UNIVERSITI TEKNOLOGI MALAYSIA

System Analysis and Design
(SECP 2613)

PROJECT

Phase 1: Project Proposal
and Planning

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1.0 Introduction

In an era where everyday life is shaped by mobility, convenience and digital innovation, the role of technology-driven initiatives in transforming traditional industries has become increasingly vital. Hasta Travel is a reliable mobility partner for students and staff of Universiti Teknologi Malaysia (UTM). It is committed to redefining the car rental experience through efficient solutions. At the core of this vision lies a critical need: the ability for users to seamlessly book, manage and experience vehicle rentals with greater transparency, convenience and security.

To support this commitment, a revolutionary system is being introduced. It is a comprehensive accounting and vehicle rental management system created to revolutionize Hasta Travel's business operations. Additionally, it improves the UTM and outside consumer experience. By providing a more intelligent and dependable method of booking cars, handling payments, and guaranteeing accountability for each transaction, this system is designed to empower consumers.

The suggested system serves as the cornerstone of this change and embodies Hasta Travel's steadfast commitment to customer service, operational efficiency and financial integrity. Customers will be able to book available cars, upload payment receipts, monitor rental histories and check rental agreements all from one single location. At the same time, it allows Hasta Travel to adjust pricing, manage fleets and monitor financial performance dynamically. Above all, it guarantees adherence to the forthcoming e-Invoice regulations that LHDN has imposed.

This initiative is not merely a booking system but a comprehensive digital ecosystem for car rental management. The platform will incorporate dynamic pricing strategies during peak periods, automated invoicing aligned with regulatory requirements, real-time fleet monitoring and intelligent customer profiling. Thus, this can enhance security and service quality. To improve operational standards and offer a flawless client experience, technologies such as AI-driven verification, auto bank statement reconciliation, accident and fine tracking are integrated.

This proposal outlines a strategic approach to the design and implementation of the system, detailing the methodologies, objectives, timeline and expected outcomes. The initiative aims to realize Hasta Travel's vision for smarter, safer and more efficient mobility services. By setting a new benchmark in university-based car rental solutions, this transformation will redefine the mobility experience at UTM and inspire future innovation in educational institution services.

2.0 Background Study

2.1 Organisation Background

Hasta Travel is a registered private limited company (Sdn. Bhd.) operating within Universiti Teknologi Malaysia (UTM), specializing in car rental services for students and staff. Established in 2017, Hasta Travel began by providing affordable and convenient transportation solutions directly at the Student Mall in UTM. Initially focused solely on car rental, Hasta Travel expanded its services by obtaining a travel and tour operating license in 2020. This enables it to offer travel packages alongside vehicle rentals.

Managed primarily by experienced staff with backgrounds in science and computer faculties, Hasta Travel operates more like a sales-driven organization rather than a technical one. The company currently caters to over 200 student customers monthly. It handles a significant volume of deposits, sales and financial transactions using traditional accounting software such as One and MYOB.

Hasta Travel's current operational model heavily relies on manual systems for booking management, payment tracking, deposit return, and accounting reconciliation. Data for audit and reporting purposes are collected manually and stored in both hardcopy and softcopy formats. Hence, it creates challenges in efficiency, accuracy and data security. As the organization moves towards a more digital future, especially with the upcoming implementation of mandatory E-Invoice integration with LHDN starting June 2025, there is a clear need for a modernized, integrated system to support continued growth, compliance and service excellence.

2.2 Case Study

Hasta Travel currently depends on a partially manual, semi-digitized system for managing car rentals, payments and customer data. Various critical processes still require manual intervention, causing inefficiencies, errors and delays.

For the current booking process, customers can just book vehicles through WhatsApp or simple online forms as shown in Figure 1 without knowing the availability of vehicles. Staff can only manually check vehicle availability in a separate fleet management system called Track and communicate with customers regarding deposits and payments. The customers also have to calculate for themselves the rental duration which is much more troublesome. While some records are kept digitally, much of the confirmation process, payment verifications and order handling require staff intervention.

Car Rental Booking Form

* Name

Please fill in your Full Name

* Enter your email

We send all our best offers and discounts to our customers via email

* Matric/Staff ID

We only provide rental to UTM staffs & students only.

If Alumni, please state in the remarks section below.

