Point of Sales System in InHome Café Website using Agile Methodology

Irma Amelia Dewi[1*]

[1]Department of Informatics, Faculty of Industry

Itenas, Institut Teknologi Nasional Bandung, Bandung, Indonesia

irma_amelia@itenas.ac.id

Yusup Miftahuddin[2], Muhammad Assidiq Fattah[3], Cikal Bingah Palenda[4],
Syahrul Fathurrahman Erawan[5]

[2,3,4,5]Department of Informatics, Faculty of Industry

Itenas, Institut Teknologi Nasional Bandung, Bandung, Indonesia

yusufm@itenas.ac.id, massidiqfattah@mhs.itenas.ac.id, cikalalen26@mhs.itenas.ac.id,
syahrulerawan123@mhs.itenas.ac.id

Abstract

The Point of Sales (POS) system is a system that supports sales transactions where POS is currently evolving because it can record sales, record inventory, print invoices, calculate profits and improve services for businesspeople and entrepreneurs. InHome Café is one of the growing cafe in Subang, Bandung. Ease of access to purchase products through online services led to an increase in transactions. At InHome Café Subang, data management, data processing, and sales transaction processing used to rely on a manual system or paper-based recording, which open to risks in data management and security. Therefore, to solve the problem, a website-based Point of Sales System was developed to record sales, collect inventory, print invoices, calculate profits using the PHP programming language with the CodeIgniter framework, and MySQL. The system was developed using the Agile development system with a reasoning that a short-term system development that emphasizes client satisfaction was required. The system functionality testing resulted in a success rate of 96.15%.

Keywords: agile, café, point of sales, scrum, website

Introduction

Point Of Sale (POS) is a sales-oriented activity to assist the transaction process consisting of inventory management, reporting, purchasing, customer management, transaction security standards, and return processing. This POS is a place to accept payments from buyers to merchants (Marisa & Yuarita, 2017). Currently, the development of systems and technology is very rapid, and the role of technology is significant for society's progress in all fields. Technology can provide many conveniences for people in their daily activities, including entrepreneurs. Some of the advantages of using a point of sales application include improving service quality with POS. A company can easily carry out a precise, fast, and systematic transaction process. This supports the orientation of business services to consumers and increases market interest. Another benefit is that it facilitates the process of controlling and making decisions. Usually, the controlling process can be carried out easily because all reports can be made available quickly, thus enabling the decision-making process both collectively and personally (Sani, Pradana, & Rusdianto, 2018).

Inhome Café is a café that has been established since 2015, which serves many dishes such as coffee, tea, snacks, and even heavy meals with menu variants. At InHome Café Subang, data management, data processing, and sales transaction processing were still using a manual system with paper-based records that open to risks in data management and data security. Another problem was that the cash register used to be working incorrectly, causing frequent human errors. Yet another problem in the cafe management process was in reporting for sales and purchases, both daily and monthly, which performed by manual data transfer, hence became the cause of ineffectiveness in time and reports preparation activity. Meanwhile, InHome Café Subang was a growing cafe business in the city of Subang with purchases and transactions using online services to increase the cafe's sales.

Therefore, in these community service activities carried out by lecturers and Informatics students, Itenas Bandung developed a Point of Sales system to assist InHome Café in data management, data processing, and sales transaction processing using Agile methodology as its software development life cycle.
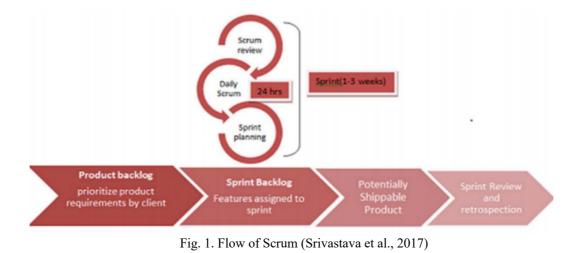
The agile method is used as a system development method in making POS systems at InHome Cafe. The Agile methodology is an iterative and incremental based software development

method, where requirements can be changed according to customer requirements. The agile methodology also requires a bit of planning, which is meant for short term projects by dividing the tasks into several steps as a teamwork effort that follows the software development life cycle (SDLC). In this agile method, SDLC includes requirements gathering, analysis, design, coding, testing, and maintenance (Sharma, Sarkar, & Gupta, 2012).

