Jurnal Impresi Indonesia (JII)
Vol. 5, No. 01, Januari 2026
p-ISSN: 2828-1284 e-ISSN: 2810-062x
website: https: //rivierapublishing.id/JII/ index.php / jii /index

Conceptual Design of A Coffee Shop Sales Information System Using the Unified Modeling Language (UML) Approach

Nia Kurniati*, Rachmat Selamat
Sekolah Tinggi Manajemen Informatika dan Komputer LIKMI, Indonesia
Email: nk.nia6188@gmail.com

Keywords
sales information system; coffee shop; UML; conceptual design.

Abstract
The increasing volume and complexity of transactions in coffee shop businesses necessitate a structured, accurate, and informative sales data management system. When sales data are recorded manually or without a well-designed system, businesses face issues such as data inconsistencies, recording errors, delayed reporting, and limited information availability for managerial decision-making. These challenges hinder operational efficiency and reduce business owners' ability to evaluate performance and plan strategic actions. This study aims to develop a conceptual design for a coffee shop sales information system, using sales transaction data as the primary basis for requirements analysis. The research employs a systems analysis and design approach with the Unified Modeling Language (UML) as the primary modeling framework. The design process encompasses several stages: actor identification, functional requirements analysis, use case diagrams and scenarios, activity diagrams, sequence diagrams, and class diagrams. Additionally, the study incorporates conceptual user interface (UI/UX) design to enhance usability and data normalization techniques to ensure data integrity and efficiency. The results yield a comprehensive conceptual design for a sales information system that serves as a blueprint for future development. This design is expected to enable more accurate data management, timely reporting, and improved decision-making in coffee shop operations.

INTRODUCTION

The rapid growth of the coffee shop industry in Indonesia has significantly increased the volume and diversity of daily sales transactions. Coffee shops are no longer limited to selling a single type of beverage but now offer various menu variants, promotional packages, and multiple payment methods such as cash, debit cards, and digital payments (Dhisasmito & Kumar, 2020; Suarez et al., 2017; Tao & Kim, 2022). This development requires business owners to manage transaction data accurately and systematically to support operational control and strategic decision-making (Muhammad Taufik Ridho, 2024; Sanjaya et al., 2025; Yulia & Hernawan, 2021).

Sales transaction data represent a critical asset for coffee shop businesses, as they reflect sales performance, consumer preferences, and financial conditions. However, in many small- and medium-scale coffee shops, transaction data are still recorded manually or using unstructured tools (Djabalul Lael & Pramudito, 2023; Hana Bernika Sabila & Feri Candra, 2023; Risandi et al., 2025; Rizky et al., 2025). Such practices often lead to data redundancy, recording errors, delayed reporting, and difficulties in generating accurate sales information.

As a result, the available data cannot be optimally utilized to support managerial evaluation and business planning.

The complexity of coffee shop sales data generally includes transaction dates and times, product types, payment methods, and transaction values. Without a proper information system design, this data complexity may become a burden rather than a strategic resource. Therefore, a well-structured sales information system is essential to transform raw transaction data into meaningful and reliable information that can support business sustainability.

Before implementing a sales information system, a comprehensive conceptual design is required to ensure that the system aligns with actual business processes and user needs. Conceptual system design serves as a foundation that defines system functionality, data structures, and interactions among system users (Colmenares-Quintero et al., 2024; Sinnaiah et al., 2023). A poorly designed system at the conceptual stage may lead to inefficiencies and system failures during implementation.

The Unified Modeling Language (UML) is widely recognized as an effective approach for conceptual system design due to its ability to visually represent system requirements, workflows, and data relationships in a standardized manner (Feichas & Seabra, 2023; Meziane & Ouerdi, 2022; Noneng et al., 2024; Putra & Andriani, 2019). UML provides various diagrams—such as use case, activity, sequence, and class diagrams—that help system designers and stakeholders achieve a shared understanding of the system to be developed.

