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# Development of an E-Ticketing Information System for the Palembang LRT Based on a Mobile Website

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## Abstract

The Light Rail Transit (LRT) system in Palembang serves as a major public transportation mode that operates on elevated railways to ensure efficient and modern urban transit. However, the existing ticketing process still relies on cash transactions and member cards, and ticket sales are conducted conventionally without optimal utilization of digital information systems. This approach forces passengers to visit stations physically to purchase tickets and check departure schedules, which is inefficient and time-consuming. This study aims to design and develop an online e-ticketing information system for the Palembang LRT using the System Development Life Cycle (SDLC) methodology. The proposed system enables passengers to book tickets and access real-time departure information through a mobile-based website. The implementation of this e-ticketing system provides greater convenience, reduces queues at ticket counters, and supports the government's efforts to promote digital transformation in public services.

## Keywords

Light Rail Transit, E-Ticketing System, Mobile Website, System Development Life Cycle

## Article History

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## Introduction

The rapid advancement of Information and Communication Technology (ICT) has profoundly reshaped human activities in almost every sector, including business, education, health, government, and transportation. Since the development of the World Wide Web (WWW) by CERN in 1992, the Internet has revolutionized the global landscape of communication and data exchange (Laudon, 2000). ICT innovations have accelerated the digital transformation process, enabling real-time connectivity, enhancing service delivery, and supporting the creation of smarter and more responsive systems. In this context, the integration of ICT in public transportation has become an essential step toward improving efficiency, sustainability, and user experience.

The development of digital platforms has enabled organizations to process information and transactions more efficiently. In the transportation sector, this transformation is reflected in the widespread adoption of electronic payment systems, mobile ticketing, and integrated travel applications that simplify passenger interaction. The availability of digital ticketing platforms not only supports operational efficiency but also enhances transparency, accountability, and data-driven decision-making. These technologies also align with broader government agendas promoting smart city development, environmental sustainability, and inclusive public services.

Within the Indonesian context, the Palembang Light Rail Transit (LRT) system stands as a pioneering initiative in urban mass transportation. Launched to support the 2018 Asian Games and to address traffic congestion in Palembang, the LRT embodies the government's commitment to developing modern, eco-friendly public transport infrastructure. Despite its potential, however, the operational model of the Palembang LRT has not yet fully embraced digital integration—particularly in its ticketing system. Ticket purchasing still relies heavily on manual processes involving cash payments and physical membership cards, which limits convenience and accessibility for passengers.

According to data from the Public Relations Division of PT Kereta Api Indonesia (KAI) Divre III Palembang, the current daily passenger volume averages approximately 360 people, a sharp decline compared to pre-pandemic figures of around 3,000 passengers per day. This drastic reduction highlights a mismatch between infrastructure capacity and service utilization. Several factors contribute to this decline, including limited digital access to ticket sales, the absence of online reservation options, and the inconvenience of on-site transactions. These challenges suggest that operational inefficiencies and outdated service mechanisms may hinder the public's interest in using the LRT as a primary mode of transportation.

The absence of an integrated e-ticketing information system has created service bottlenecks in several areas. Passengers are still required to visit stations physically to purchase tickets, confirm schedules, or check fare information—processes that are time-consuming and impractical in a digitally connected society. Moreover, the lack of a mobile-friendly platform reduces the ability to attract younger, tech-oriented passengers who expect seamless digital experiences. The implementation of a web-based or mobile-based e-ticketing system can overcome these barriers by providing flexibility, real-time data access, and operational transparency. In addition, such a system can support better resource allocation, reduce paper-based ticketing costs, and contribute to environmentally sustainable transportation practices.