The process that had been carried out through the stages of the agile method was as follows. The first step was the collection of requirements by identifying features asked by the In Home Cafe owner, performed by the system development team. The system analysis process was done by creating a business process flow, task analysis, and user analysis. In the design stage, database design was carried out, and system design was using Unified Modelling Language (UML) and mock-up creation. At the coding phase, the process of features creating and testing was done. After the next coding stage, there was a testing stage where the code was tested according to user needs. The last stage was periodic maintenance to ensure that the system developed was safe from bugs or system gaps.

Methods

The agile development method was implemented in the development of this POS system using the SCRUM framework. Scrum is an Agile method that develops a high-value product in creativity and productivity (Haryana, 2019). The Agile framework used in the development of this POS system was Scrum. Scrum is a framework that provides steps to manage and control the product or software development process (Srivastava, Bhardwaj, & Saraswat, 2017). One of the founders of Scrum, Schwaber, said that the scrum process is based on three pillars of empiricism: transparency, inspection, and adaptation, which means that every process carried out must be seen by everyone (transparency). Every process that is carried out must be checked frequently by experienced people (inspection), and finally that every suggestion and input made must be reflected in the code (adaptation) (Cho, 2008).

In Scrum, there are three roles in the team, namely the product owner, the scrum master, and the scrum team (Mahalakshmi & Sundararajan, 2013). The following is the scrum process depicted in Figure 1.

Fig. 1. Flow of Scrum (Srivastava et al., 2017)

Therefore, this project was built based on the stage of the Agile method and Scrum framework. The following Figure 2 is a framework for developing this system.
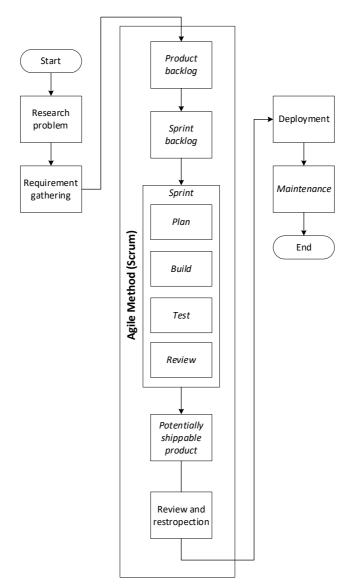

Fig. 2. Flowchart Develop a System

A. Research Problem and Requirement Gathering

The initial stage in developing the POS system is the data collection process, after determining the community's problem or the third party as a community service target. The data collection process is carried out by survey method. The survey method collects data from a population that can be measured economically and involves questionnaires and interviews. The following are the stages of data collection:

1. Observation

    In this process, observations had been made by observing the current system in the café to determine the process.

2. Interview

    Interviews here were conducted face-to-face with users to obtain data and facts about user needs for the system being built. The requirement gathering collected system development needs such as hardware requirements, software requirements, and identification of features from interviews with InHome Cafe owners. The result of the interviews revealed the need of features to manage product sales, purchase raw materials for making products sold, and sales and purchases report.

3. Literature study

    A literature study collects data and information through documents in books, journals, proceedings, reports, or other forms in printed or digital format.

B. Product Backlog

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

Table 1. Product Backlog of the POS System

No	Backlog item	Description
1	*Database*	The database is created to store data related to the development of the system
2	Manage Database	Manipulation of data stored in a database
3	Sales	Product sales that are integrated with goods data
4	Purchase	Purchases made for the supply process
5	Manage of sales	Sales data can be managed as income data
6	Manage of Purchases	Purchase data made can be managed as expense data
7	Print Sales Invoice	The results of sales transaction activities have an output in the form of sales details
8	Data Report	A report of all transactions that can be filtered based on data per-month, year, week, or even a day

C. Sprint Backlog

The sprint backlog is a fraction of product backlog items based on the highest priority selected first and is divided into smaller ones to be completed (Cho, 2008). The following is Table 2, which contains the sprint backlog.

