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Design and Development of the Koperasi Bintang Tapanuli (KBT) Ticket Ordering System

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ABSTRACT

The transportation industry has undergone a major transformation with the widespread adoption of online ticketing systems. However, Koperasi Bintang Tapanuli (KBT), a major player in regional transport, relies on a traditional manual booking system for its buses. The system suffers from inefficiencies such as long queue times and limited access to information. The project used a rigorous requirements gathering process, including stakeholder interviews to ensure the system met user needs and functionality. Passengers can conveniently search routes, compare timetables, book tickets and manage bookings online without the need for a physical ticket counter. The team built a website consisting of 28 functions. They are: registration, authentication (login and logout), profile viewing, profile editing, information viewing, adding information, information editing, information deleting, ticket viewing, ticket adding, ticket editing, ticket deleting, vehicle detailed information viewing, dashboard viewing, customer data viewing customer package information viewing, package payment viewing, ticket approval, review viewing, payment viewing, notification viewing, history viewing, ordering method viewing, payment viewing, ticket ordering, package delivery, check ticket order and add review. This website is built using the laravel framework and the waterfall software development methodology. The application we built helps KTB admins in managing ticket orders.

Keywords : *online booking system; koperasi bintang tapanuli (KBT) bus; requirements gathering*.

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1. INTRODUCTION

Transportation is something that is really needed in daily human activities.[1]. Several scholars have investigated these facets through diverse research techniques. The quality of public services is important because citizens are the primary beneficiaries of public services and are directly affected by administrative impartiality.[2]. One of adventages of online ticket booking system (like in Agen Pahala Kencana Banyuwangi) is expected to help humans in bus ticket booking activities, because with this application, individuals can purchase bus tickets without having to travel to the terminal; they simply need to use this service. After that, users can open the web address of this application.[3].

KBT (Koperasi Bintang Tapanuli) is one of famous transportation in North Sumatera. The KBT bus ticket booking system around Toba is currently still manual and traditional. Passengers must come to the KBT bus agent counter, provide personal information such as travel destination, departure date, number of tickets, name and telephone number, and choose a seat (if available). The officer then checks ticket availability manually, prints a physical ticket, and accepts cash payment. Passengers then receive a physical ticket. This system has several shortcomings, such as a manual process that takes time and effort, limited information about seat availability, and the risk of losing physical tickets. Therefore, it is necessary to implement an online booking system that can simplify the booking process, provide real-time information, and increase flexibility for passengers.

As technology develops, many changes occur, one of which is the ticket ordering system, which was initially still done manually, namely online, wherever and whenever. This technological progress also has an impact on several environments such as education, the economy, transportation and many more. The Koperasi Bintang Tapanuli (KBT) is a relatively large type of transportation but has not kept up with the flow of technological developments where KBT still orders tickets manually by coming to the nearest KBT counter or by ordering tickets by contacting KBT via WhatsApp or telephone. This strategy has a number of drawbacks, including the need for lengthy lines at the counter for customers[4]. These limitations not only frustrate passengers but also hamper KBT's potential to grow and develop in the modern transportation landscape.

Utilizing a fragmented approach to research, the problem identification method analyzes performance, information, economics, control, efficiency, and service. The old system is analyzed, from which a number of issues are gleaned, leading to the identification of the primary issue[5]. Although the importance of requirements gathering is recognized in software development, existing research lacks exploration of its application specifically to the KBT bus online booking system. There is a critical gap in the form of comprehensive guidance and best practices tailored to the unique needs and dynamics of the KBT sector.

This research aims to bridge this gap by collecting requirements and interface design processes for the KBT bus online booking system. Apart from that, to support the development of this software, interviews were also conducted with KBT staff at the KBT Laguboti counter. This interview aims to obtain some data that supports the development of software that will help order KBT tickets[6]. Ultimately, this research seeks to contribute valuable knowledge and practical tools to the development of an efficient and user-centric online booking system for the KBT bus industry, empowering KBT bus operators and software developers to revolutionize ticketing systems and improve passenger experience.

