



(RESEARCH ARTICLE)



Design and build a Point of Sales (POS) application model using the agile method for super mama frozen food

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Abstract

The Point of Sales (POS) system refers to a system which supports sales transactions where POS is currently growing since it has the ability not only to record sales, record inventory, print invoices, calculate profits but also improve services for business people and entrepreneurs. Super Mama Frozen Food is a store that is currently developing in Malang. In addition, the simple of access to buying products through online services has made the increasing in transactions. However, at Super Mama Frozen Food, most of the data management, data processing, and sales transaction processing have so far relied on a manual or paper-based recording system. As a result, this condition may open up risks in both data management and security. By designing a website-based Point of Sales System, recording sales, collecting inventory, printing invoices, and calculating profits can be done using the PHP programming language with the CodeIgniter framework and MySQL. This system was developed using the Agile Method with the reason that short-term system design can increase client satisfaction.

Keywords: Agile; Point of Sales; Scrum; Website

1. Introduction

Micro-enterprises are productive businesses owned by individuals and/or individual business entities that meet the criteria for micro-enterprises as stipulated in Law Number 20 of 2008 concerning Micro, Small and Medium Enterprises (MSMEs). Currently, the prediction for the number of MSMEs in 2018 will reach 58.97 million. Of the 58.97 million MSMEs in Indonesia, when viewed from the characteristics of technology use, it turns out that not all MSMEs in Indonesia have been supported with technological assistance. According to data from Kominfo, as many as 3.79 million or 8% of the 58.97 million MSMEs in Indonesia have utilized technology, both to market their products and to support their respective business processes. One of the technologies commonly used by SMEs engaged in the retail sector is the use of Point of Sale (POS).

Super Mama Frozen Food Malang is a business engaged in the distribution and sale of frozen food in Malang, East Java, Indonesia. Super Mama Frozen Food Malang provides various types of frozen food such as cut chicken, beef, seafood, vegetables, fruits and ready-to-eat food. This business was founded by a group of people who have experience and expertise in the culinary and business management fields. To support business activities in this business, it is necessary to use technology, especially IT, to facilitate business work within the company. The cashier or point of sales (POS) application is an example of technology that can help sales management in stores and is widely used today. However, the application only focuses on B2C (Business to Customer) services. It is very rare that there are applications that carry out B2B (Business to Business) which allow users to manage themselves, thus providing practicality for businesses in storing used data and using organizational data resources and can be combined which are cashless. Cash payment is required to increase the transaction amount. This condition then becomes an opportunity to create point of sales (POS)

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applications for more business users, especially MSMEs and companies or organizations that are integrated with digital payment gateways as a substitute for non-cash payment solutions.

In making the POS system at Super Mama Frozen Food, the system development method used is the agile method. This method is an iterative and incremental based software development method. With the use of this method, the requirements can be changed according to customer needs. Furthermore, this agile methodology also requires less planning for short-term projects by dividing tasks into Steps. This step was taken as a teamwork effort to follow the software development life cycle (SDLC). As SDLC knows, in an agile method, it includes not only requirements gathering, analysis, design, coding, testing, but also maintenance [1]. There are several processes carried out in the stages of the agile method. The first step is gathering needs by identifying the features requested by Super Mama Frozen Food owners, which is carried out by the system development team. The second step is the system analysis process which is carried out by creating business process flows, task analysis, and user analysis. The third step is the design stage which is carried out through database design, and system design using the Unified Modeling Language (UML) and making mock-ups. The next step is the coding stage which is carried out through the process of creating and testing features. After going through the coding stage, the next stage is the testing stage where the code is tested according to user requirements. Further, at the last stage is periodic maintenance. This is done to ensure that the developed system is safe from system bugs or loopholes.

2. Literature Review

2.1. Accounting Information System for SMEs

Researchers observed the practice of recording business accounting in micro businesses over a certain period of time. Halls (2007) noted that the manual process model is the oldest traditional form of accounting information system and is still used by many small businesses. A large number of growing literature has investigated that manual accounting records in small and medium enterprises in a number of countries are still using bookkeeping in a simple way, namely single entry, both recording sales and expenditure information (Ademola et al., 2012; Chelimo & Sophia, 2014). Meanwhile, MSMEs in Indonesia mostly use manual accounting records that are incomplete and not in accordance with existing standards (Andarsari & Dura, 2018; Coram, 2018; Sari, 2013).

There has been a revolution in the change in the treatment of accounting information systems along with the development and use of IT in the contemporary world. Initially the manual accounting recording system was known to use tools such as pencils, paper and even machines such as typewriters and calculators but with the influence of IT, the use of computer-based information systems to achieve information processing actions so as to be able to produce information in a short time (France, 2017; Stiglitz, 2017). There is automatically increasing awareness of the role of strategic IT installations in SIAs, particularly in terms of giving facilities a competitive advantage and simplifying accounting records to be faster and more efficient [10].

Because in general the accounting recording system is not implemented properly in many MSMEs, automatic technology-based accounting records are still very rarely found in MSMEs. Contrary to previously described studies, Fagbemi & Olaoye (2016) shows that while the Accounting Information System (AIS) has been affected by the use of IT, it turns out that small and medium enterprises in Nigeria are gradually taking advantage of information technology which can increase their competitive advantage. In addition, a positive relationship was found between the use of SIA and business growth, such as increased sales and customers [12]. In a study in Malaysia, participants who used an Accounting Information System agreed that it facilitated their company's financial and accounting management, thereby having a positive impact on their business [13]. It can be seen that the performance of small businesses that use SIA is better than businesses that do not use SIA.