Table 2. Sprint Backlog POS System

No	Story	Estimation (day)	Priority
1	The system can retrieve data from the database	3	1
2	The system can manage data	4	2
3	The system can process sales transactions and store data automatically	4	3
7	The system can print invoices from the sales transaction process	1	4
5	The system can manage income data from sales	2	5
4	The system can carry out the purchase process and store data automatically	3	6
6	The system can manage expenditure data from the purchase results	2	7
8	The system can display reports that are exported to pdf	1	8

D. Sprint

The sprint is the smallest block containing the team's tasks completed based on the sprint backlog. This stage includes a plan, build, test, and review. At the end of each sprint, a review was conducted to the product owner for demonstrating product improvement (Srivastava, Bhardwaj, & Saraswat, 2017). The following is a sprint plan that contains the planning of the system being made.

D.1 System Analysis

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

There are 4 (four) processes in completing the point of sales system.

1. Customers place orders for products in InHome Café.

2. Cashier adds orders by entering purchased transaction data based on product data in the system.

3. When the order process has been carried out, the transaction data is saved to the database and produces an invoice or transaction detail document based on the customer's purchase.

4. Transaction data is also integrated into the database to be accessed by the owner/super admin for data management.
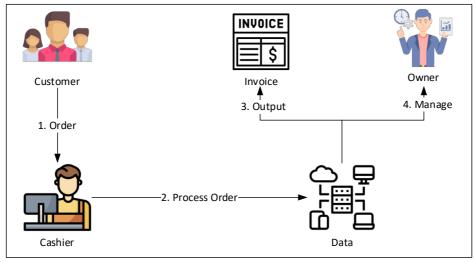
Fig. 3. System Business Processes in InHome Cafe

Based on Figure 3, there are three roles user in the POS system of InHome Café: the customer, the cashier, and the owner. Figure 4 explains the workflow system with three actors who carry out the POS system process, namely customer, admin, and super admin. The first stage is that the customer orders the product to make a transaction to the admin. Based on the interview result with the owner, the owner requested that the cashier can be assigned as admin. The admin enters the product data into the system, so if the transaction is successful, it produces an invoice that can be printed. After the transaction is completed and the invoice is printed, the data is saved to the system and can be managed by the super admin in reports or master data management feature.
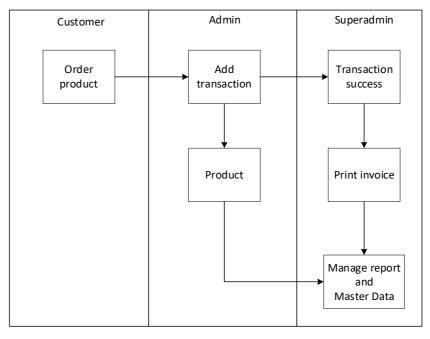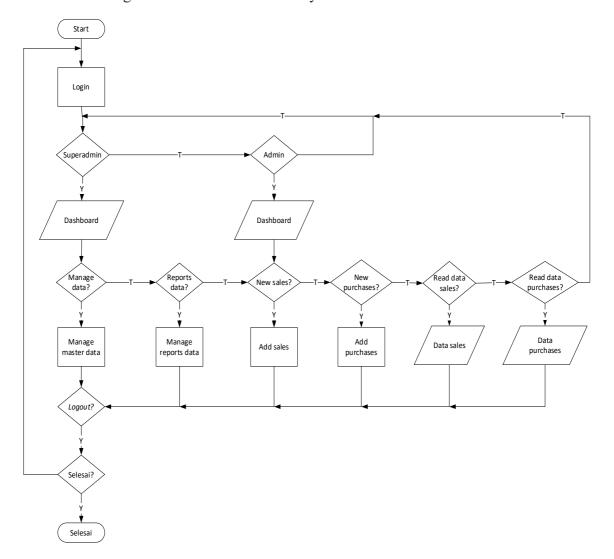

Fig. 4. System Workflow POS System in InHome Cafe

The flowchart in Figure 5 describes the overall system workflow.