The urgency of this research lies in the need to provide a structured, data-driven conceptual design for a coffee shop sales information system that reflects real transaction conditions. Many previous studies focus on system implementation or general design without explicitly using actual sales datasets as the basis for system requirements analysis. This gap may reduce the relevance of the system design to real operational needs.

The novelty of this research is reflected in the use of sales transaction datasets as the primary foundation for conceptual system modeling. By mapping dataset attributes directly into UML diagrams and normalized data structures, this study ensures that the designed system is closely aligned with real business data. This approach strengthens the practical relevance of the conceptual design compared to purely theoretical system modeling.

Based on the above considerations, the objective of this study is to conceptually design a coffee shop sales information system using the Unified Modeling Language (UML) approach. The study aims to identify system actors and functional requirements, develop UML models, and design a normalized data structure supported by conceptual UI/UX design. The expected benefits of this research include academic contributions in the field of information system design and practical benefits as a reference or blueprint for coffee shop owners and system developers in developing an effective, structured sales information system.

RESEARCH METHOD

This research adopted a qualitative approach using systems analysis and design methods, with a primary focus on the conceptual design of a coffee shop sales information system without proceeding to system implementation. The data source used in this study was a coffee shop sales dataset consisting of transaction date, transaction time, beverage product name, payment method (cash or card), and transaction value.

The research was conducted through several structured stages, beginning with an analysis of the sales dataset to understand transaction characteristics, followed by the identification of system actors and functional requirements. Subsequently, the system was modeled using the Unified Modeling Language (UML), including the development of use case, activity, sequence, and class diagrams. The design process was complemented by conceptual UI/UX planning to illustrate user interaction with the system, as well as data normalization to ensure data consistency and minimize redundancy in the proposed data structure.

RESULTS AND DISCUSSION

1. Identify the Actor

Table 1. System Actors

No	Actors	Description
1	Cashier	Record sales transactions
2	Admin	Manage product data and reports
3	Owner	Access sales reports

2. Functional Needs

Table 2. Functional Needs

Code	Description
KF-01	Record sales transactions
KF-02	Manage product data
KF-03	Record payment methods
KF-04	Presenting sales reports
KF-05	Storing transaction data