This technology will make ordering KBT tickets considerably simpler and accessible to a wider range of Toba society members. In addition to helping the locals, this accessibility draws tourists who value the ease of making reservations online. In order to give prospective clients the best possible service, the system will also assist in managing and distributing ticket sales data[7]. Client data will be managed by the system, and passengers will be able to select their preferred seat, departure time, and destination[8]. By moving to a digital platform, KBT will be able to streamline operations and obtain useful information on travel patterns and passenger demographics, which will help them make informed decisions on future enhancements. Through the deployment of this online ticketing system, KBT will be able to advance toward a future marked by effectiveness, accessibility, and a dedication to provide a first-rate passenger experience.

The introduction of the KBT bus online booking system makes it easier to purchase tickets and increases accessibility while also opening up possibilities for more significant social and economic gains. The Toba region's citizens can more easily connect to jobs, educational opportunities, and other important services by having easier access to transportation services. In addition, the surge of visitors drawn by the convenience of online reservations supports local businesses in the hotel and tourism industries and aids in economic development. Using a comprehensive strategy not only makes KBT more efficient and competitive, but it also promotes community welfare and growth in the area, making society as a whole more dynamic and integrated.

This ticket ordering system will be build by using waterfall method. By using that methodology, we can understand the work flows from communication through deployment. The waterfall model sometimes called the classic life cycle. This method proposes a systematic, sequential approach to software development that starts with the requirements specified by the client and moves through planning, modeling, building, and deployment.

Each transportation strives to provide the best service with adequate facilities to passengers so that they are satisfied with the service they feel and they want to become customers.[9]. Like The Trans Metro Deli policy in Medan City is a significant step in improving public transportation services by integrating various aspects such as operational efficiency, utilization of technology, safety, comfort, and accessibility.[10]

Customers' perspectives on purchasing bus tickets at PO. Harapan Jaya and the inefficiency of time and money resulting from having to visit the PO. Harapan Jaya directly are discussed in the article titled Web-Based Bus Ticket Ordering Application (Case Study at PO. Harapan Jaya)[11]. The purpose of the research is to reduce the time and expense consumers incur by providing them with more information about purchasing bus tickets at PO. Harapan Jaya and enabling them to do so without having to visit the PO. Harapan Jaya. The study is underpinned by qualitative methodologies, as the system developer gathered information on consumer obstacles and challenges related to bus ticket purchases through many surveys and interviews.

In addition, the article Development of a Web Information System for Tour and Travel Services explains that, at this time, Smart Tour's system—which is still manual—does not meet the needs of the community because it is one of the travel agencies in Bandar Lampung. Furthermore, Smart Tour offers car rental services in locations where the prior system was still manual and non-computerized[12]. The system developer performed multiple surveys and interviews to gather information about consumer obstacles and problems when buying tickets and using the car rental system, as well as gathering automobile information that is typically included in the section on cars for rent.

The study "Development of a Web Information System for Tour and Travel Services," which highlights the importance of switching from manual to digital systems in the travel business, is similar to how PT. Digital Trans Gemilang developed Velotow. In both cases, the shortcomings of manual systems in satisfying contemporary customer demands are brought to light, and computerized solutions are subsequently implemented to improve service efficiency. Velotow's web-based E-Service for ticket reservations, which was created using the System Development Life Cycle (SDLC) and Unified Modeling Language (UML), significantly improved the marketing and operational efficacy of travel services between Riau and West Sumatra. Even throughout the epidemic, travel operators have been able to sustain and grow their revenue thanks in large part to this digital change[13].

The inefficiencies of the manual ticket ordering system, where customers frequently have to visit counters and not secure tickets due to insufficient staff and recording errors, are discussed in the article "Design and Development of a Kupang-Atambua Bus Ticket Ordering System Based on SMS Gateway."In order to solve these problems and create a more dependable and easily accessible ticket ordering system, this study used a qualitative approach to collect system needs. Similarly, the goal of RSIMA TRAVEL Pekanbaru's computerized ticket booking system development is to get over the drawbacks of the existing manual procedure, improving booking accuracy, efficiency, and accessibility for customers while lightening the administrative burden. The

aforementioned studies underscore the imperative requirement for digital solutions to enhance service delivery and operational efficiency within the travel sector[6].

