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Redesign of the airport train ticketing vending machine (TVM) system at commuter train

Enda Wista Sinuraya [1*], Denis [2], Ajub Ajulian [3], Yosua Alvin Adi Sutrisno [4]
[1-4] Department of Electrical Engineering, Diponegoro University, Semarang, Indonesia

* Corresponding Author: **Enda Wista Sinuraya**

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Abstract
PT Kereta Commuter Indonesia (KCI) is one of the companies operating in the field of commuter train and local train services under the Indonesian Railways (KAI) company as a provider of transportation facilities for the community located in the Pasar Baru area, Sawah Besar District, Central Jakarta. Purchasing a ticket is one of the most important elements in a passenger's travel experience. However, problems are often found in the form of long ticket queues due to limited facilities and infrastructure, which is one of the main reasons for PT Railink to develop a system in the form of a Ticketing Vending Machine (TVM) which was later adopted by PT KCI to facilitate the passenger experience in buying tickets. The occurrence of operational transfers without system documentation resulted in the obstruction of the process of integrating the KAI Airport system with the KCI Jabodetabek network. In practical work for 30 days, the author was assigned to create a documentation design for the Ticketing Vending Machine (TVM) system to assist PT KCI in continuing the system integration process. The author conducted trials by directly simulating the system to understand the system workflow and conditions in the field. From the trials carried out, the author was able to visualize system documentation by analyzing functional and non-functional requirements, designing use cases, activity, sequence, and class diagrams, and redesigning a new prototype of the system. From this practical work, the author also discovered several things such as differences in the ordering flow of the old system and the new system, passengers being able to reprint tickets repeatedly, and the addition of a rescheduling feature for tickets that passengers have ordered.

Keywords: Development of system documentation, System Redesign, Ticket Vending Machine, Soekarno-Hatta Airport Railway, Draw.io, Figma

1. Introduction

Transportation is a means that plays a role in human life, both for continued interaction between humans, and as a tool to make it easier for humans to move goods from one place to another. [1] As the population grows, the need for efficient and reliable transportation systems increases.

One means of transportation that has been around for a long time is the train. In Indonesia itself, trains are operated by PT Kereta Api Indonesia (Persero). As time and technology develop, PT Kereta Api Indonesia (Persero) continues to innovate with the aim of meeting its customers' expectations. In this modern era, for example, PT Kereta Api Indonesia (Persero) collaborates with PT Angkasa Pura II (Persero) to establish a subsidiary called PT Railink. Since its inception, PT Railink has provided services in the form of airport train operations. However, at the beginning of 2023, PT Railink has handed over the operations of the Soekarno-Hatta Airport Train to PT Kereta Commuter Indonesia (KCI). This operational transfer was said by the Managing Director of PT Railink [2] so that it could be better integrated with the Jabodetabek Commuter Line train network.

One important element in the train travel experience is the ticket purchasing system. In an effort to increase efficiency and passenger comfort, PT Railink has adopted a TVM (Ticketing Vending Machine) system at their airport train stations.

One of the problems faced in the operational transfer process was the unavailability of system documentation. Moreover, the aim of this operational transfer is intended as a step to integrate the system on the Soekarno-Hatta Airport Railway with the Jabodetabek Commuter Line train network. Therefore, a documentation system is needed that can make it easier for PT Kereta Commuter Indonesia to realize this goal.

For approximately 1 month, the author carried out practical work at PT Kereta Commuter Indonesia. The author was responsible for creating documentation for the Soekarno-Hatta Airport Train TVM system. This system documentation was created with the aim of enabling PT KCI to integrate the entire Jabodetabek Commuter Line train network system. Apart from creating system documentation, related to the trade mark and identity owned by a company, PT KCI also assigned a writer to redesign the appearance of the Ticket Vending Machine.

2. Research Methods

2.1 Use case Diagram

The first stage in preparing this system is creating a Use case diagram. A use case diagram is a visual representation of interactions between actors and a system that depicts use cases or situations in which users interact with the system to achieve certain goals. In this diagram, use cases (actions or interactions) are linked to actors via arrow lines, illustrating how actors interact with system features. Use case diagrams help in depicting system functionality with different usage scenarios. In this way, use cases can be presented in a simple sequence that is easy for system users to understand.