3. Use Case Diagram

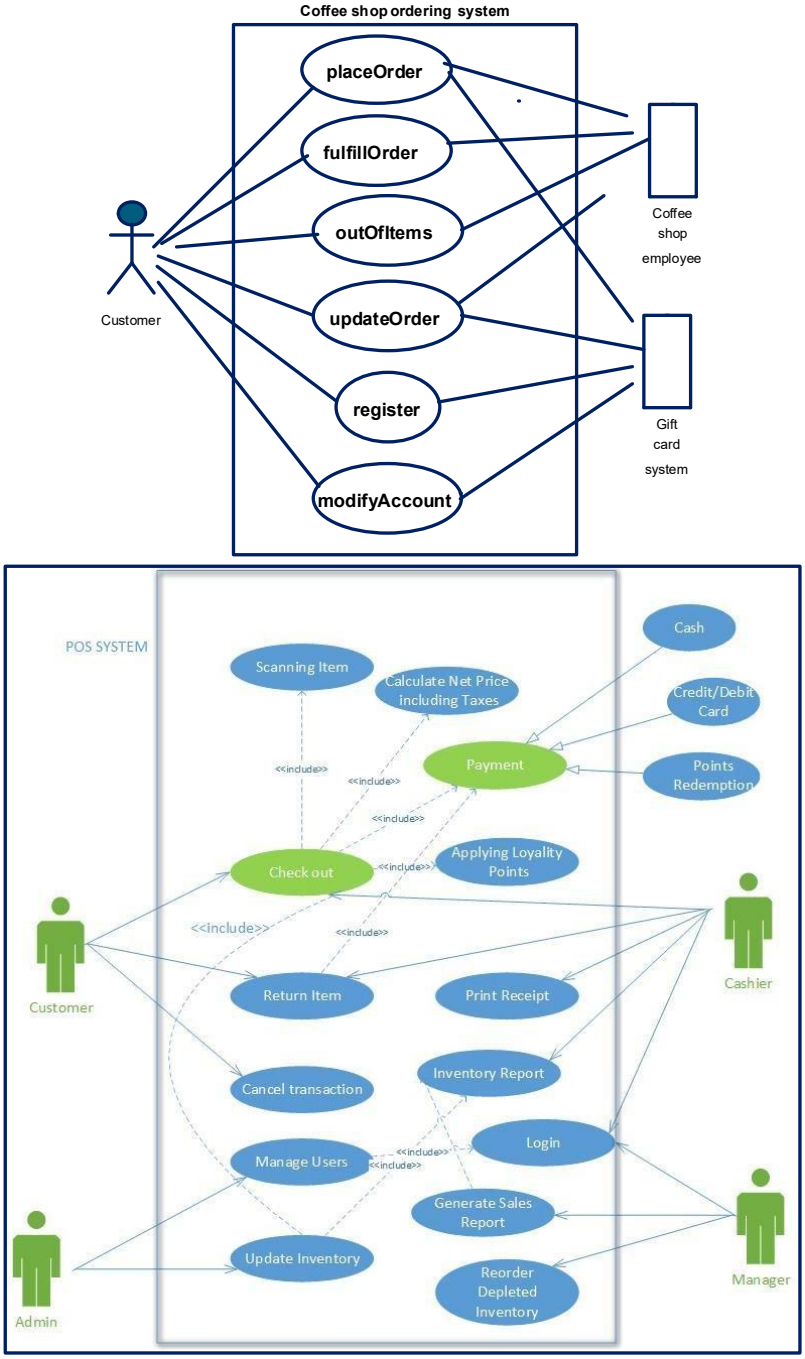


Figure 1Use Case Diagram

Table 3. Use Case List

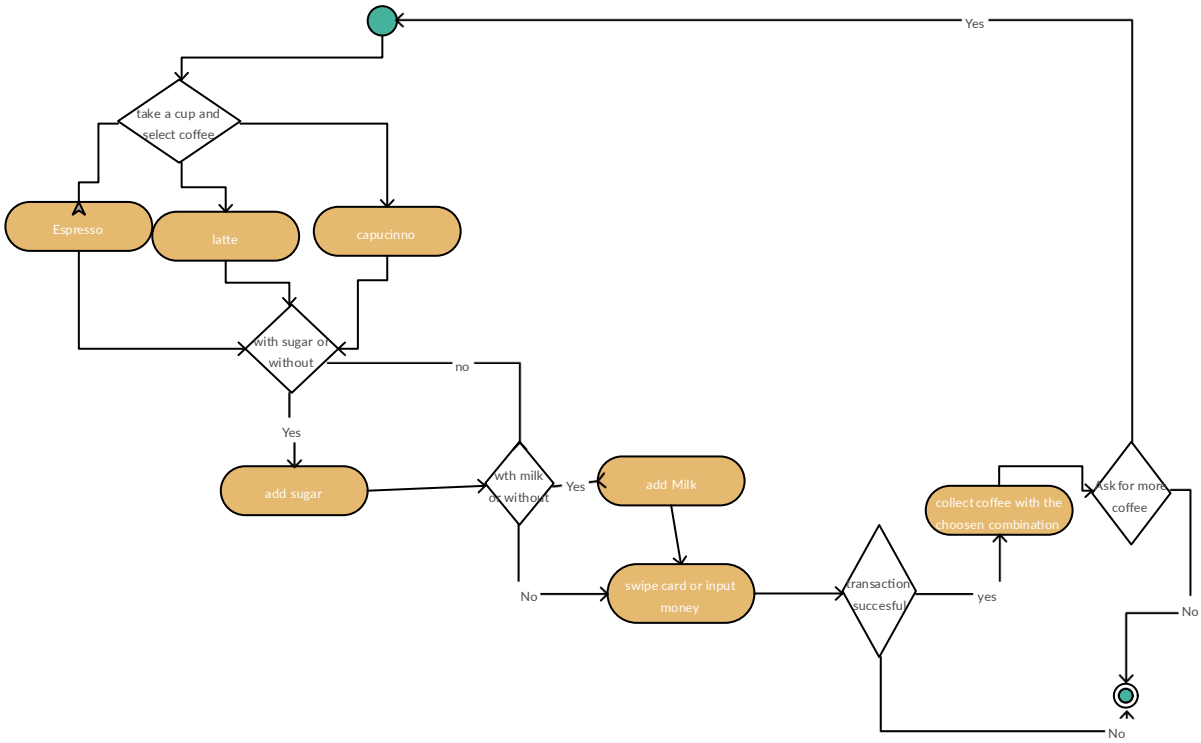
Actors	Use Case
Cashier	Transaction input
Cashier	Choose a payment method
Admin	Manage products
Admin	View report
Owner	Access reports