Fig. 5. Flowchart of the Whole POS System in InHome Cafe

In the flowchart depicted in Figure 6, on the first page, the user opens the system, namely the login page where the user must enter a username and password. In this point of sales system, user roles are divided into 2, namely admin and super admin. Superadmin has full access rights to process sales, purchases, manage master data, and manage data reports. While the admin has access rights to carry out the sales and purchase process

D.2 Design

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

D.2.1 Use Case Diagram

The use case diagram is a model that presents how the interaction between one or more actors and the system is made. The use case of the system to be built is shown in Figure 6 below.
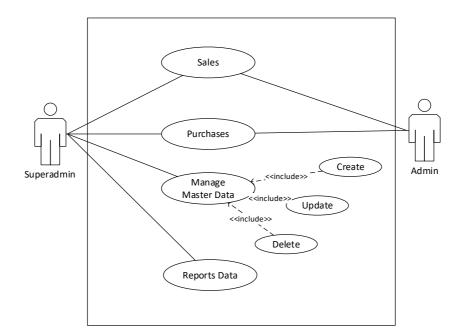
Fig. 6. Usecase POS System in InHome Café

Sequence diagrams depict objects' behavior in use cases by describing the time and sequence of messages sent and received between objects. A sequence diagram image is made at least as much as defining use cases (Heriyanto, 2018). The following is a sequence diagram in this system based on the use case diagram in Figure.6.

Figure 7 shows a sequence diagram of the product sales process. In the sales process, after the admin or super admin logs in, they can carry out the sales process by selecting the sales menu and entering or selecting products purchased by consumers and entering the quantity. The system accumulates the total sales of the product at each transaction. Sales data is saved to the database, and the system displays and prints the transaction invoice. If there is a failure when inputting or processing sales data, the system will issue a warning. Stored product sales data will be affected by updating the item data in the database. The system automatically adds sales count, monthly income, and daily income on the super admin dashboard page.
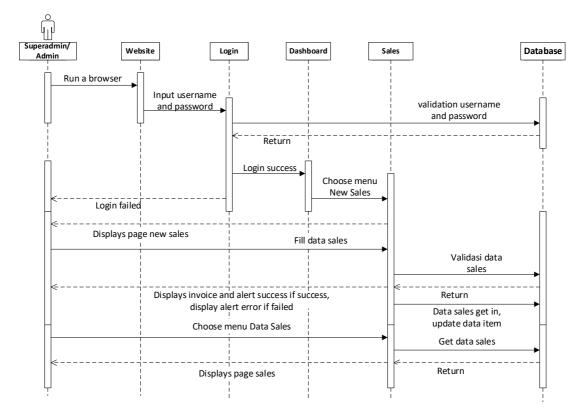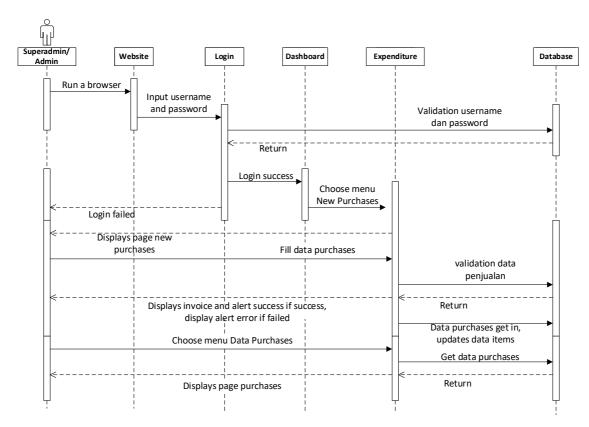
Fig. 7. Sequence Diagram of Sales