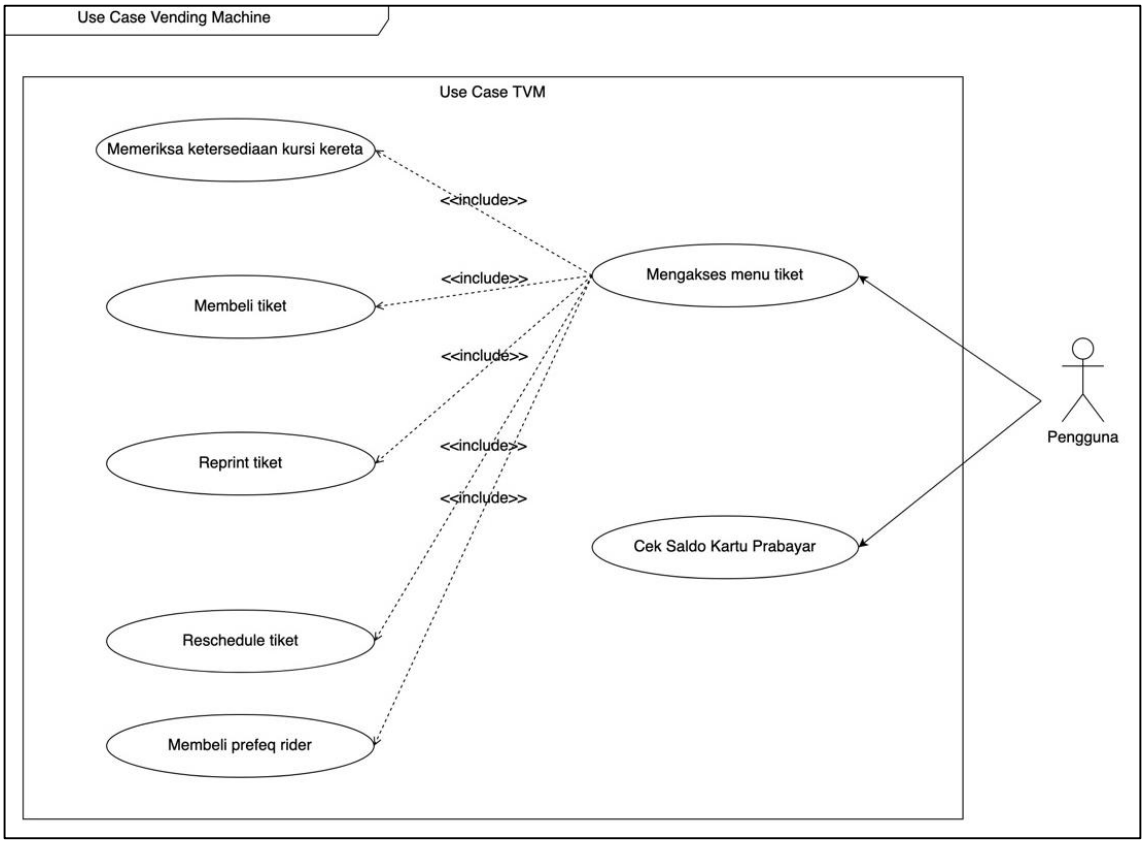

Fig 1: Use Case Diagram Ticket Vending Machine

Based on this diagram, you can see the actor's interaction with the system. From this use case there is 1 actor, namely the user, with 6 scenarios that can be carried out. In this case, users can check prepaid card balances, check seat availability, purchase tickets, reprint tickets, reschedule ticket schedules, and can purchase tickets for perfeq rider trips. The system created in this use case diagram will be used to create further diagrams to facilitate system development.

2.2. Activity Diagram

The second stage in preparing this system is creating an activity diagram. In the book Software Engineering by Fitria Nur Hasanah, it is explained that activity diagrams describe various activity flows in the system being designed, how each flow begins, the decisions that may occur, and how they end. In preparing this automatic ticket machine system, there are 6 activity diagrams. However, in this paper the author will only show the ticket purchase flow.