In other research, Public perception of public transport in Medan is poor, impacting passengers' quality of life and increasing stress. Improving transport services could enhance life quality. Further research should explore this relationship with different variables in other countries.[14]

The Medan City Transportation Agency plays an important role in improving city transportation services, supervising vehicle operations, and regulating permits to ensure safe and efficient transportation. However, they face obstacles such as limited human resources, low community participation, and challenges in accessibility and passenger waiting time.[15]

The performance of the Medan City Transportation Agency in improving the quality of public transportation services is considered quite good, but not yet optimal. The quality of employee work is adequate, but the number of bus stops is still lacking. The punctuality and effectiveness of service are quite good, with employees who work independently and enthusiastically. Factors such as organizational climate, leadership, and discipline also support good performance, but there is still room for improvement in several aspects.[16]

The conclusion of other study shows that the Medan Public Transportation Cooperative (KPUM) is still lacking in fulfilling the rights of passenger comfort and safety, which is caused by ineffective management and low awareness and professionalism of drivers. Other obstacles include poor physical conditions of transportation and minimal maintenance due to high costs. As a recommendation, it is suggested to increase driver awareness of their responsibilities and for business actors to be more selective in choosing professional drivers to ensure the safety of passengers and road users.[17]

Beside that, there is study evaluated 14 criteria of public transportation services, namely route coverage, distance to location, waiting time, operating time, reliability of travel time, passenger density, comfort, noise level, cleanliness, exterior appearance, fare, driver behavior, and driver appearance and cleanliness. The results of the analysis showed that the User Satisfaction Index (CSI) was below the middle value, which was 4.81, indicating that the quality of public transportation services was considered less than satisfactory by student respondents. Although the operational time and fare of public transportation were considered good, there were six service criteria that needed to be improved, with 'driver behavior' as the main priority.[18]

Another articles shows public transport in Medan, North Sumatra, to understand its current status and develop future planning. It highlights the balance between meeting current needs and ensuring future generations' needs, emphasizing the tension between broad sustainability goals and practical, incremental progress. While the article provides a comprehensive view of urban transport planning, further research is needed to enhance the findings.[19]

In other part, study concludes that the Medan City government's mass transportation strategies include Core, Consequences, Customer, Supervision, and Cultural strategies. Using SWOT analysis, key strategies are strengthening environmental policies, utilizing city programs for increased mass transport use, and enhancing taxes and levies. AHP evaluation prioritizes online-based taxi services, with a focus on the Deli Trans Bus, which uses a SMART CARD payment system and is environmentally friendly.[20]

There is another view about this research, study concludes that public participation significantly influences the sustainability of urban public transportation and regional development in Medan. Higher public involvement, from decision-making to investment and management, enhances sustainable transportation, which in turn drives regional growth.[21]

Beside that, there is analysis using Matlab Software revealed that the maximum flow of public transportation on the Medan City vehicle network, specifically from Jalan Jamin Ginting to Jalan Williem Iskandar, is 5 units. Exceeding this flow would result in vehicles surpassing the road segment's capacity.[22]

Another research in a company like PT. Rehobot Bethania Trans Pontianak. A company engaged in public transportation. Specifically, a systematic and sequential website is created beginning with system analysis, application design, and coding and continuing through testing and normalization. This research

methodology is known as the waterfall technique. [23]