However, it was found that many SMEs in Tanzania consider SIAs to be expensive due to the cost of installing and operating them [14]. MSMEs, which are medium to lower scale businesses, of course have to be careful in adopting an automated SIA if they don't want to experience losses considering the limited capital they have [15]. In order to facilitate and lead to the desired results as a basis for decision making, it must be in accordance with the elements of technology acceptance in TAM which pay attention to the perception of the usefulness and convenience of technology to increase the acceptance and use of technology by its users [16]; [17].

2.2. Point of sale for SMEs

Point of Sale (POS) refers to a form of combining not only hardware but software as well. This combination then forms a system to facilitate transactions with customers, record inventory, find out sales and profit reports per day, week,

month and yearly [18]. The Point of Sale (POS) system relates to a computer device which is connected to a barcode scanner and printer device, where special software for POS is installed on the computer [19]. POS was originally a cash register. It was a kind of calculator machine with a cash drawer and proof of purchase, receipt or invoice (Utami, 2010). However, nowadays, the cash register function cannot meet business needs that require detailed profit and loss reports, inventory, and other needs. Therefore, the use of POS is increasingly widespread. Its use is not limited to large-scale businesses but also to small businesses.

This is in line with the trend of the 4.0 Industrial Revolution Era which demands that all institutions that want to have a competitive advantage in order to win the competition and seize the market, should not only use technology in their business but also must ensure that the use of technology is in harmony with the needs of the institution ([20]; [21]). One of the applications of technology in the business sector is the use of a website that can be used for any purpose according to the needs of MSMEs which can ultimately provide support and added value for these MSMEs [22].

3. Method

The Agile method used in the development of this POS system is the Scrum framework. As we know, Scrum is an agile method for developing products that have high value both in creativity and productivity [23]. Scrum is a framework that provides steps to both manage and control the product or software development process [24]. Schwaber, who is known as one of the founders of Scrum, says that the scrum process is based on three pillars of empiricism: transparency, inspection, and adaptation. This means that every process carried out must be visible to everyone (transparency). Furthermore, every process carried out must also be checked frequently by experienced people (inspection), and can be adapted.

In addition, there are three roles in the team, namely product owner, scrum master, and scrum team [25]. The following is the scrum process depicted in Figure 1.

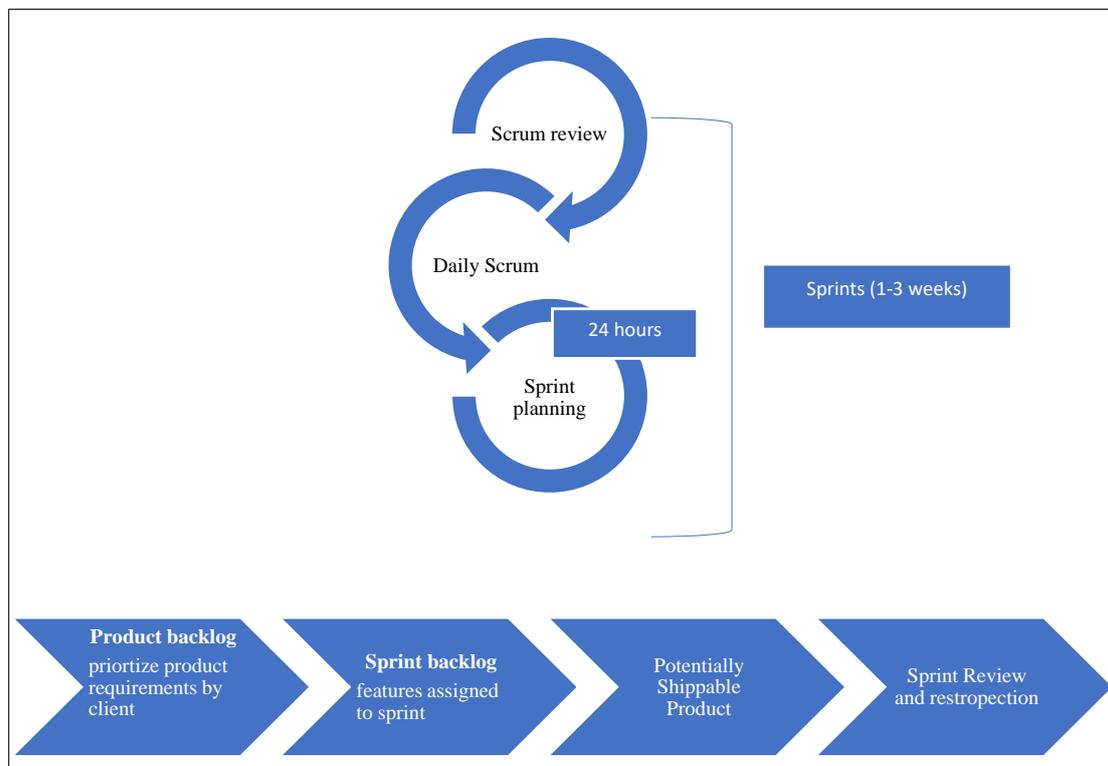


Figure 1 Scrum Flow [24]

This indicated project is built based on the stages of the Agile method and the Scrum framework. Figure 2 below shows a framework for developing this system.