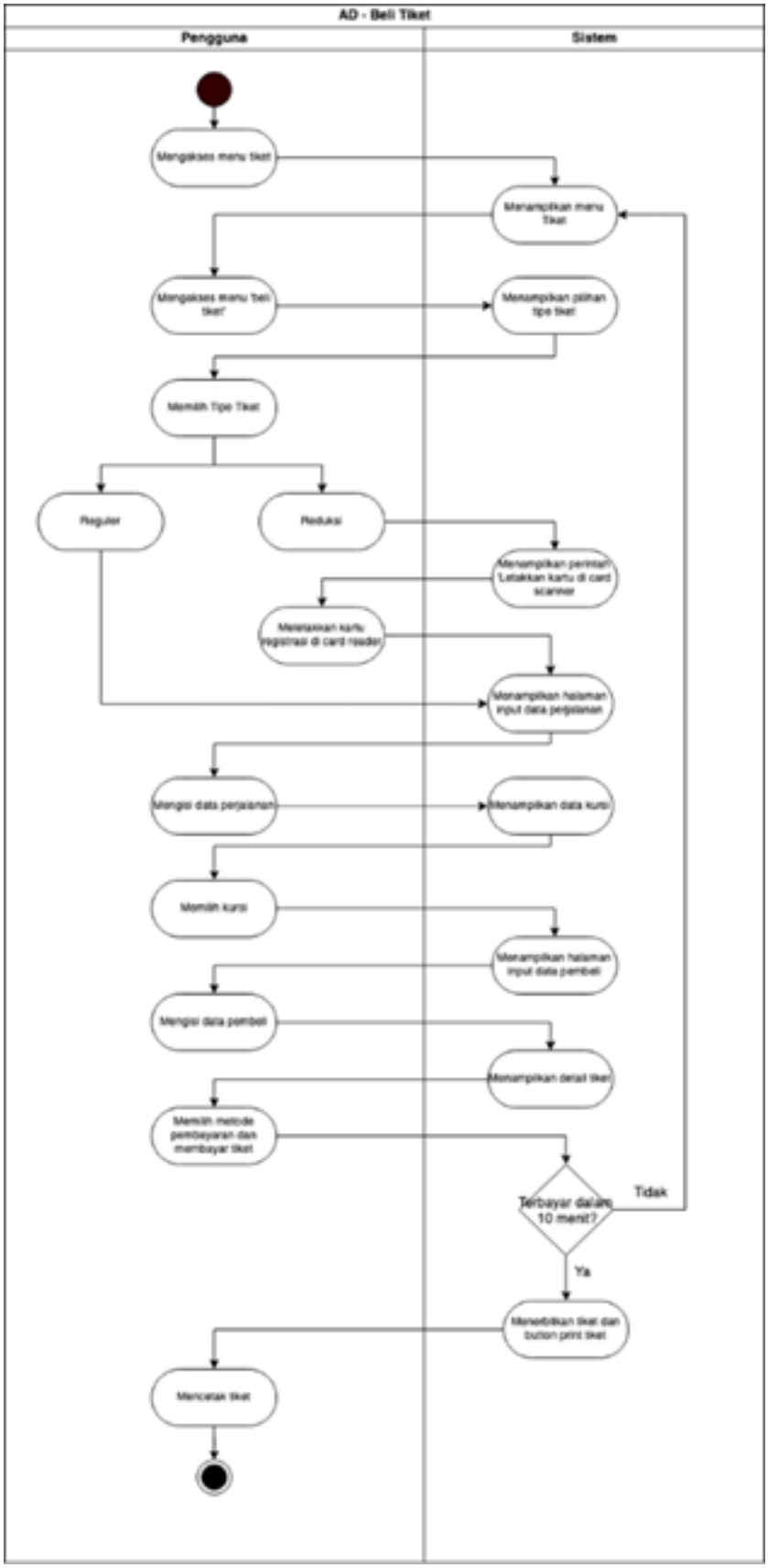

Fig 2: Activity Diagram to buy tickets

The Buy Ticket scenario starts with the user accessing the 'Tickets' menu. Then the system will display the 'Ticket' menu. The user then accesses the 'Buy Ticket' menu and the system will display a choice of ticket types. After that, the user chooses the ticket type between reduced and regular. If the user selects the reduced ticket type, the system will first display the command 'Place card on card scanner'. Then the user places the registration card on the card scanner and the system will display a travel data input page. The user then fills in the trip data and after that, the system will display the seat data and the user will select a seat. After that, the system will display the buyer data input page and the user will fill in