Use Case Scenario

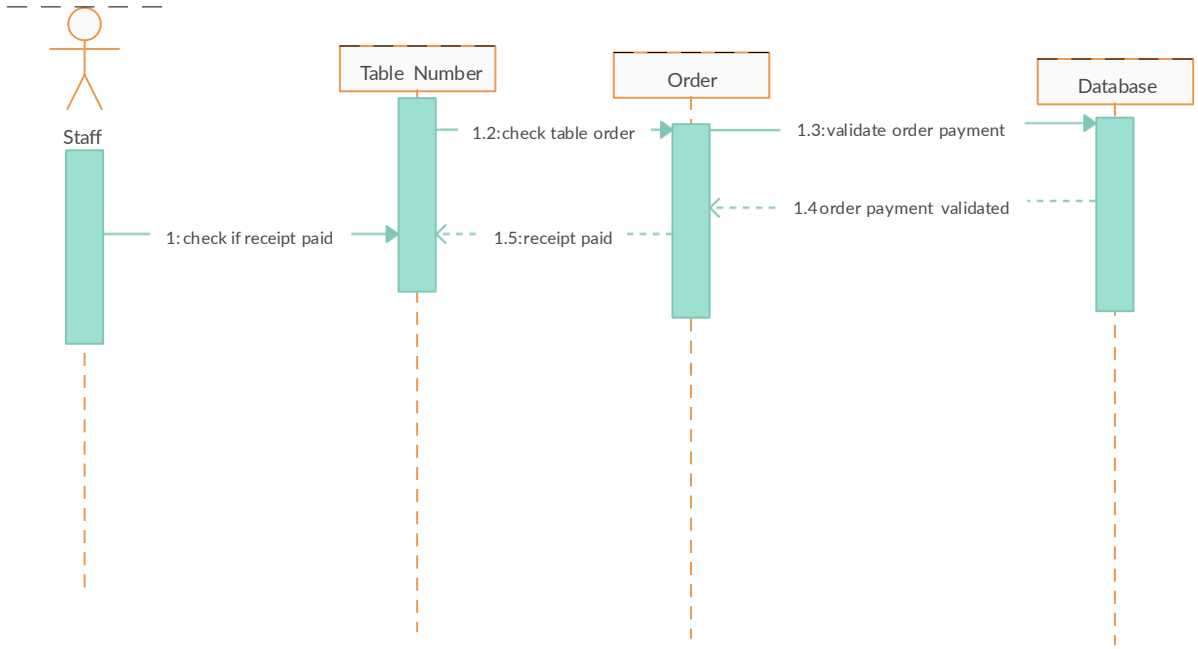
Table 4. Use Case Scenario "Transaction Input"

Elements	Description
Actors	Cashier
Purpose	Record transactions
Prerequisites	Product data available
Main Plot	Select a product → calculate the total → select payment → save
Post-condition	Stored transaction data