In other location, there are several research related to develop the ticket ordering system, like The method of developing a Web-Based Bus Ticket Booking Information System at PO. Aurel Jambi uses a waterfall model. The implementation of this research uses the PHP Programming Language and Laravel Framework version 6 and MySQL DBMS, resulting in an application that can provide convenience for customers in making reservations, as well as the PO.[24], a bus ticket booking application was built. The designed application is good to be developed in the Bengkayang district, West Kalimantan, because the strategic location is close to the Indonesia-Malaysia border which is a point of community mobility.[25], The design of the bus ticket sales application at PO. Antar Lintas Sumatera uses the Waterfall system development method. In this study, the stages are system engineering, analysis, design, coding, testing, and maintenance. The results of this study are to create an application for effective and efficient bus ticket sales.[26], The development of a Web-based Bus Ticket Reservation System is an innovative step towards enhancing efficiency and comfort in land travel reservations. This system is focused on developing an intuitive user interface, enabling users to search for routes, select travel schedules, and even determine the preferred bus type[27], In the Ticket Booking Information System at PO Tranex Graha Mandiri Padang, the SDLC method is used, namely: planning the creation of applications, analysis, namely collecting needs and information in creating systems, system design, namely designing software architecture and interface representation, design, namely designing the structure and appearance of the application, and application testing carried out on computers with the Windows 10 operating system.[28], In Bus Ticket Booking Information System PT. This DamDam, tickets can be purchased without having to come directly to the ticket sales outlet. Buyers can buy tickets via smartphones or laptops by accessing this bus ticket booking website.[29].

There are also research abroad related to ticket oredering system like A study on Customers Attitude Towards Online Ticket Booking During Covid-19 With Special Reference To Coimbatore City. Studies actually demonstrate that a 24/7 online reservation system significantly boosts the volume of reservations. The use of online ticket booking has grown significantly with advances in science and technology. A rise in internet literacy promotes consumer purchasing behavior and online ticketing.[30], The system (An online bus ticket reservation system for a transportation service in Nigeria) is a web – based application that allows visitors to check bus availability, buy and pay bus ticket online. The proposed bus reservation system in this paper was created with the help of JavaScript, Ajax, Cascading Style Sheet (CSS), PHP Hypertext Preprocessor (PHP), and Extensible Hypertext Markup Language (XHTML).[31]

However, as prior research has shown, the success of online ticketing systems also depends on elements like service quality and marketing initiatives. This examination of the literature demonstrates that the number of passengers at the Koperasi Bintang Tapanuli (KBT) may change if an online ticketing platform is implemented. Nonetheless, it's critical to understand the outside variables that may affect passenger volume. This study seeks to clarify the precise impact that these platforms have on the quantity of KBT passengers in a certain environment.

2. METHODS

When developing software or information systems, one of the SDLC models that is commonly utilized is the waterfall model. This model uses a step-by-step, methodical approach. The stages in this model begin with the planning phase and move through the following phases one at a time until they reach the maintenance phase[32].The waterfall method's phases are as follows:

a. Communication (Project Initiation & Requirements Gathering)
   Before we build the system, first of all, we collect the requirements from our client. Our client is admin of KBT in Laguboti.
b. Planning (Estimating, Scheduling, Tracking)
   In this phase, we are trying to make planning like estimate the tasks,

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scheduling work and also tracking the system working process.

c. Modeling (Analysis & Design)
In this phase, we analyse the requirement and then we make the UML design, like use case diagram.

d. Construction (Code & Test)
In this part, we construct the system from modelling that we have made before.

e. Deployment (Delivery, Support, Feedback)
This is the last phase we provide our system to clients to check its functions.

The Waterfall approach concludes with this step. Programming code that has been finished and updated. Correction of errors missed in earlier steps is part of maintenance.

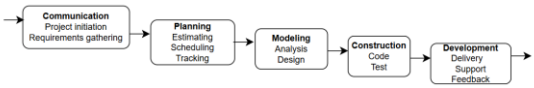

Figure 1. *Waterfall method[32]*

3. RESULTS AND DISCUSSION

3.1. Communication (Project Initiation & Requirements Gathering)

Interviews with clients reveal some insights into the current ticket booking process and potential improvements needed for Koperasi Bintang Tapanuli (KBT). Currently, ticket reservations are done manually at the booking counter where customers select seats and pay for tickets before waiting for departure. Additionally, tickets can be booked over the phone, although this method often results in delays and confusion, as customers are often late or cancel at the last minute.