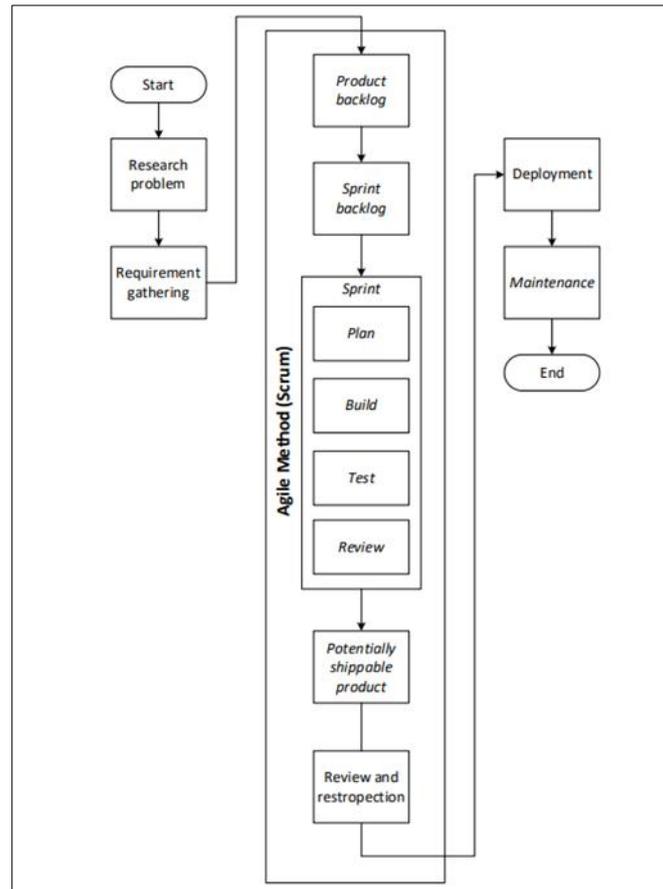


Figure 2 System Development Flowchart

3.1. Research Problem & Requirement Gathering

After determining community or third party problems as the target of community service, the data collection process is carried out as an initial stage in the development of the POS system. The process of collecting population data that can be measured economically either through questionnaires or interviews is carried out using survey methods. There are several stages in data collection:

3.1.1. Observation

The observations have been made by observing the system that is running in the shop to determine the process.

3.1.2. Interview

To obtain data and facts about user needs for the system being built, interviews were conducted face to face. Data collection for system development needs such as hardware requirements, software requirements, and feature identification was carried out through interviews with Super Mama Frozen Food owners. The results of the interviews revealed the need for features to manage product sales, purchase raw materials so that products are sold, and report sales and purchases.

3.1.3. Study of literature

Literature study was conducted by collecting not only data but also information through documents in books, journals, proceedings, reports, or other forms either in print or digital formats.

3.2. Product Guarantee

Product backlog refers to a certain list of requirements in which items are created and managed by the product owner (Srivastava, Bhardwaj, & Saraswat, 2017). The following Table 1 indicates the product backlog in this point of sales system.

Table 1 POS System Product Backlog

No	Savings item	Information
1	Database	the stored data which related to system development
2	Manage Database	Manipulation of data which is stored in the database
3	Sale	Product sales which are integrated with item data
4	Purchase	Crazy buying for supply process
5	Manage sales	Sales data that can be managed as revenue data
6	Manage Purchases	Purchase data made which can be managed as expenditure data
7	Print Sales Invoice	The results of sales transaction activities which have an output in the form of sales details
8	Data Report	A report on all transactions that can be filtered by month, year, week, or even day by day

3.3. Sprint Backlogs

Sprint backlog refers to a fraction of product backlog items. It is based on the highest priority selected first and divided into smaller units to be completed [26]. The following Table 2 shows the sprint backlog POS system.

Table 2 Sprint Backlog POS System

No	Story	Estimation (day)	Priority
1	The system is able to retrieve data from the database	3	1
2	The system has ability to manage data	4	2
3	The system is able to process sales transactions and store data automatically	4	3
4	The system can carry out the process of purchasing and storing data automatically	3	6
5	The system has ability to manage revenue data from sales	2	5
6	The system is able to manage expenditure data from purchase results	2	7
7	The system can print invoices from the sales transaction process	1	4
8	The system has ability to display reports exported to pdf	1	8

3.4. Sprints

The smallest blocks of team tasks that are completed based on the sprint backlog are called sprints. This stage covers planning, manufacturing, testing, and reviewing. At the end of each sprint, a review is conducted for the product owner to demonstrate product improvement [24]. The system planning created can be seen in the following sprint plan.

4. Results and Discussion

4.1. System analysis

This analysis of system describes the overall system business processes, system workflows, and block diagrams based on the needs that have been discussed with the user. The process of the business flow can be seen in Figure 3.

There are 4 processes in completing the point of sales system in the business process system at Super Mama Frozen Food, namely:

It is started when Customers have ordered the products at Super Mama Frozen Food.

The cashier then adds the customers' orders by entering purchased transaction data based on product data in the system.

Having carried out the order process, the transaction data is stored in the database. Then it generates an invoice or transaction detail document based on the customer's purchase.

Finally, the transaction data is integrated into the database which can be accessed by the Super Mama Frozen Food owner/super admin as the data management.

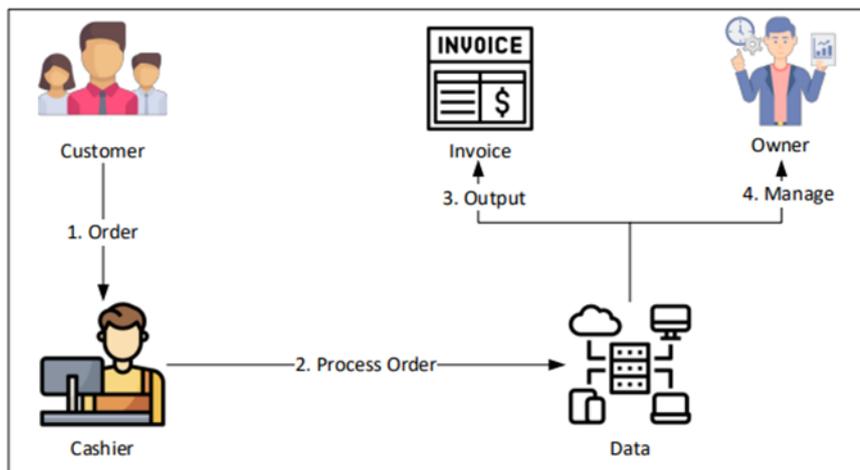


Figure 3 Business Process System at Super Mama Frozen Food

Based on the above Figure 3, it can be seen that there are three user roles in the Super Mama Frozen Food POS system. Those roles cover customer, cashier, and owner.