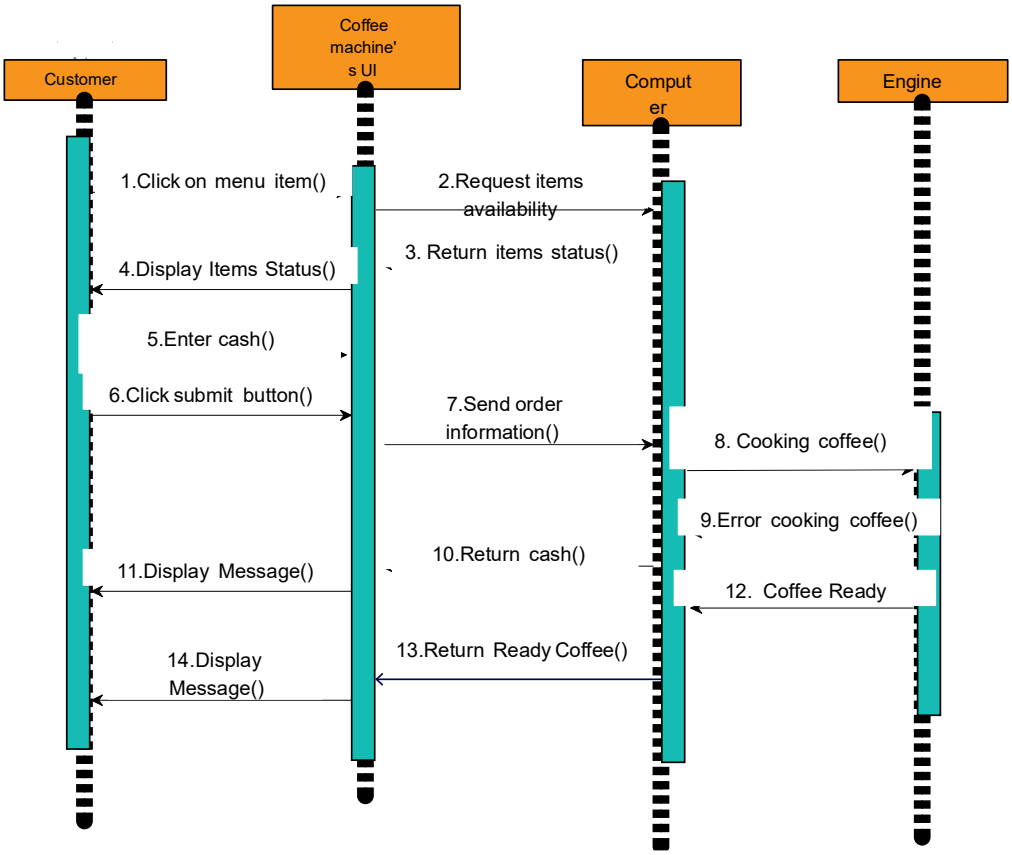
4. Activity Diagram



5. Sequence Diagram



Coffee Machine Sequence Diagram



6. Class Diagram

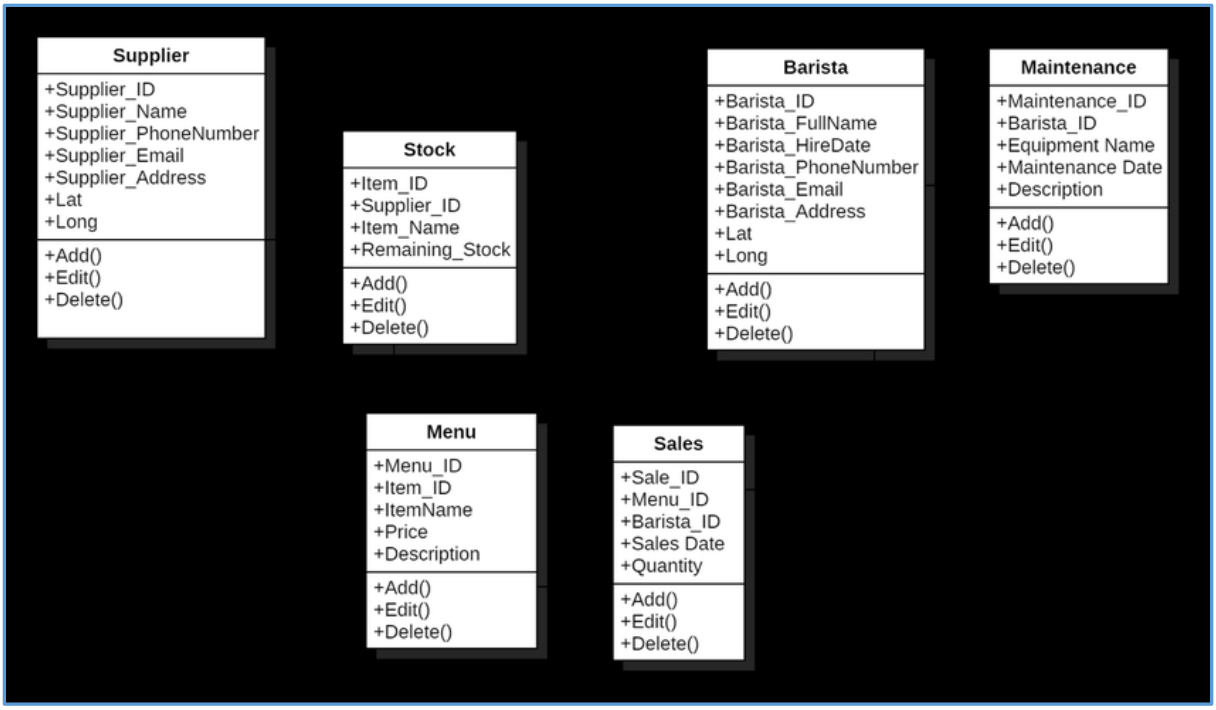


Table 5. Class Structure

Class	Attributes
Transactions	id_transaksi, date, total
Products	id_produk, nama_produk, price
Payment	id_pembayaran, type
Transaction Details	id_detail, qty, subtotal

7. Mapping Dataset → Attribute Class

Table 6. Mapping Datasets to Diagram Classes

Dataset Attributes	Class	Class Attributes
Date	Transactions	Date
Time	Transactions	Time
Coffee_name	Products	Product name
Money	Transactions	Total
Cash_type	Payment	Types

8. Traceability Matrix

Table 7. Traceability

Requirements	Use Case	Class
KF-01	Transaction input	Transactions, Transaction Details
KF-02	Manage products	Products
KF-03	Select payment	Payment
KF-04	View report	Transactions
KF-05	Save data	Transactions

9. UI/UX Design (Conceptual Mockup)

This chapter discusses the results of the conceptual design of a coffee shop sales information system that has been prepared using the Unified Modeling Language (UML) approach. The discussion focused on the relationship between system needs, UML modeling, data structure, and the suitability of the design with the sales dataset used in the research. In addition, in this section, a comparative discussion with several previous relevant studies was also carried out.

1. Suitability of System Needs with Business Processes

The results of the needs analysis show that the main activities in coffee shop operations are centered on recording sales transactions, managing product data, and presenting sales reports. The functional needs formulated in this study are compiled based on the business process flow reflected in the sales dataset, such as daily transactions, beverage product variations, and payment methods used.

The formulation of system requirements departing from actual transaction data provides a solid foundation in the design process. Each functional need is not only theoretical, but represents the real activities that occur in the operation of the coffee shop. Thus, the resulting system design has a high level of relevance to the business context being studied.

2. Discussion of Use Case Modeling and Scenarios

Use case modeling is used to conceptually describe the interaction between actors and systems. In this study, cashier actors play the role of the main users who record transactions, while admin and owner actors play a role in data management and monitoring sales reports. The division of roles of actors reflects the simple organizational structure that is commonly found in small and medium-scale coffee shop businesses.

The use case scenarios that are prepared, especially in the "Transaction Input" use case, provide a detailed overview of the expected flow of interactions in the system. The presentation of use case scenarios helps clarify system limitations and system behavior under normal conditions. This is important to reduce potential differences in interpretation between system designers and users at a later stage of development.

3. Activity Analysis and Sequence Diagram

Activity diagrams are used to describe the overall flow of sales activities, from order receipt to transaction data storage. This diagram shows that the coffee shop sales process is linear with several decision points, especially regarding the choice of payment method. This representation is in line with the characteristics of the sales data used in the research.