In response to these challenges, this study aims to develop a mobile web-based e-ticketing system for the Palembang LRT, utilizing the System Development Life Cycle (SDLC) approach as a methodological framework. The SDLC model offers a structured process for

system development, encompassing requirement analysis, design, implementation, testing, and maintenance stages. Through this approach, the study seeks to design an information system that enhances operational efficiency, streamlines passenger transactions, and improves overall service quality. The final objective is to create a digitally integrated ticketing solution that aligns with the vision of smart urban mobility and strengthens the role of ICT in advancing Indonesia's public transportation ecosystem.

## Methodology

### *Data Collection Methods*

The following methods were used to gather relevant data for the system development process:

1. Observation – Direct observation was conducted at LRT stations to examine the operational workflow, identify user needs, and analyze existing limitations.
2. Interviews – Structured interviews with administrative staff and passengers were carried out to understand user experiences and expectations regarding e-ticketing.
3. Literature Review – Journals, textbooks, and prior studies related to e-ticketing systems and transportation management were reviewed to establish the theoretical foundation.
4. Documentation – Official documents, operational data, and visual materials were collected to support system analysis and design accuracy.

### *System Development Approach*

The System Development Life Cycle (SDLC) method was employed for system creation, consisting of the following seven phases:

1. Project Identification and Selection – Identifying the need for a digital ticketing solution based on field observations and problem analysis.
2. Project Initiation and Planning – Outlining project goals, technical specifications, and implementation schedules.
3. Analysis – Determining user requirements and mapping the workflow of the existing ticketing system.
4. Logical Design – Creating system models using Unified Modeling Language (UML), including use case diagrams and flowcharts.
5. Physical Design – Translating logical models into executable database structures and user interface components.
6. Implementation – Developing the system using PHP and MySQL, followed by testing and deployment.
7. Maintenance – Monitoring, correcting, and upgrading the system as needed.


Figure 1. SDLC Phases for System Development
(Source: Adapted from Salamadian.com)

***Database Design***

The database design followed a structured three-stage process to ensure data normalization and efficient management:

1. Conceptual Design – Identification of entities, attributes, and relationships, including the definition of primary keys and foreign keys.
2. Logical Design – Construction of an Entity-Relationship Diagram (ERD) and normalization to eliminate redundancy.
3. Physical Design – Conversion of the ERD into relational database tables for implementation in the MySQL DBMS.

***System Testing***

Testing was conducted using the Blackbox Testing technique, focusing on input-output validation and functional performance. This approach does not require source code analysis and ensures that all user-facing features operate correctly. The main benefits include:

1. Ensuring that the system meets all specified user requirements.
2. Identifying any missing functionalities or interface inconsistencies.
3. Validating operational performance from an end-user perspective.

## Results

### System Requirements Planning

Based on field analysis, the developed system was designed to manage essential operations such as ticket reservations, passenger data recording, and train schedule information. The e-ticketing platform allows users to conduct transactions online without physically visiting the station.