the buyer data. Then the system will respond by displaying the ticket details. The buyer will then select a payment method and pay for the ticket. The ticket details will also include the ticket payment method. The buyer will then select a payment method and pay for the ticket. If the payment is successful within 10 minutes, the system will issue a ticket and a print ticket button and if it is not paid within 10 minutes, the system will return to the 'Ticket' menu page. After the user presses the print ticket button, the ticket will be printed.

Then, if the user chooses the regular ticket type, the system will immediately direct the user to the travel data input page. After that, the user will fill in travel data and after pressing the search ticket button, the system will display seat data and the user will select a seat. After that, the system will display the buyer data input page and the user will fill in the buyer data. Then the system will respond by displaying the ticket details. The ticket details will also include the ticket payment method. The buyer will then select a payment method and pay for the ticket. If payment is successful within 10 minutes, the system will issue a ticket and a print ticket button and if it is not paid within 10 minutes, the system will return to the 'Ticket' menu page. After the user presses the print ticket button, the ticket will be printed.

2.3 Sequence Diagram

Sequence diagrams are a type of interaction diagram in software engineering, using vertical lines as "lifelines" for each object, these diagrams depict method calls, message communication, state changes, and logic fragments such as branching and looping, helping in modeling and understanding complex interactions in a system or process. Just like the activity diagram, in this sequence diagram there are also 6 activity scenarios that can be carried out by the user. However, in this paper the author will only show the ticket purchase flow.

The ticket purchase flow is divided into two types, namely to purchase regular and reduced tickets. This scenario starts with the user selecting the 'Tickets' menu which then sends a request to the system to display the menu. After that, the user accesses the 'Buy Ticket' menu and requests the system to display the Select Ticket Type page. The first discussion is when the user selects the reduction type and sends a request to the system to display the 'Put Card on Reader' command. After that, the user places the card in the card reader and requests the system to display the Travel Data Input page. Users fill in travel data and send seat data requests to the system and database. After that, the user selects a seat and sends a system request to display the buyer data input page. Users fill in buyer data and request ticket details. User makes payment. If it is paid within 10 minutes, the system will issue a ticket and print button and if not, the system will display a ticket menu. The Sequence Diagram of buying a reduction ticket is depicted as follows.