Sequence diagrams complement activity diagrams by displaying the sequence of interactions between actors and systems chronologically. Through sequence diagrams, it can be understood how the system receives input from the cashier, processes transaction data, and stores it into the database. The combination of the two diagrams provides a comprehensive picture of the system's behavior from a process and interaction perspective.

4. Discussion of Data Structure and Class Diagrams

The diagram class is designed to reflect the main data structures required in a coffee shop sales information system. Transaction, Product, Payment, and Transaction Detail classes are organized based on the attributes found in the sales dataset. This approach ensures that the

design of the data structure is not speculative, but rather based on data that is actually used in operations.

The data normalization carried out aims to minimize redundancy and maintain data consistency. By separating data into interrelated classes, the designed information system becomes more structured and easy to develop. This data structure also supports the preparation of more accurate sales reports.

5. Design Consistency through Traceability Matrix

The preparation of the traceability matrix is one of the important aspects in ensuring the consistency of system design. The traceability matrix shows a clear relationship between functional needs, use cases, and class diagrams. Every system need can be traced back to the UML model and the data structure that represents it.

In addition, mapping dataset attributes into class attributes strengthens the validity of the system design. The direct relationship between sales data and system models shows that the resulting design is relevant to the research context and can be used as a reference for future system development.

6. Conceptual UI/UX Design Discussion

The design of the user interface (UI/UX) in this study is presented conceptually as a complement to the system design. The cashier interface is designed with a focus on ease of transaction recording and clarity of transaction information, while the admin interface is designed to support the monitoring and management of sales data.

Although it has not yet been implemented, this UI/UX design plays an important role in providing an initial idea of the expected user experience. The preparation of the UI/UX at the conceptual stage helps to ensure that the system developed later is in accordance with the needs and habits of the user.

7. Comparison with Previous Research

The results of this study are in line with the research of Dennis et al. (2018) who stated that information system design using UML can increase the clarity of system needs and data structures. In addition, this study also supports the findings of Haryanto and Nugroho (2020) which emphasize the importance of designing a sales information system for small-scale businesses based on transaction data. The main difference between this study and previous research lies in the use of sales datasets as the basis for conceptual system modeling. Thus, the resulting system design is not only theoretical, but has a direct relationship with real operational data.

CONCLUSION

This study produced a conceptual design for a coffee shop sales information system using the Unified Modeling Language (UML) approach, systematically identifying actors, functional requirements, and modeling use case, activity, sequence, and class diagrams based directly on real sales dataset characteristics—including transaction date, time, product name, payment method, and value—to ensure alignment with operational business processes. The design incorporated data normalization, attribute mapping to class diagrams, and a traceability matrix for internal consistency, providing a reliable blueprint for future development. Although limited to the conceptual stage, future research should advance to full system implementation

and testing for functionality and performance, while exploring non-functional aspects like data security, usability, and sales analytics integration to enhance strategic decision-making for coffee shop owners.

REFERENCES

Colmenares-Quintero, R. F., Baquero-Almazo, M., Kasperczyk, D., Stansfield, K. E., & Colmenares-Quintero, J. C. (2024). Analysis of IoT technologies suitable for remote areas in Colombia: Conceptual design of an IoT system for monitoring and managing distributed energy systems. *Cleaner Engineering and Technology*, *21*. https://doi.org/10.1016/j.clet.2024.100783

Dennis, A., Wixom, B. H., & Roth, R. M. (2018). *Systems analysis and design* (6th ed.). Wiley.

