31 in AnyLogic aims to improve customer flow efficiency and reduce waiting time during shopping and checkout. The simulation uses Discrete Event Simulation with the Process Modeling Library, covering five main stages: customer arrival, shopping activity, cashier queue, checkout service, and store departure. Customers are entered into the system through a Source block using exponential (5) arrival distribution, reflecting an increase in visits due to better layout.

The shopping process uses a Delay block with triangular (2,5,9) distribution, adapted to variations in customer behavior. Circulation paths are better organized with expanded shopping areas, and the cashier queue is shortened due to added service points.

For the checkout process, the number of cashiers is increased from one to two parallel Service units. Customers are automatically directed to the queue with the least load using select Output Based On = MIN_QUEUE_LENGTH. Service time is adjusted based on the number of items using uniform (1,3) for small transactions and triangular (3,5,7) for large transactions. The system records wait times, total time in the store, and cashier utilization rates for performance evaluation. The simulation results show significant improvements: reduced customer waiting times, increased service capacity, and more balanced load distribution between cashiers. This model proves that layout redesign can enhance operational efficiency and support more accurate managerial decision-making at Toko Pink 31.

In addition to the physical layout improvement and customer flow, this study also developed a MySQL-based accounting information system aimed at improving financial management efficiency at Toko Pink 31. This accounting system implementation is an integral part of the business's digital transformation, supporting comprehensive store management especially in transaction recording, stock management, daily financial reporting, and production cost calculation. Digital Product Ordering Steps at Toko Pink 31:

1. Step 1
   - Opening the System
   - Open XAMPP Control Panel v 324L
   - Apache shows Started and Stop
   - MySQL shows Started and Stop
   - Minimize and open Firefox
   - Home page appears: Toko Pink
   - Click Products, then Add Product
   - Fields appear: Product Name, Product Code (SKU), Unit (e.g., Pieces, DOS, PACK), Brand (matching Product Code), Purchase price per unit, automatically calculates selling price & margin.
   - Click Save

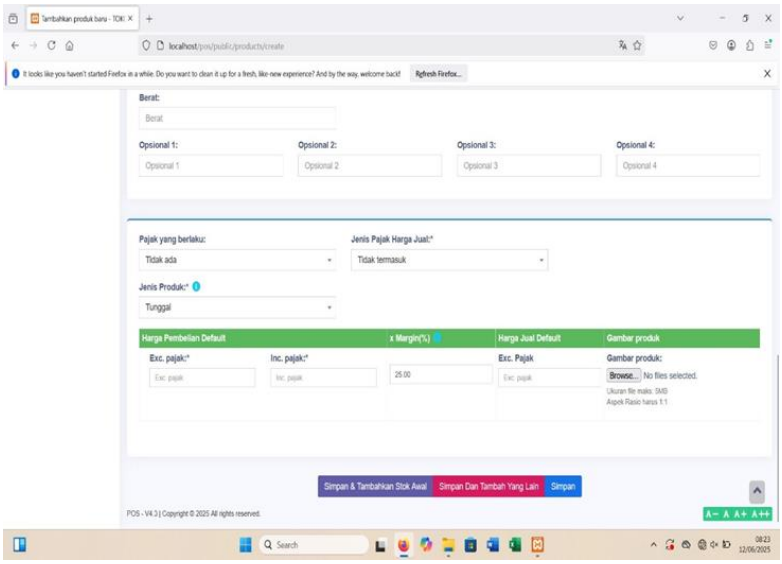


Figure 6. Step 1

2. Step 2
   - Click Add Purchase
   - Supplier data appears: e.g., INDO GROSIR
   - Enter Reference Number: Item code + Purchase order number
   - Example: B1 (B for item code, 1 for order number)
   - Enter purchase date
   - Choose purchase system: received (buy) or ordered (order)
   - Enter item code – product name appears
   - Enter purchase quantity and re-enter if price changes
   - Enter payment date
   - Choose Payment Method: Cash
   - Click Save