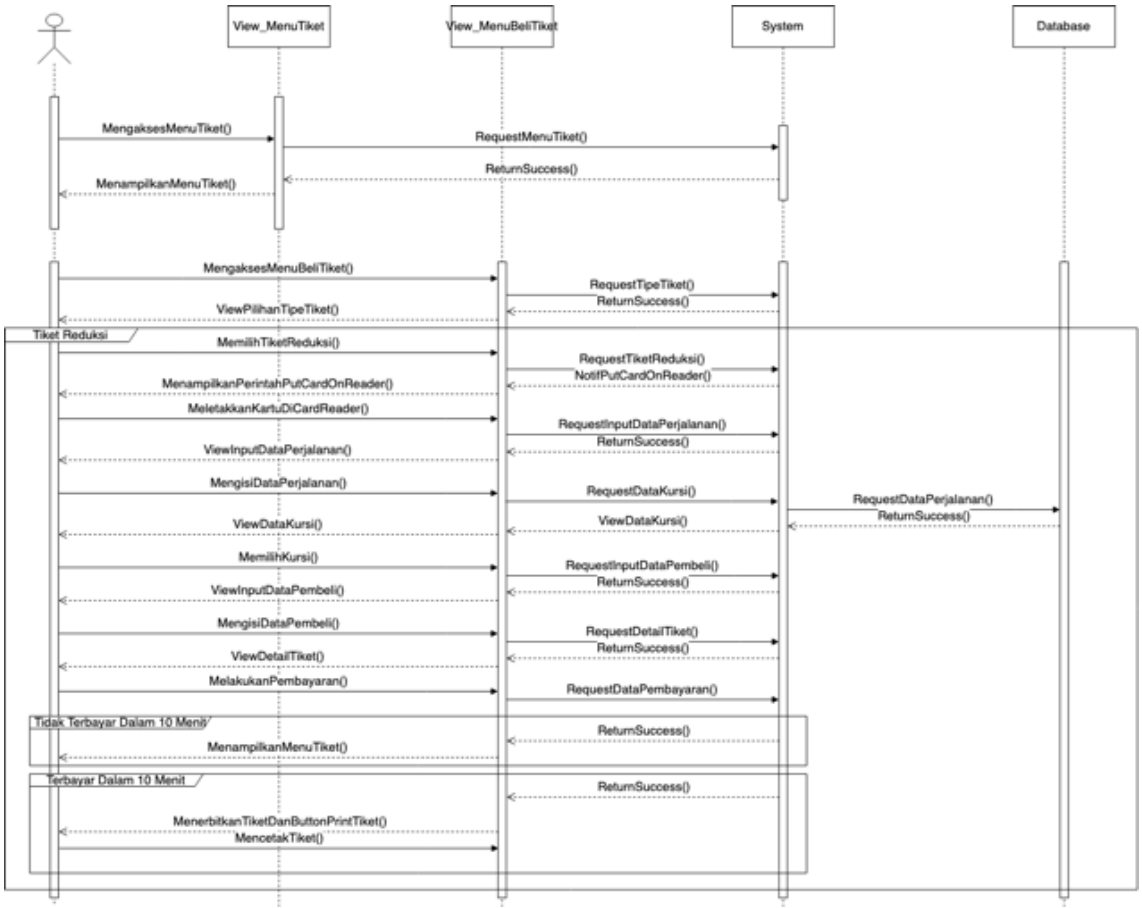

Fig 3: Sequence Diagram to buy tickets

2.4 Class Diagram

Markup Analysis of class diagram formation is the beginning of designing a program. Domain modeling itself is a way to identify objects in nouns in the list of requirements that are classified in the same problem domain area to be used as candidate classes in the class diagram.