Dhisasmito, P. P., & Kumar, S. (2020). Understanding customer loyalty in the coffee shop industry (A survey in Jakarta, Indonesia). *British Food Journal*, *122*(7). https://doi.org/10.1108/BFJ-10-2019-0763

Djabalul Lael, T. A., & Pramudito, D. A. (2023). Use of Data Mining for The Analysis of Consumer Purchase Patterns with The Fpgrowth Algorithm on Motor Spare Part Sales Transactions Data. *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, *4*(2). https://doi.org/10.34306/itsdi.v4i2.582

Feichas, F. A., & Seabra, R. D. (2023). Evaluation of Perception of Use of a Gamified Platform from the Student Perspective: An Approach for Studying Unified Modeling Language. *Informatics in Education*, *22*(3). https://doi.org/10.15388/infedu.2023.22

Hana Bernika Sabila, & Feri Candra. (2023). Implementation of Apriori Algorithm for Data Mining on Sales Transaction Data. *International Journal of Electrical, Energy and Power System Engineering*, *6*(3). https://doi.org/10.31258/ijeepse.6.3.189-193

Haryanto, T., & Nugroho, A. (2020). Analysis of sales information systems based on transaction data in small and medium enterprises. *Journal of Information Systems, 16*(2), 101–110.

Meziane, H., & Ouerdi, N. (2022). A Study of Modelling IoT Security Systems with Unified Modelling Language (UML). *International Journal of Advanced Computer Science and Applications*, *13*(11). https://doi.org/10.14569/IJACSA.2022.0131130

Muhammad Taufik Ridho. (2024). Pengembangan Aplikasi Pemesanan Makanan Berbasis Web Mobile Menggunakan Metode Prototyping pada KAF Fried Chicken. *Jurnal KomtekInfo*. https://doi.org/10.35134/komtekinfo.v11i4.597

Noneng, M., Kevin, K., Hafiz, N., & Fiqa, K. (2024). Pelatihan Pembuatan UML (Unified Modelling Language) Menggunakan Aplikasi Draw.io Pada Prodi Sistem Informasi Universitas Muhammadiyah Jambi. *Transformasi Masyarakat : Jurnal Inovasi Sosial Dan Pengabdian*, *1*(2).

Putra, D. W. T., & Andriani, R. (2019). Unified Modelling Language (UML) dalam Perancangan Sistem Informasi Permohonan Pembayaran Restitusi SPPD. *Jurnal TeknoIf*, *7*(1). https://doi.org/10.21063/jtif.2019.v7.1.32-39

Risandi, A. P., Hasanah, H., & Oktaviani, I. (2025). Website-Based Sales Transaction Data Monitoring Information System. *Bit-Tech*, *8*(1). https://doi.org/10.32877/bt.v8i1.2679

Rizky, F., Syahra, Y., Winda Nazry, H. S., Halim, J., Niawati Lo, N., Muhammadiyah Sumatera Utara, U., & Trigurna Dharma, S. (2025). Implementation Of Data Mining To

Categorize Daily Sales Transaction Data Using K-Means Clustering. *Proceeding International Seminar on Islamic Studies*, *6*(1).

Sanjaya, L., Yusuf, N. I. F., Izdihar, R. D., As Syahril, S. P., & Hidayah, Y. (2025). Penggunaan Aplikasi Kasir Dalam Mendukung Digitalisasi Transaksi Di Warmindo Bestie. *Jurnal Lentera Akuntansi*, *10*(1). https://doi.org/10.34127/jrakt.v10i1.1551

Sinnaiah, T., Adam, S., & Mahadi, B. (2023). A strategic management process: the role of decision-making style and organisational performance. *Journal of Work-Applied Management*, *15*(1). https://doi.org/10.1108/JWAM-10-2022-0074

Suarez, A. N., Koelenlacay, J., Villanueva, V., Ashley Velasquez, R., Reyes, C., Serrano, V., & Borbon, C. D. (2017). Impacts of Coffee Shop Business to Tourism Industry in Three Cities of Batangas, Philippines. *Journal of Tourism and Hospitality Research*, *14*(1).

Tao, S., & Kim, H. S. (2022). Online customer reviews: insights from the coffee shops industry and the moderating effect of business types. *Tourism Review*, *77*(5). https://doi.org/10.1108/TR-12-2021-0539

Yulia, R., & Hernawan, A. R. (2021). Penerapan System Development Life Cycle Dalam Aplikasi Pemesanan Lapangan Futsal Berbasis Web. *Reputasi: Jurnal Rekayasa Perangkat Lunak*, *2*(2). https://doi.org/10.31294/reputasi.v2i2.750