Fig. 8. Sequence Diagram of Purchase

In Figure 8, users can add item data, product data, and category data by choosing the Purchase menu. These data items are processed raw materials and their amounts. Product data are products offered to customers, while categories are groupings of types of food or beverages. When the user adds sales or transaction data from a customer, the corresponding item's amount of data is automatically reduced.
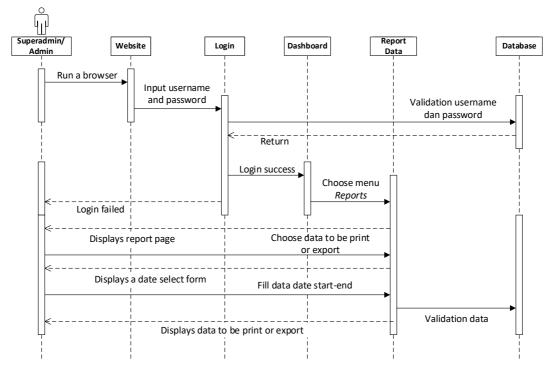

Fig. 9. Sequence Diagram of Data Report

In Figure 9, users can select data reports such as item data, product data, purchase data, sales data based on an annual, monthly, weekly basis by selecting the start and end date of reporting. Reporting data can be printed or exported in excel form to facilitate numerical data processing

D.2.2 Database Design

In designing the database, an Entity-Relationship Diagram (ERD) and Table Relationship Diagram (TRD) are designed for the whole system

1. Entity-Relationship Diagram (ERD)

   ERD is a data modelling tool describing relationships between entities and helps organize data in making the system into entities (Fridayanthie & Mahdiati, 2016). Figure 10 below is a depiction of ERD on this system.
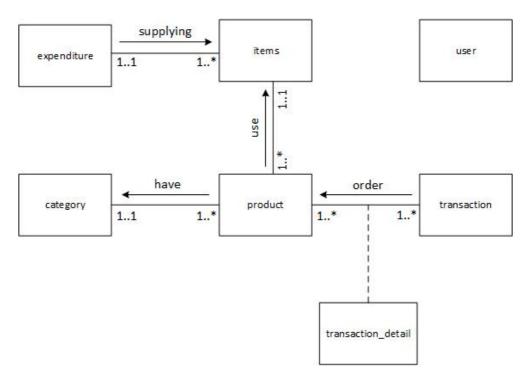
Fig. 10. The Entity-Relationship Diagram of POS System in InHome Café

2. Table Relationship Diagram (TRD)

The database design in the form of TRD represents the records in the table by forming relationships. Figure 11 shows the TRD depiction of this system.
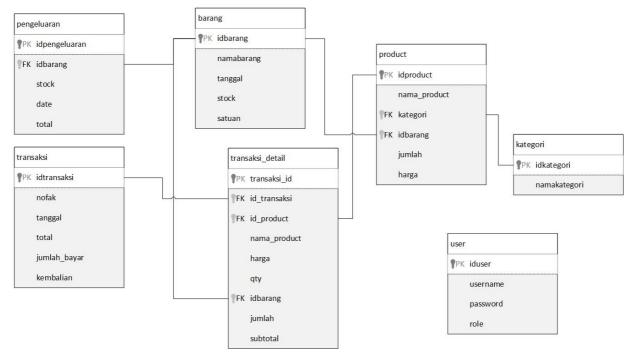

Fig. 11. The Table Relationship Diagram of POS System in InHome Café

Results and Discussions

Results

In the implementation process, this system displayed pages built based on the UML and database design that had been made. Below are the results of the implementation of the In Home Café point of sales system. Figure 12 shows the login page where the admin/superadmin user must enter a username and password to enter the system.
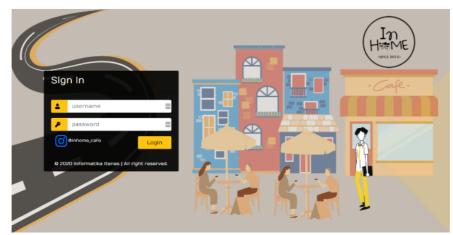