Figure 4 below explains the workflow process of the POS system. It consists of three actors, they are, customer, admin and super admin. There are some stages in the workflow of the POS system. The first stage refers to the customer after conducting order of the product then making a transaction to the admin. The admin inputs the product data into the system. If the transaction is successful, it will generate an invoice that can be printed. Having completed the transaction, the invoice can be printed. As a result, the data is saved to the system and it can be managed by the super admin in the report management feature or master data.

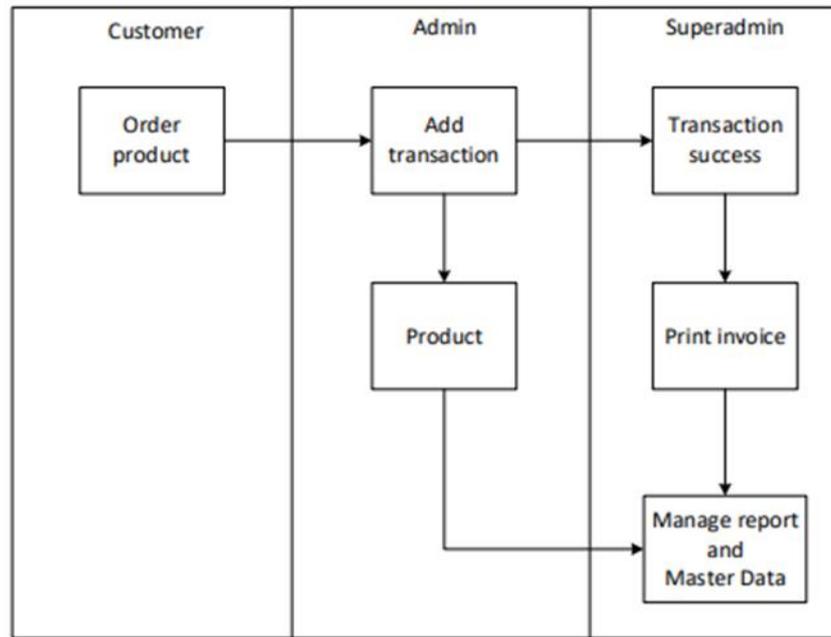


Figure 4 POS System Workflow at Super Mama Frozen Food

The flowchart in Figure 5 illustrates the overall system workflow

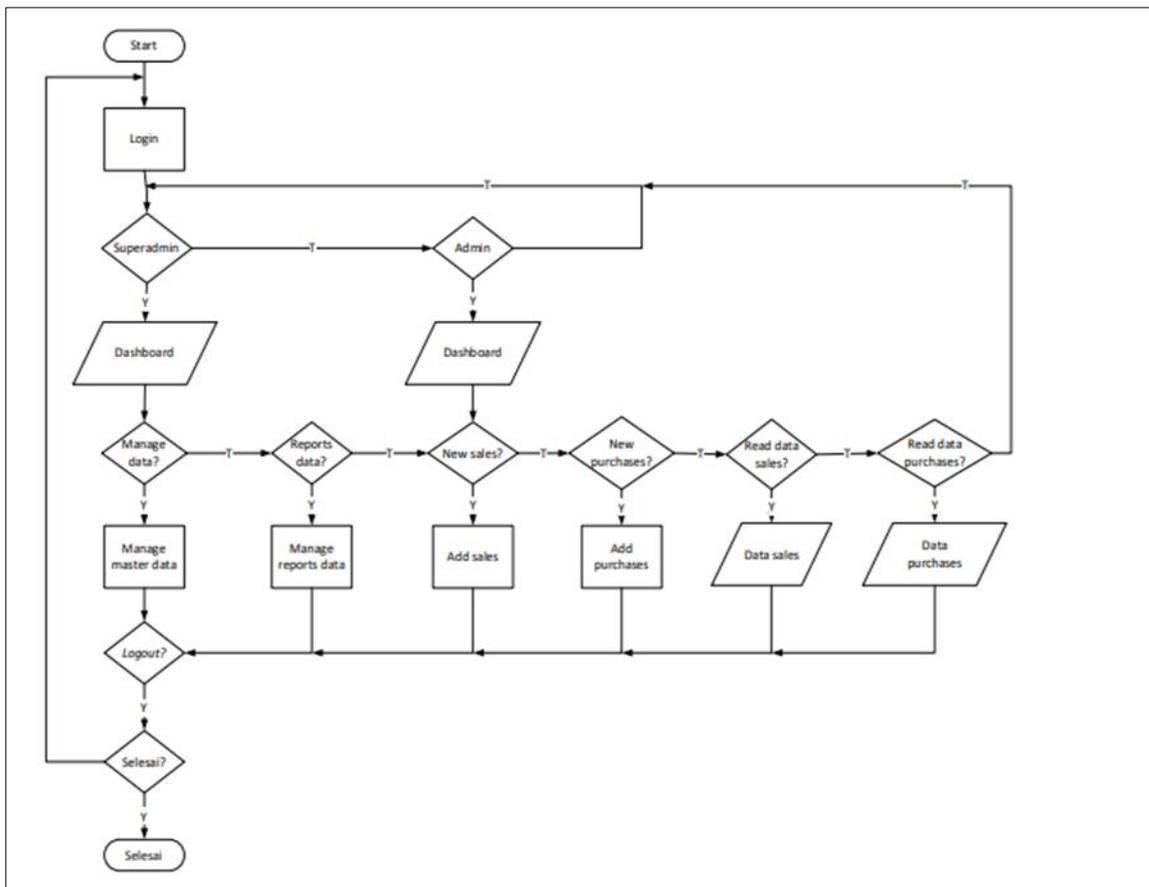


Figure 5 Flowchart of the Whole POS System at Super Mama Frozen Food

Figure 5 depicted of the flowchart of the Whole POS System at Super Mama Frozen Food. It can be seen that on the first page the user opens the system, namely, the login page. Here, the user must enter a username and password. In this point of sales system, there are two user roles, they are, admin and super admin. In this case, the super admin has full access rights to process not only sales, purchases, manage master data, but manage data reports as well. On the other hand, the admin has access rights to carry out both the buying and the selling process.

4.2. Design

In this design, the system works by making a Unified Modeling Language (UML) design and database design.

4.3. Use Case Diagrams

Use case diagrams describe a model that presents the creation of a system during interactions between one or more actors. The building of the use case of the system is shown in Figure 6 below.



Figure 6 Use case POS System at Super Mama Frozen Food

Sequence diagrams describe the behavior of objects in a use case POS system. The description is shown by describing the time and sequence of messages sent and received between objects. The Sequence diagram images are made at least as much as defining use cases [27]. Use cases aim to present interactions between actors and systems (Marianto & Rizky, 2022). Actor is a human entity that interacts with the system to do certain jobs. The sequence diagram for use case POS system can be seen in Figure 6 diagram.

Figure 7 below depicts a sequence diagram of the product sales process. The sales process can occur after the admin or super admin logs in. then the admin or super admin can select the sales menu and then enter or select the quantity of products purchased by consumers. The system automatically accumulates total product sales for each transaction. Sales data is then stored in the database. after that the system displays and can print transaction invoices. If there is a failure in inputting, the system will issue a warning. The stored product sales data will update the item data in the database. In this case, the system will automatically add sales amount, monthly income, and daily income on the super admin dashboard page.