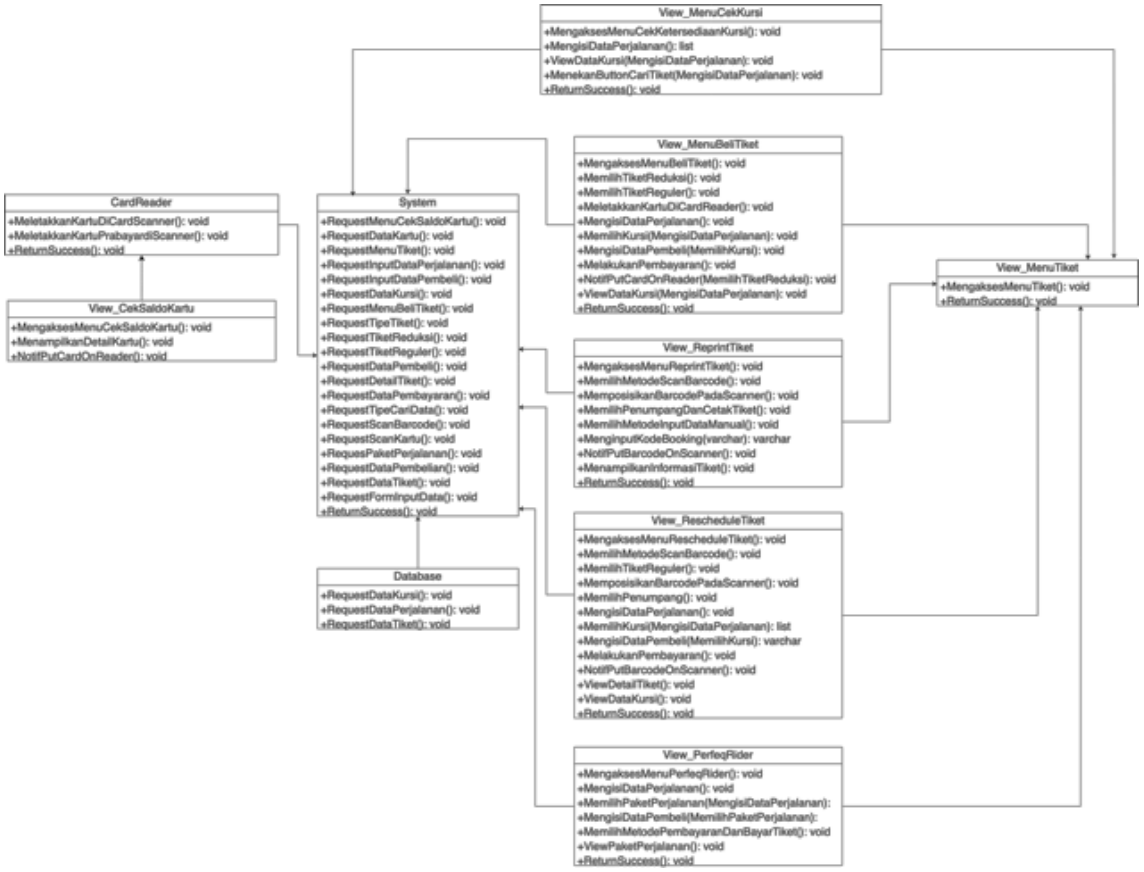

Fig 4: Class Diagram TVM system

The diagram explains the class diagram which is the database architecture of the system to be designed. There are six tables as database tables for the website. These six tables contain scenarios that users can carry out.

3. Results and Analysis

The ticket menu page will be displayed when the user presses the 'Ticket' button on the desktop page. On the ticket menu page a submenu will be displayed that users can access. These submenus include checking seat availability, buying tickets, reprinting tickets, rescheduling tickets, and perfeq rider. If the button from this submenu is pressed, it will immediately direct the user to the related page. If the user wants to buy a ticket, the user must press the Buy Ticket button.

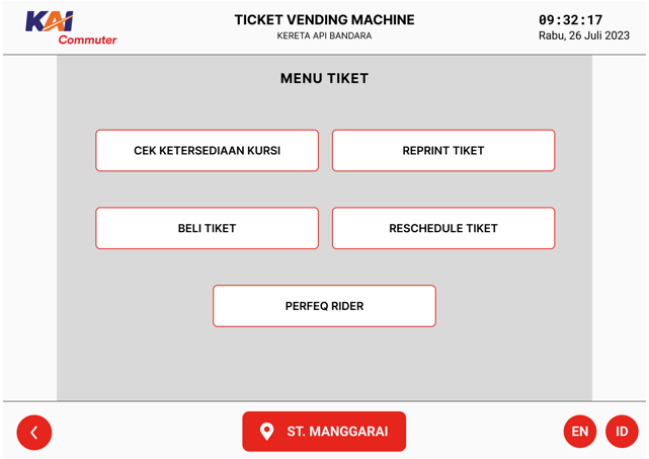

Fig 5: High-Fidelity ticket menu

This page will be displayed when the user presses the 'Buy Ticket' button on the previous ticket menu page. In this sub menu, the user first selects the type of ticket, namely between regular tickets and reduced tickets. If the user chooses the reduced ticket type, the user will be directed to the registration card scan page as in Figure 5, but if the user chooses the regular ticket type, the user will be immediately directed to the page for filling in travel data as in Figure 6.