Fig. 12. Login Page Display

Figure 13 is the main page of the POS system in InHome Café. The page displays contain brief information about daily and monthly income and expenses.
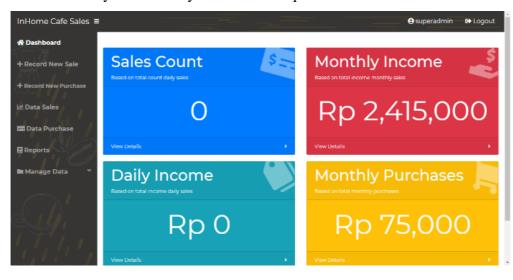

Fig. 13. Dashboard Page Display

There are several menus on a sidebar, namely Record New Sales, Record New Purchase, Data Sales, Data Purchase, Report, and Manage Data. On the first time managing POS system, the user needs to add a category, product, and item, as shown in Figure 14-16. In Category Menu,

the user can categorize a product based on raw material such as coffee, chocolate, and tea, dessert, milkshake, etc.

No	Name of Category	Action
1	Coffee	✏ 🗑
2	Chocolate and Tea	✏ 🗑
3	Frappe	✏ 🗑
4	Milk Shake Special	✏ 🗑
5	Desert	✏ 🗑

Showing 1 to 5 of 5 entries   Previous 1 Next

Fig. 14. Category Page Display

On the Product Menu, users can manage all the products offered to consumers, determine the categories, items, or raw materials used in the products (drinks or snacks) and prices. Each product has an item and a gram measure of materials used. The 'use' field on the product menu indicates the need for material used in grams units to make the product. For example, a Coffelate uses a Coffeblend raw item of 10 grams, as shown in Figure 15.

No	Product Name	Category	Items	Use	Price	Action
1	Cafe Latte	Coffee	Coffeeblend	10	Rp 16,000	✏ 🗑
2	V60	Coffee	Coffee Gayo Mountain	14	Rp 16,000	✏ 🗑
3	Caramel Machiato	Coffee	Coffeeblend	10	Rp 17,000	✏ 🗑
4	Hazelnut Coffee	Coffee	Coffeeblend	10	Rp 17,000	✏ 🗑
5	Vanilla Coffee	Coffee	Coffeeblend	10	Rp 17,000	✏ 🗑
6	IH. Coffee Oreo Frappe	Frappe	Coffeeblend	10	Rp 17,000	✏ 🗑
7	Kopi Susu Inhome Cafe	Coffee	Coffe Spesial Inhome	15	Rp 15,000	✏ 🗑
8	Cappuccino	Coffee	Coffe Spesial Inhome	14	Rp 15,000	✏ 🗑

Fig. 15. Product Page Display

Item data is updated daily, so that owners can add raw materials, stock in grams. Changes in stock use on the product menu affect the amount of stock in the Item menu, as shown in Figure 16.

No	Items Name	Date	Stock	Unit	Action
1	Coffee Gayo Mountain	30 November -1	1508	gram	✎ 🗑
2	Coffee Ciwidey Honey	30 November -1	1300	gram	✎ 🗑
3	Coffeeblend	30 November -1	1870	gram	✎ 🗑
4	Coffe Spesial Inhome	09 Januari 2021	135	gram	✎ 🗑
5	Coffe Jawa	18 Januari 2021	2000	gram	✎ 🗑

Showing 1 to 5 of 5 entries

Previous 1 Next

Fig. 16. Item Page Display

On a sales page such that can be seen in Figure 17, the cashier enters the product's and amount purchased, the amount of money paid, and the change. When the Save button is pressed, the system print a consumer purchase invoice, as shown in Figure 18.