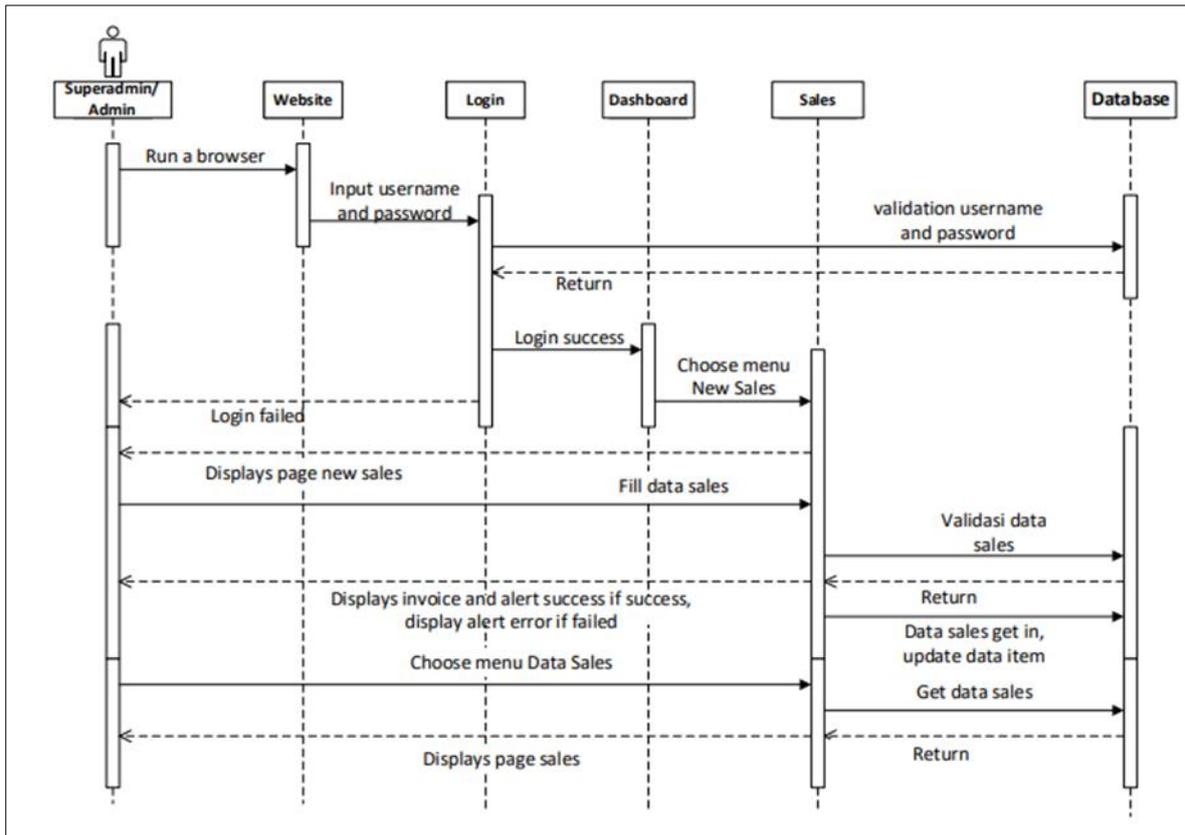


Figure 7 Sales Sequence Diagram

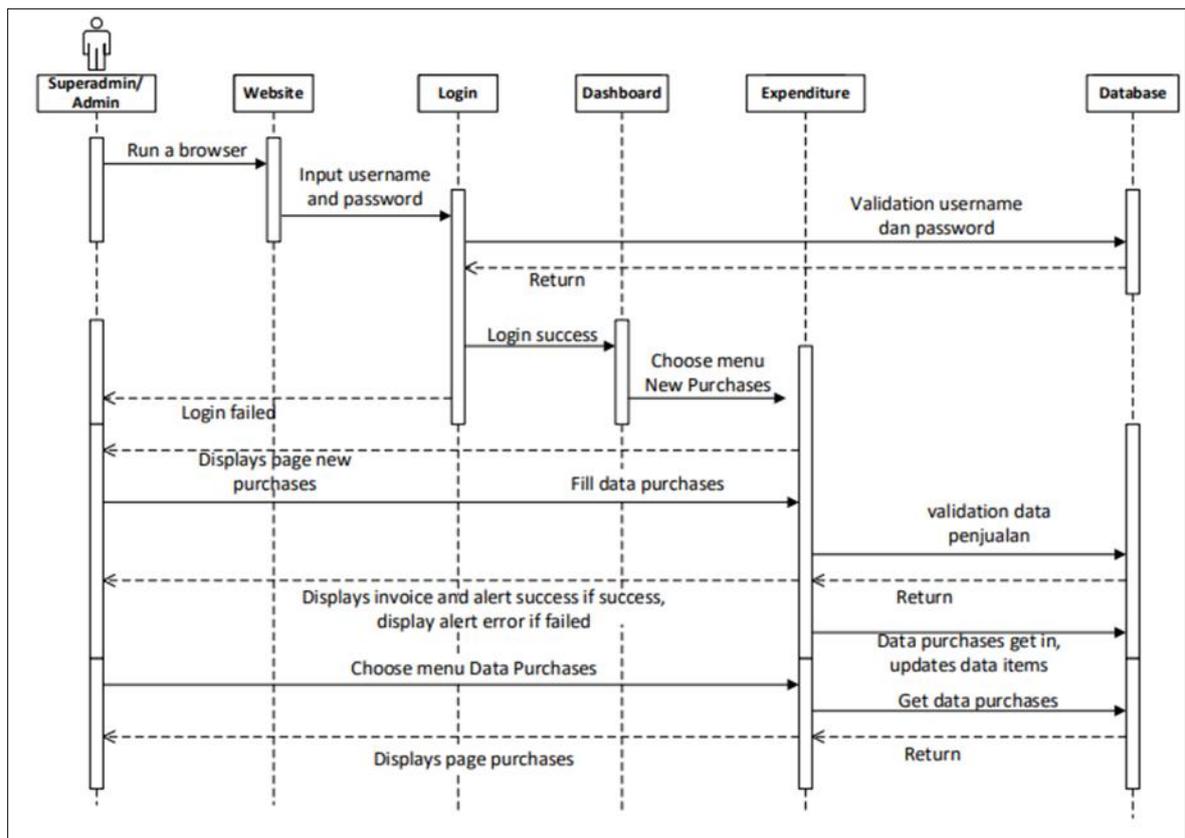


Figure 8 Purchase order diagram

Figure 8 illustrates the purchase order diagram. Here, the users can add not only item data, product data, but also category data by selecting the menu of purchase. This data item is processed raw materials and their quantities. while product data is the product offered to customers. furthermore, category is a grouping of frozen food types. When a user adds sales or transaction data from a customer, the number of related item data is automatically reduced.