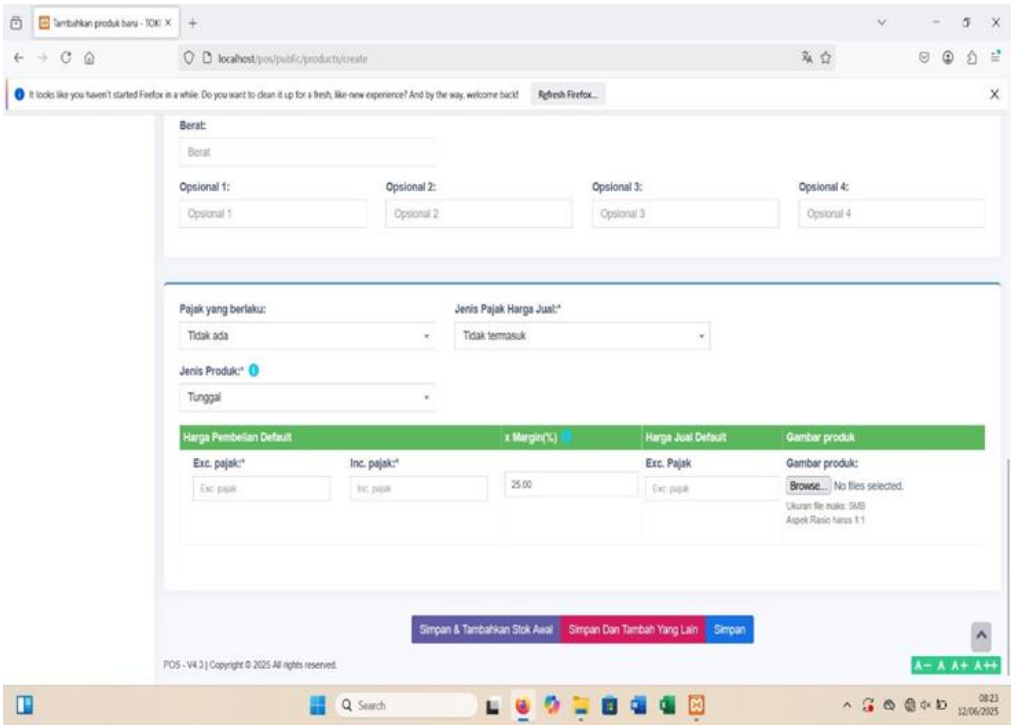


Figure 7. Step 2

Discussions

In the simulation of both the existing and redesigned layouts at Toko Pink 31, several identical treatments were applied consistently to maintain testing scenario equality.

1. The number of customer sources (pedsource) was kept the same five customer entry points in the simulation representing the store entrances or the initial customer interaction points.
2. Both layouts followed an identical process flow: customers entered from the pedsource, interacted with various product areas such as snack racks, snack hangers, and refrigerators, proceeded to the cashier, and finally exited via the pedsink. This ensured that the simulation measured customer behavior across comparable paths and activities.
3. Main store elements such as product racks, refrigerators, and cashier counters were used in both scenarios, although rearranged in the redesigned layout.
4. The simulation measured the same variables, namely the duration of customer interaction at each service point (indicated by clock icons in the diagram), such as

time at the cashier or time spent choosing products. This equal treatment is crucial to ensure that the simulation differences reflect layout changes rather than differences in scenarios or variables.

The simulation was analyzed over a period of 5 minutes and 57 seconds, representing 1 hour of real-time. It was conducted between 06:00–07:00 and 13:00–14:00, the peak hours for customer visits—primarily local residents and elementary school children. Customer congestion sampling was taken at the 2-minute 35-second mark of the simulation time.

The analysis yielded the following results:

1. General Differences Between Normal and Recommended Layouts

Table 1. General Differences Between Normal and Recommended Layouts

Layout Existing	Layout Redesign
Narrow and inefficient aisle pattern slows down customer flow.	More open design, with wider aisles and better circulation.
Many bottlenecks, especially in the middle of the store.	Popular products and cashier positions are rearranged to reduce congestion.
Rack and cashier placements cause customer build-up in certain areas.	Clearer entry and exit paths that do not overlap.

2. Customer Accumulation Analysis Based on Simulation

Table 2. Customer Accumulation Analysis Based on Simulation

Layout Existing	Layout Redesign
Significant accumulation near promotional racks (snack racks) and entrance	More even customer distribution; no excessive crowding in one area.
Cashier area appears crowded, indicating long queues and slow service.	Shorter queues, indicating more efficient transactions.
Customer movement is obstructed in the middle due to narrow paths.	Clear exit paths reduce congestion at entrance/exit.
Many stagnant customers (standing still at one point), indicating limited product access and long wait times in crowded areas.	Fewer stagnant customers, showing smooth customer traffic flow.

3. Effect of Arrangement on Satisfaction and Efficiency

Table 3. Effect of Arrangement on Satisfaction and Efficiency

Layout Existing	Layout Redesign
Customer frustration due to waiting and difficulty accessing products.	Increased customer satisfaction due to smoother shopping experience.
Potential lost sales because customers are unwilling to wait.	Increased customer turnover (number of customers served per unit time).
Increased workload for cashiers and narrow areas.	Reduced workload and better space utilization.

CONCLUSION

This research has successfully designed and implemented a comprehensive digital transformation strategy for Toko Pink 31, a small retail business in Surabaya. The study focused on two core components: redesigning the physical store layout and developing a database-driven accounting system using MySQL. Through the application of Systematic Layout Planning (SLP) and simulation via AnyLogic, the redesigned layout significantly improved customer circulation, reduced bottlenecks, and enhanced service efficiency.

Simultaneously, the implementation of a database-based accounting system allowed for more accurate, efficient, and secure financial data management. The system streamlined daily transaction recording, inventory management, cost calculations, and reporting processes. As a result, the store's overall operational performance and decision-making capabilities improved substantially.

The integration of spatial optimization and digital system development demonstrated the importance of a holistic approach in empowering small and medium enterprises (SMEs) to thrive in the digital era. This study not only provides a replicable model for other retail SMEs but also contributes to the broader national agenda of digitalizing micro and small businesses to enhance their competitiveness and sustainability.

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