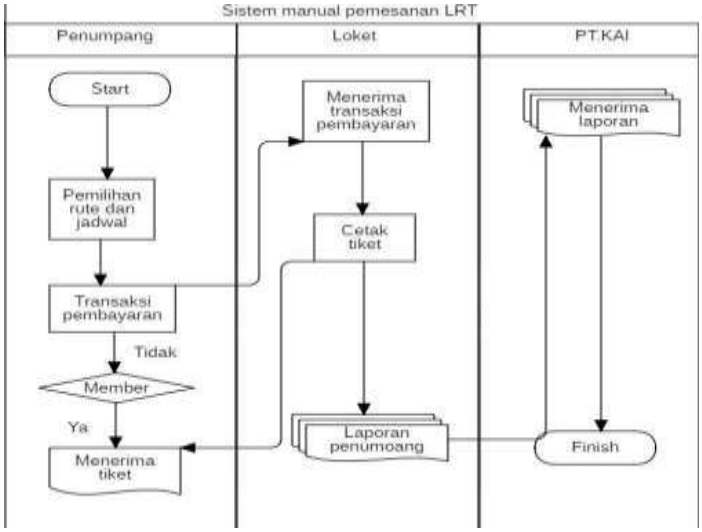


Figure 2. Flowchart of the Existing System

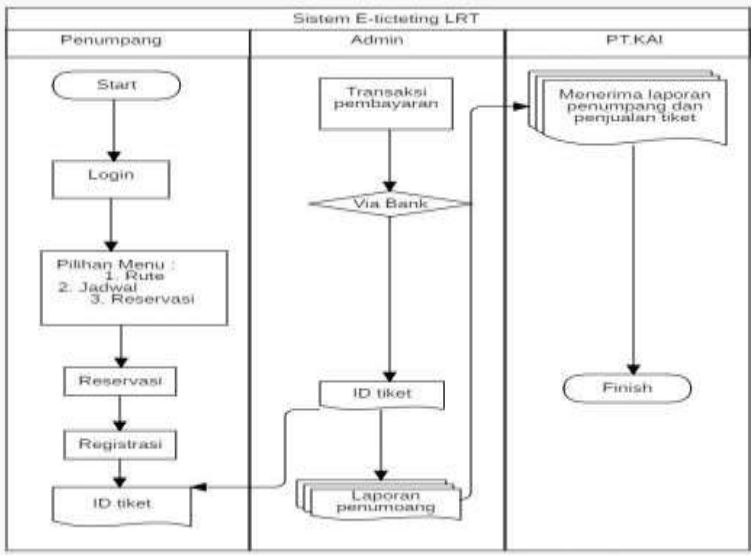


Figure 3. Flowchart of the Proposed System

**Use Case Diagram**

The Use Case Diagram visualizes the interactions between the system and its actors (Admin, Manager, and Passenger), representing user access rights and functions.

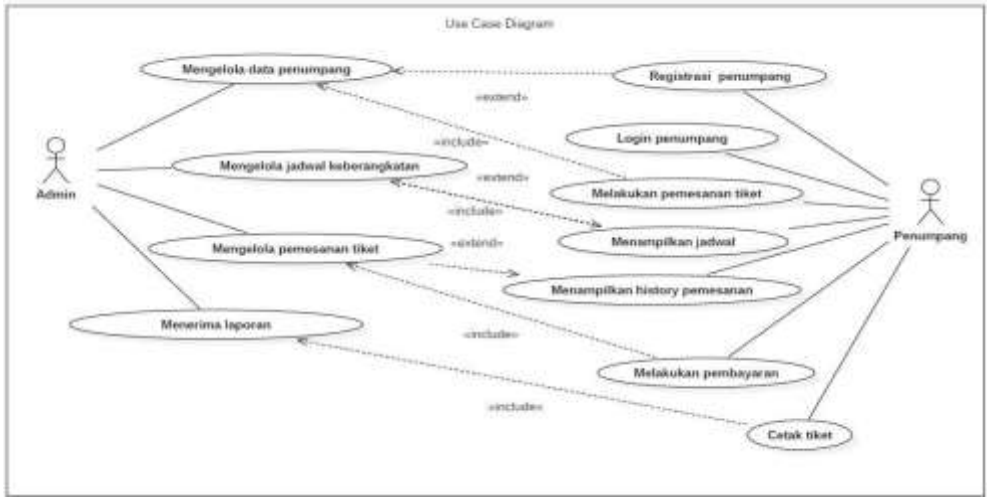


Figure 4. Use Case Diagram of the E-Ticketing System

### System Interface

The system was built as a mobile-friendly web application with interfaces designed for both passengers and administrators.

1. Passenger Login Page – Users log in with a registered account to access the ticketing dashboard.
2. Ticket Booking Page – Allows passengers to select departure schedules and confirm ticket orders.
3. Departure Schedule Page – Displays train departure times and routes, updated in real-time.