Counter staff faced several challenges, including slow response to telephone orders and miscommunication with drivers. Customers are asked to provide their identity details such as name, telephone number, origin and destination address when ordering. There is no specific time limit for purchasing tickets, orders can be made until 23:59 WIB because KBT operates 24/7.

When passengers have questions or need assistance, counter staff will provide explanations in person or by telephone. KBT offers regular and executive car ticket booking services. Until now, there is no digital system that supports KBT ticket sales; all transactions are handled manually and promoted by word of mouth.

The proposed KBT ticket booking system aims to simplify the process by allowing customers to book tickets online, thereby eliminating the need to visit the counter. The preferred payment method for this new system involves bank transfer. Additionally, there are suggestions to incorporate a package delivery function into the system to handle sender and recipient information digitally, thereby reducing the risk of loss or damage.

KBT has special rules and regulations for passengers, including baggage policy, compensation for lost items, restrictions on bringing animals, and prohibition on bringing illegal items. Each KBT carriage has a capacity of 12 passengers, and a seat selection service is available when ordering tickets, either at the counter or by telephone. The new system is intended to address current inefficiencies and improve overall service for KBT customers.

3.2. Planning (Estimating, Scheduling, Tracking)

There are 28 functions in this application. They are:

1. Registration
2. Authentication Function (Login and Logout)
3. Profile Viewing Function
4. Profile Editing Function
5. Information Viewing Function
6. Adding Information Function
7. Information Editing Function
8. Information Deleting Function
9. Ticket Viewing Function
10. Ticket Adding Function
11. Ticket Editing Function
12. Ticket Deleting Function
13. Vehicle detailed information viewing function
14. Dashboard Viewing Function
15. Customer Data Viewing Function
16. Customer Package Information Viewing Function
17. Package Payment Viewing Function
18. Ticket Approval Function
19. Review Viewing Function
20. Payment Viewing Function
21. Notification Viewing Function
22. History Viewing Function
23. Ordering Method Viewing Function

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24. Payment Viewing Function
25. Ticket Ordering Function
26. Package Delivery Function
27. Check Ticket Order
28. Add Review Function

3.3. Modelling (Analysis & Design)

From planning that have been explained before, here we describe some functions.

a. View Payment methods function

This function is used by users (guest and customers) who have accessed the Koperasi Bintang Tapanuli (KBT) website to pay the ticket. The client can use CIMB Virtual Account.

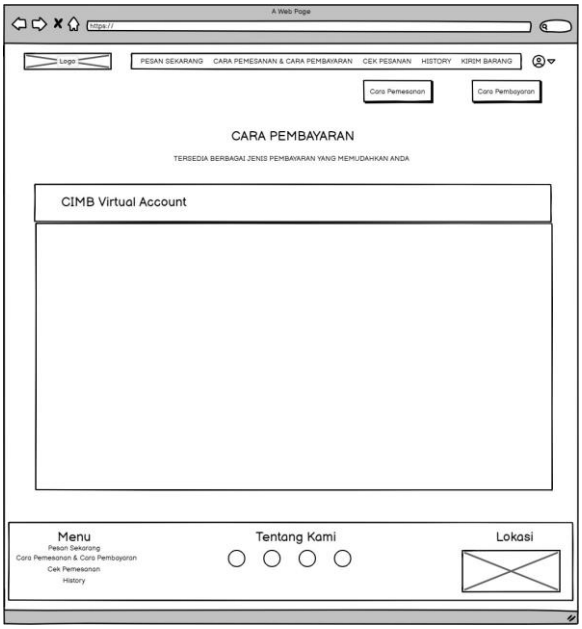

Figure 2. *View payment methods function*

3.4. Construction (Code & Test)

We use Laravel to construct our application. Here is the example of our code for payment ticket:

a. View – ticket payment

b. Model – ticket payment

```php
<?php

namespace App\Models;

use Illuminate\Database\Eloquent\Factories\HasFactory;
use Illuminate\Database\Eloquent\Model;

class Payment extends Model
{
    use HasFactory;

    protected $table = 'payments';
    protected $fillable = [
        'ticket_id',
        'name',
        'email',
        'kelas',
        'amount',
        'payment_method',
        'payment_date',
        'payment_proof',
        'ktp_image',
        'status',
    ];
```

```php
    public function ticketApproval()
    {
        return $this->hasOne(TicketApproval::class);
    }

}
```