⊞ Sales Products   **+ Search Product for Sale**

Product ID	Product Name	Qty	Sub-Total	Action
1	Cafe Latte	2	32,000	Batal
3	Caramel Machiato	1	17,000	Batal
6	IH. Coffee Oreo Frappe	1	17,000	Batal

Showing 1 to 3 of 3 entries

Total(Rp) 66,000
Cash(Rp) 100,000
Change(Rp) 34000

Save

Fig. 17. Sales Page Display

In Home Cafe

Invoice Num **20012171**
Created At   **20-01-2021 18:12:35**

Product Name	Qty	Subtotal
Cafe Latte	2	Rp 32,000
Caramel Machiato	1	Rp 17,000
IH. Coffee Oreo Frappe	1	Rp 17,000
Total		Rp 66,000
Cash		Rp 100,000
Change		Rp 34,000

Fig. 18. Purchase Invoice

Purchase history sales data can be seen on the Sales Data menu by specifying the start and end date of report printing, as shown in Figure 19.

Fig. 19. Log of Sales

Meanwhile, on the purchase menu, users can manage the purchase of raw materials in making products and enter the amount of stock purchased per day and the purchase cost, as shown in Figure 20. The stock item in the data purchase decreases every time a product purchase transaction uses it. The log of the purchase can be seen in Figure 21.

Fig. 20. Purchase Page

Fig. 21. Log of Purchase

Cafe owners can view their products' detailed sales data in the Report Menu by specifying the start and end dates of reporting, as shown in Figure 22 and Figure 23.
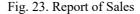
LAPORAN DATA PENJUALAN

No	Number Invoice	Date	Total	Pay	Change
1	01012121	01 Januari 2021	Rp 16,000	Rp 20,000	Rp 4,000
2	05012167	05 Januari 2021	Rp 33,000	Rp 35,000	Rp 2,000
3	11012119	11 Januari 2021	Rp 31,000	Rp 50,000	Rp 19,000
4	17012184	17 Januari 2021	Rp 16,000	Rp 20,000	Rp 4,000
5	20012171	20 Januari 2021	Rp 66,000	Rp 100,000	Rp 34,000

Fig. 22. Report of Sales

LAPORAN DATA PENGELUARAN

No	Items Name	Stock	Date	Total
1	Coffee Ciwidey Honey	50	06 Januari 2021	Rp 40,000
2	Coffeeblend	70	06 Januari 2021	Rp 70,000
3	Coffee Gayo Mountain	70	06 Januari 2021	Rp 50,000
4	Coffee Ciwidey Honey	250	10 Januari 2021	Rp 75,000
5	Coffee Gayo Mountain	150	18 Januari 2021	Rp 50,000
6	Coffee Gayo Mountain	250	22 Januari 2021	Rp 145,000

Fig. 23. Report of Sales

Discussions

This testing explains the results of testing using black-box testing. Black box testing itself is a testing method that focuses on the function of the system that has been built (Anwar, Kurniawan, Rahman, & Ani, 2020). The results of system testing using black-box testing can be seen in Table 9 below. Testing is done by testing the usability and functionality of the system by the user. 26 test items were divided into each feature in the InHome Cafe point of sales system, including login, sales, purchase, category data processing, items, products, and users Based on the functionality test results, there was an error in using the data type at the Purchase menu's nominal total price. When the user adds the total nominal price with a negative value, the system still stored the data even though the system should warn that the nominal price cannot be a negative value, as shown in Fig 24-25.

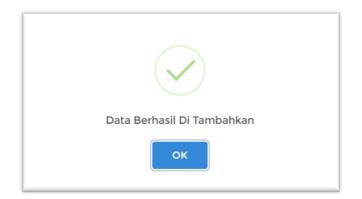Fig. 24. Data Type Error in the 'Total Price' Field

Fig. 25. Feedback System when Inputting Negative Values in the Field 'Total.'

Therefore, in the black box testing process, a system success rate of 96% was obtained, as shown in Table 3.

Table. 3 System Test Results

Testing case	Validity	Number of Validity	System Success Rate
26	Valid	25	96,15%
	Not Valid	1	3,85%

Conclusion

The conclusion from the results of designing, developing, and testing the point of sales system at Inhome Cafe that had been done is as follows:

1. The point of sales system at In Home Café was successfully built using the agile method with black-box testing with a system success rate of 96.15%.

2. The point of sales system has been built following the design of flowcharts, use cases, and sequence diagrams.

3. The functions contained in the point of sales system can run according to the design.

Acknowledgements

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