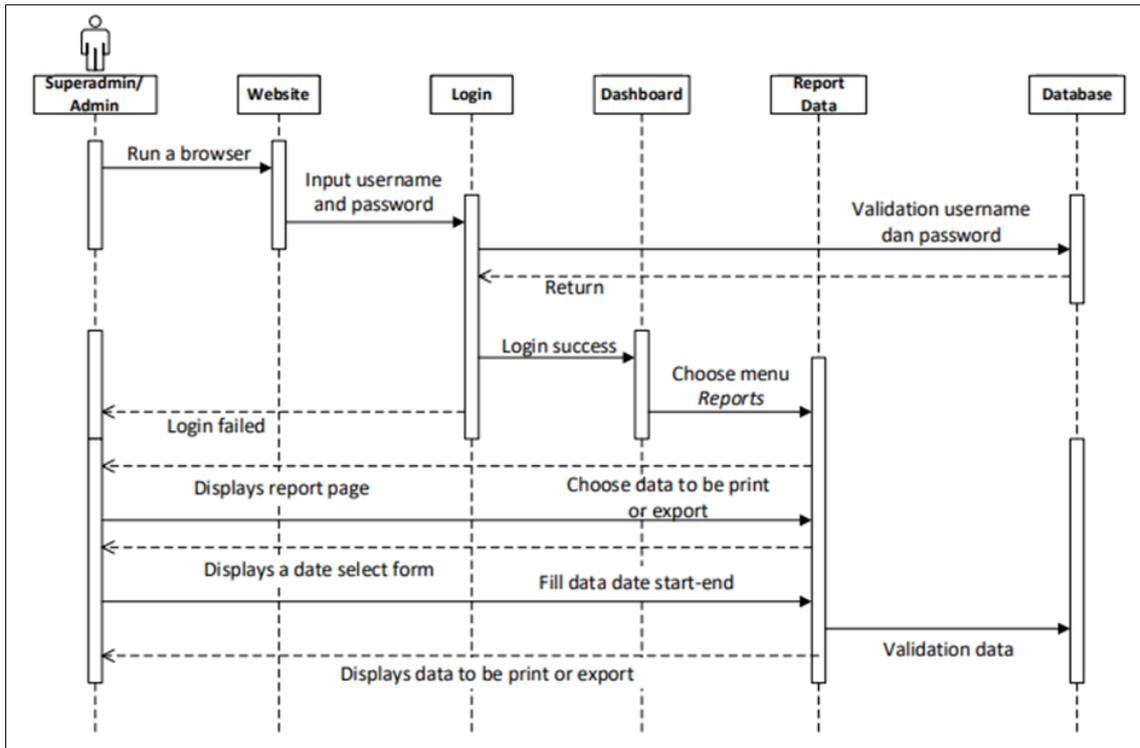


Figure 9 Report Data Sequence Diagram

Figure 9 describes the report data sequence diagram. Here, users can select data reports, for instance, goods data, product data, purchase data, and sales data based on annual, monthly, weekly by selecting the start and end dates of reporting. Moreover, the reporting data can be printed or exported in excel form to facilitate numerical data processing.

In the process of implementation, this system displays pages that are built based on UML and the database design that has been created. The following is the result of implementing the Super Mama Frozen Food point of sales sales system.

Figure 10 shows the login page where the admin/super admin user must enter a username and password to enter the system.