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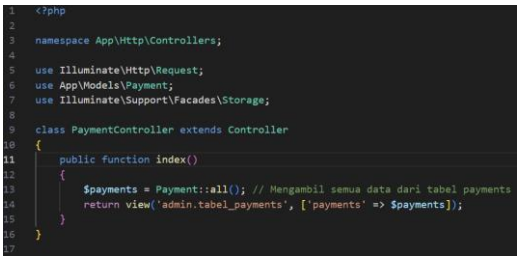
c. Controller – ticket payment



```php
<?php

namespace App\Http\Controllers;

use Illuminate\Http\Request;
use App\Models\Payment;
use Illuminate\Support\Facades\Storage;

class PaymentController extends Controller
{
    public function index()
    {
        $payments = Payment::all(); // Mengambil semua data dari tabel payments
        return view('admin.tabel_payments', ['payments' => $payments]);
    }
}
```

3.5. Deployment (Delivery, Support, Feedback)

The resulting website is the Koperasi Bintang Tapanuli (KBT) ticket booking system website. Utilizing the Laravel programming language to build structured programming, Microsoft Windows 10 as the operating system, and the XAMPP V.3.2.0 application as a stand-alone server (localhost) with Apache serving as the web server and MySQL as the database. In this part, we test all the functions. Here is the example:

Table 1. *Deployment Ticket booking system*

Identification	BU-23
Function Number	F-23
Name of test item	Test to see how to order
Goal	Guests and customers can see how to order
Decription	This function shows guests and customers can see how to order.
Pre-condition	Accesing the website
Test Date	May, 21 2024
Tester	All group member
Test Scenario	
1. Guests and customers access the website 2. Guests see the booking methods available in the system 3. Customers log in with a validated account 4. Customers access the booking and payment method page 5. Customers see the ticket booking methods provided in the system	
Evaluation of result	
Guests and customers can see how to order tickets provided in the system.	

Table 1 continued…

Situation and results of the testing process			
Data input	**Expected results**	**Observation**	**Conclusion**
None	Guests and customers can see how to order tickets provided in the system.	Function operates as intended	[X] accepted [ ] rejected

CONCLUSION

In this research, qualitative interviews with Koperasi Bintang Tapanuli (KBT) staff provided valuable insights into the existing ticket booking process, challenges faced, and desired features. These interviews facilitated a comprehensive understanding of the current workflow, enabling researchers to pinpoint pain points, identify bottlenecks, and discern user expectations essential for crafting an effective digital solution. The proposed solution entails the development of a digital ticket booking system aimed at enhancing both customer satisfaction and operational efficiency. Envisioned as an online platform, this system streamlines ticket reservations, offering passengers an easy and efficient booking experience while automating processes to minimize errors and accelerate operations. Moreover, the system presents revenue opportunities beyond ticket sales, including additional services like package ordering and delivery.

Despite its promising benefits, several challenges must be addressed. Firstly, given the location's potential for limited internet connectivity in Toba Lake, Sumatera Utara, exploring offline capabilities or alternative communication channels is crucial. Additionally, ensuring payment security remains paramount, necessitating integration with reliable payment gateways and robust fraud prevention measures. For future research and implementation, it is imperative to conduct user feasibility testing involving potential passengers to assess usability, functionality, and overall experience. Furthermore, collaboration with payment providers for seamless integration of secure transaction options and ongoing evaluation of long-term impacts, including monitoring passenger

numbers, customer satisfaction, and revenue trends, is essential. By strategically transitioning to digital solutions, KBT can position itself for sustainable growth in the dynamic transportation landscape, recognizing the transformative potential of this system.

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