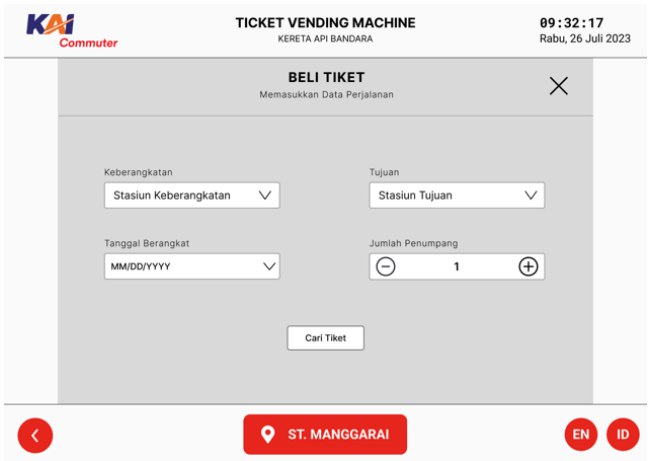

Fig 6: High-Fidelity Travel Data Input

After that, the user presses the 'Select Payment Method' button and the system will direct the user to the ticket details page as in Figure 7. Then, the user chooses a payment method. There are 4 methods available to make payments. Ticket payments can be made, among others, by debit/credit/direct debit, prepaid card, QRIS, and ATM. If the ticket is paid within 10 minutes, the system will continue the display to the ticket print page as in Figure 7 below.

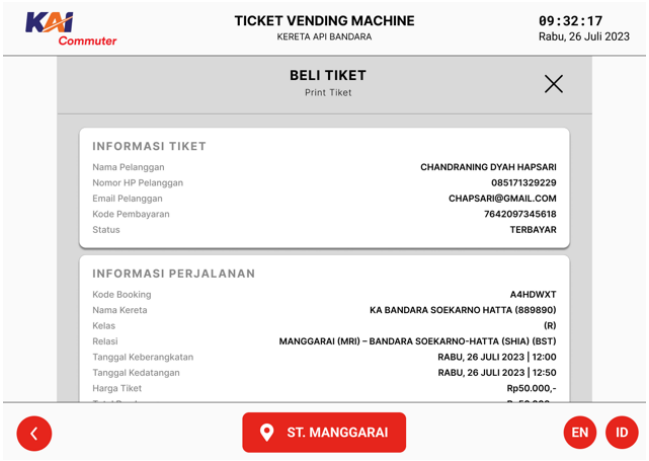

Fig 7: High-Fidelity Print Tickets

4. Conclusion

The background to the design of the Ticket Vending Machine system was PT Railink, which did not yet have TVM system documentation. The output of this system design itself is a system design in the form of use case diagrams, activity diagrams, sequence diagrams, and class diagrams. The redesign of the Ticket Vending Machine has been created using the figma application with the output in the form of an image design. In this redesign, the author describes 45 different display frames, including the desktop menu display, the check prepaid card balance menu display, the check seat availability menu display, the buy ticket menu display, the ticket reprint menu display, the ticket reschedule menu display, the perfeq rider menu display. User-interface analysis is created to help designers of a system understand user behavior and preferences. User-interface analysis of Ticket Vending Machine use has an output in the form of a prototyping scheme for using TVM.

5. References

1. TB Kurniawan. Perancangan Sistem Aplikasi Pemesanan Makanan dan Minuman pada Cafetaria No Caffe Di Tanjung Balai Karimun Menggunakan Bahasa Pemograman PHP dan MySQL, Jurnal TIKAR. 2020; 1(2):192-206.
2. A Safitri dan SP Julia. Perancangan Sistem Informasi Penggajian (SIPEGA) Pada PT. PBI Kota Bengkulu, Jurnal Teknosia. 2023; 17(1):26-37.
3. S Fatimah. Pengantar Transportasi, Ponorogo: Myria Pulisher, 2019.
4. Siti. Analisis kepuasan penggunaan aplikasi kai access dalam melakukan pembelian dan pembatalan tiket kereta API (Studi Kasus pada PT. Kereta Api Indonesia Daop 4 Semarang), 2021.
5. E Hendrawan, M Meisel, DN Sari. Analysis and Implementation of Computer Network Systems Using Software Draw.io, Asia Information System Journal. 2023; 2(1):9-15.
6. ZFF Putra, H Ajie, IA Safitri. Designing A User Interface and User Experience from Piring Makanku Application by Using Figma Application for Teens, International Journal of Information System & Technology, 2021, 5(3).
7. FE Sandnes, HL Jian, YP Huang, YM Huang. User Interface Design for Public Kiosks: An Evaluation of the Taiwan High Speed Rail Ticket Vending Machine, Journal of Information Science and Engineering. 2010; 26:307-321.