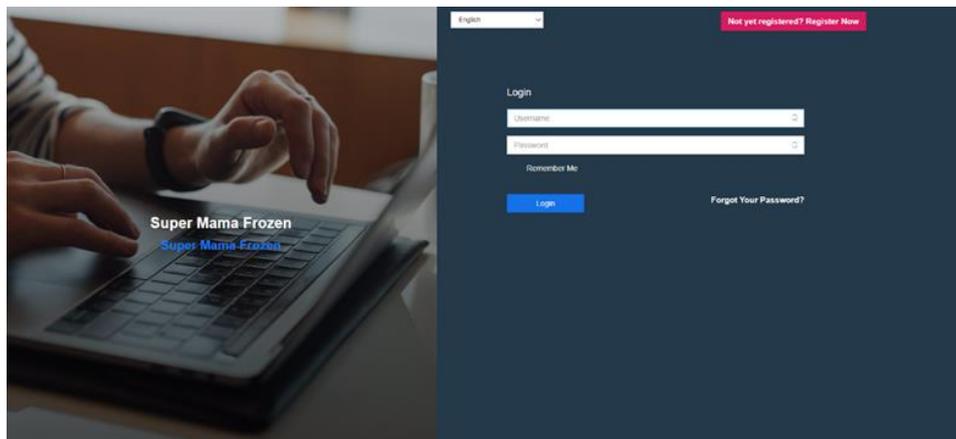


Figure 10 Display of the Login Page

Figure 11 is the main page of the POS system at Super Mama Frozen Food. The page view contains brief information about daily and monthly income and expenses.

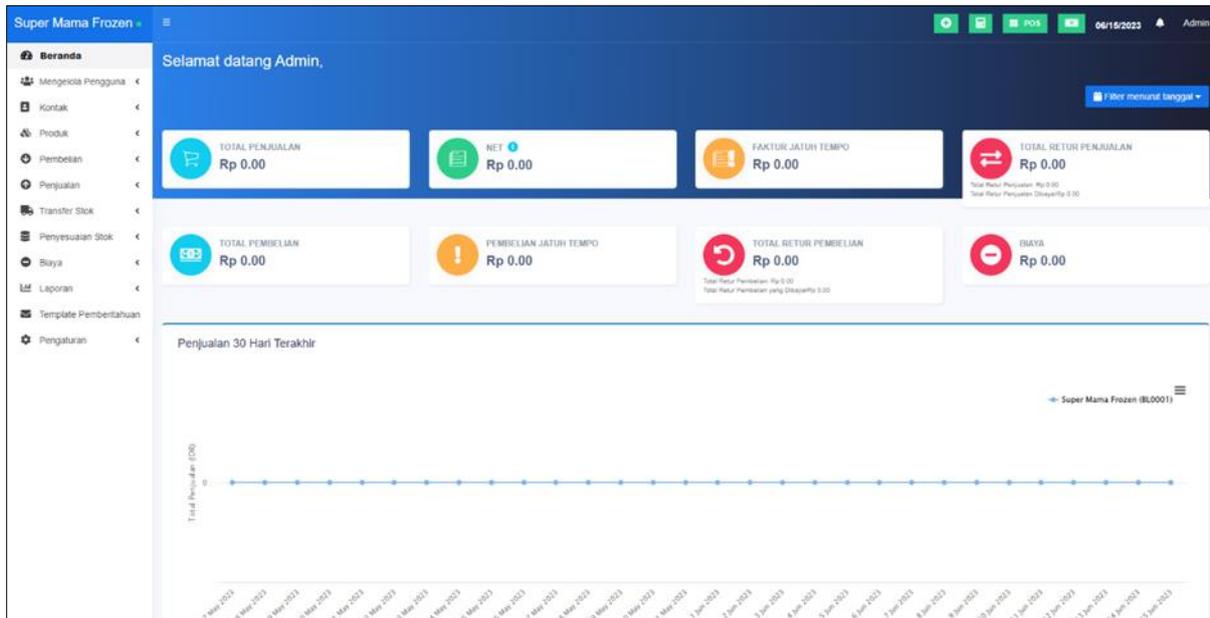


Figure 11 Dashboard Page Display

There are several menus on the sidebar, namely Manage users, Contact, Product, Purchase, Sales, Stock Transfer, Stock Adjustment, Cost, Report, Notification Templates, Settings. When first managing the POS system, users need to add categories, products, and items, as shown in Figure 12-13. In the Product Menu, users can manage all products offered to consumers, define categories, items and prices. Each product has item sizes and grams of materials used as shown in Figure 13.