### Discussion

The development of the e-ticketing information system for the Palembang Light Rail Transit (LRT) highlights the strategic importance of integrating digital technology into public transportation management. In an increasingly connected society, the shift from conventional ticketing toward mobile web-based solutions represents a crucial step in modernizing service delivery. The system developed in this study not only digitizes the ticket-purchasing process but also redefines how passengers, administrators, and managers interact with transportation data. As emphasized by Laudon (2000), the effective use of information systems enhances efficiency, accuracy, and transparency in decision-making processes—principles that are clearly demonstrated through this implementation.

The introduction of a mobile web-based e-ticketing platform allows for faster and more convenient transactions, significantly reducing passenger dependency on physical ticket counters. By enabling online access, users can purchase tickets, check schedules, and monitor train availability anytime and anywhere, which aligns with modern public expectations for on-demand mobility services. This shift contributes to improved service accessibility, particularly for digital-native users who rely on smartphones as their primary tool for navigation and

payment. Additionally, it reduces queuing times at stations and supports social distancing protocols—an operational improvement that became particularly relevant during and after the COVID-19 pandemic.

From a system architecture perspective, the implementation of multi-user functionality—comprising administrator, passenger, and manager access—represents a robust design choice that ensures scalability and transparency. Administrators are able to manage operational data such as train schedules, routes, and ticket availability, while passengers can autonomously access real-time information and perform self-service transactions. Meanwhile, managers can generate analytical reports that support performance monitoring, demand forecasting, and policy formulation. This division of access and responsibility fosters data integrity and minimizes errors or duplication across the system. It also demonstrates how effective database design can enhance coordination among multiple stakeholders within the transportation ecosystem.

The results from system testing and validation confirm that all developed functionalities operated correctly and met user expectations. The testing phase, conducted using a black-box testing method within the SDLC framework, verified that system modules—including login authentication, schedule management, ticket purchase, and reporting—functioned seamlessly under real conditions. The user acceptance evaluation also indicated a high level of satisfaction, particularly regarding interface usability, response speed, and transaction reliability. These findings validate the system's technical feasibility and its readiness for real-world deployment in the Palembang LRT network.

Beyond technical success, the implementation of this e-ticketing system carries broader organizational and societal implications. For PT KAI Divre III Palembang, digitalization supports more efficient operational management through automated data recording and centralized reporting. It enhances transparency in financial transactions, reduces human error, and allows better monitoring of passenger flow. On a societal level, digital ticketing promotes the adoption of environmentally sustainable practices by reducing paper usage and encouraging a shift toward cashless mobility ecosystems. Moreover, it strengthens public trust in government-led infrastructure projects by demonstrating a tangible improvement in service quality and user experience.

In conclusion, the successful development and testing of the Palembang LRT e-ticketing system affirm that digital transformation in transportation is both feasible and beneficial when guided by structured methodologies such as the System Development Life Cycle (SDLC). The system effectively integrates operational efficiency with user-centered design, contributing to the broader goals of smart mobility and sustainable urban development. Future enhancements may include integration with national e-payment gateways, implementation of QR-based ticket validation, and data analytics features to support demand forecasting. These extensions would further solidify the role of ICT as a key enabler of innovation and service excellence in Indonesia's public transportation sector.

## Conclusion and Recommendations

This study successfully designed and developed a mobile web-based e-ticketing information system for the Palembang LRT using the SDLC approach. Based on the results of analysis, design, and testing, several conclusions can be drawn: The e-ticketing system streamlines ticket purchasing and improves passenger accessibility. The system integrates key functions, including user registration, ticket booking, and schedule management. System development using PHP and MySQL provides reliable

data storage and efficient web access .The SDLC method ensures structured development, from problem identification to maintenance. The platform enhances operational efficiency, reduces queue times, and supports digital transformation in Palembang's public transportation services.

## Disclosure Statement

The authors declare no conflict of interest. The research was conducted solely for academic purposes within the Faculty of Computer Science, Universitas Bina Darma.

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