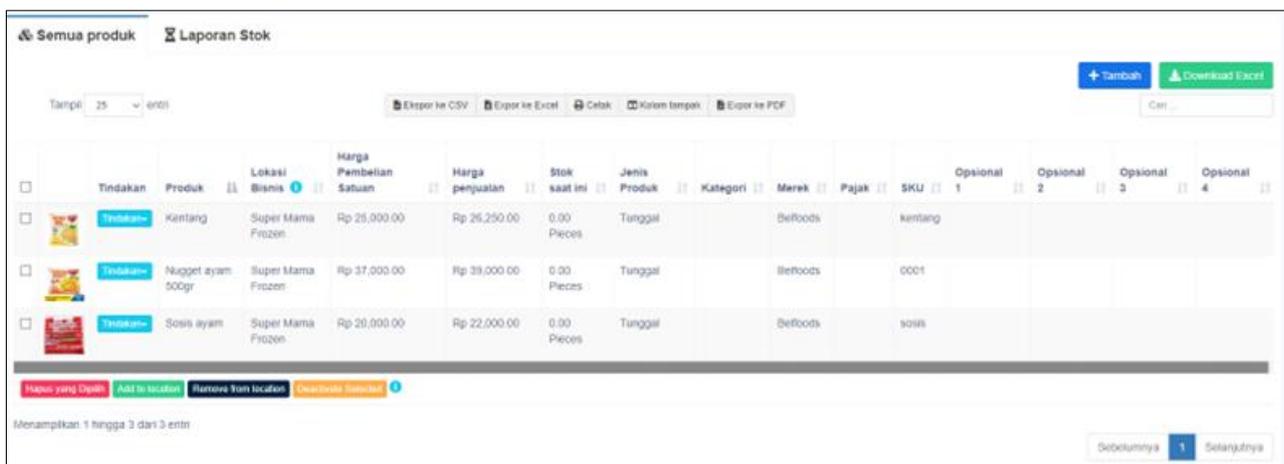


Figure 12 Product Menu

Harga Pembelian Default (Exc. pajak)	Harga Pembelian Default (inc. pajak)	x Margin(%)	Harga Jual Default (Exc. pajak)	Harga Jual Default (inc. pajak)	Gambar Variasi
Rp 25.000.00	Rp 25.000.00	5.00	Rp 26.250.00	Rp 26.250.00	

SKU	Produk	Lokasi	Harga Satuan	Stok saat ini	Nilai Stok Saat Ini	Total unit terjual	Total Satuan Dimutasikan	Total Satuan Dipesanakan
kentang	Kentang		Rp 26.250.00	0.00Pc(s)	Rp 0.00	0.00Pc(s)	0.00Pc(s)	0.00Pc(s)

Figure 13 Item Page Display

On the sales page as shown in Figure 14, the cashier inputs the product and the amount purchased, the amount paid and the change. When the payment button is pressed, the system will print a consumer purchase invoice, as shown in Figure 15.

Produk	Kuantitas	Subtotal	
Kentang kentang Belfoods	- 1.00 + Pieces	Rp 26,250.00	X
Nugget ayam 500gr 0001 Belfoods	- 1.00 + Pieces	Rp 39,000.00	X
Sosis ayam sosis Belfoods	- 1.00 + Pieces	Rp 22,000.00	X

Item: 3.00	Total: 87,250.00
Diskon (-): 0.00	Pajak Pesanan(+): 0.00
	Pengiriman(+): 0.00

Konsep	Penawaran	Menangguhkan	Penjualan Kredit	Kartu	Multi Bayar	Tunai	Batal	Total Hutang 87,250.00
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Figure 14 Display of the Sales Page

Invoice No. 0001		Date 06/18/2023 13:19	
Customer Walk-In Customer Mobile:			
Product	Quantity	Unit Price	Subtotal
Kentang , kentang	1.00 Pc(s)	26,250.00	26,250.00
Nugget ayam 500gr , 0001	1.00 Pc(s)	39,000.00	39,000.00
Sosis ayam , sosis	1.00 Pc(s)	22,000.00	22,000.00
Tunai		Rp 87,250.00	06/18/2023
Total Paid		Rp 87,250.00	Total: Rp 87,250.00

Figure 15 Purchase Invoice

Purchase history sales data can be viewed on the Sales Data menu by specifying the start and end date of report printing, as shown in Figure 16.

Tindakan	Tanggal	No. Faktur	Nama Pelanggan	Nomor kontak	Lokasi	Status pembayaran	Metode pembayaran	Jumlah total	Total dibayar	Penjualan jatuh tempo	Retur Penjualan jatuh tempo	Status Pengiriman	Total Item	Ditambahkan oleh	Catatan penjualan
Tindakan	06/18/2023 13:19	0001	Walk-In Customer		Super Mama Frozen	Dibayar	Tunai	Rp 87,250.00	Rp 87,250.00	Rp 0.00			3.00	Admin	
Total:								Dibayar - 1	Tunai - 1	Rp 87,250.00	Rp 87,250.00	Rp 0.00	Rp 0.00		

Figure 16 Sales Logs

5. Conclusion

Based on the results of the research and discussion that have been described, it can be seen in the case of Super Mama Frozen Food, the data management, data processing, and sales transaction processing have so far relied on manual systems or paper-based records, which open up risks in data management and security.

With the design of the POS Application Model using the agile method, this research can produce a website-based POS application model that can record sales, collect inventory, print invoices, calculate profits and purchases and print proof of payment or transaction receipts more efficiently. In short, POS is acceptable because the service is faster and the level of effectiveness is the highest. In reporting POS can provide a faster process, guaranteed data security and minimize errors in the process of all transactions.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to disclosed.

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