* IC / Passport

Using this format: 057439927466 or A45678990

Enter your phone number

🇺🇸 ▾ +60

Using this format: +601367483668

Figure 1: Online Booking Form of Hasta Travel

By the same token, the payments are made via QR code, bank transfer or cash. Customers upload their bank-in receipts through WhatsApp or external forms. Thus, staff must manually verify the receipts. There is no centralized system that automates receipt verification, allocation of payments to rental, or tracking of outstanding balances. The current manual tracking increases the likelihood of human errors, misallocation of deposits and inefficiencies during refund processes.

Nevertheless, vehicle conditions are inspected manually upon return with staff filling out return inspection forms. There is limited integration between the inspection results and customer rental records. In addition, customer data such as matric numbers, IC numbers, driving licenses and blacklist statuses are recorded separately. This brings difficulties when performing automated verification or security checks.

The existing accounting system struggles with reconciling rental deposits, payments and returns. Monthly bank statements must be manually matched to transaction records and outdated methods like classical Excel spreadsheets are often used. Furthermore, the current system is not ready for the mandatory E-Invoice submission required by LHDN starting June 2025.

Hence, in order to nip these problems, Hasta Travel intends to upgrade to a fully integrated, AI-driven car rental management system. The system will automate booking confirmations, payment processing, deposit tracking, dynamic pricing and financial reporting. It will also include modules for fleet

management, customer verification (including matric card checks), accident and fine tracking and E-Invoice generation. The goal is to streamline operations, enhance data security, reduce human error and provide a seamless experience for both customers and staff.

3.0 Problem Statement

This section highlights the problems and challenges within the current vehicle rental management system.

3.1 Manual Data Handling Incurs Human Error and Reporting Delays

The current vehicle rental management system relies on manual data which may lead to the risk of increasing errors of data keyed in. This adoption of the current method not only prone human error as well as data inconsistencies across the system. Since all of the data is required to be handled manually, financial reports are unable to be generated in a timely manner for audits and decision-making which further contributes to inefficiency in operations.

3.2 Lack of Real-Time Integration

Time-consuming in payment verification and deposit management due to lack of real-time integration between booking, payment, fleet, and accounting systems. As a result, unsynchronized updates in the booking update are high probably to cause a poor user experience during using this system.

3.3 Lack of Centralized Platform and User Autonomy

Absence of a centralized platform for customers to manage bookings, payments, and rental history increase the data loss risk and the probability of security breaches due to non-centralized record-keeping. The dependency of staff or workers to operate and manage this system is also increasing. At the same time,users are unable to control their bookings and payment which causes the user, who has to manage rental history or the record of past history for purposes of analyzing personal expenses and applying for reimbursement which potentially reduces willingness of users to use the service again.

3.4 Fixed Pricing Reduces Revenue Opportunities

The rental price in the current system is fixed, and the dynamic pricing mechanism that is absent in this system has reduced the opportunity of the company to optimize its revenue due to no charges for the customer who rents the vehicle during the peak period.

3.5 Insufficient Safeguards for Risk Management and Customer Vetting

The system lacks an automated blacklist system that tracking customers with outstanding fines, accidents, or payment issues should be included in this system to enhance the risk management capabilities of the company as well as protect against potential financial and reputational losses.

4.0 Proposed Solutions

The proposed solution to solve all of the problems in the current vehicle rental management system is to develop a centralized system that supports live data synchronization and an intelligent pricing system. Automation features that aid in tracking the customer history, booking, payment, fleet status and accounting operations are also proposed to be implemented in this system. The following are the feasibility analyses of different aspects: technical feasibility, operational feasibility, and economic feasibility.

4.1 Technical Feasibility

Since there is a large amount of data in the system, implementing cloud technology such as AWS or Firebase is essential for ensuring the security of the data and the scalability of the system. This is not only to protect the sensitive information of the users and system but also to minimize the data loss or data breaches through automatic backups. This system will be adopted as a web-based platform to allow authorized users to access the rental system anytime and anywhere. To ensure the system has a good integration between booking, payment, fleet, and accounting systems, API integration will be used to enable real-time communication across all components of the system. By adopting these technologies, the overall data flow and operation of the system will be improved.

4.2 Operational Feasibility

The operationally feasible system is designed with a user-friendly interface to ensure that users of this system may use this system without too much of a learning curve. The automation system is able to automate some processes such as booking confirmation, blacklist management and report generation. Hence, most of the tasks that rely on manual methods will be removed to minimize human errors so the staff is able to focus on higher-value tasks. Through the implementation of a customer self-service portal, users are allowed to manage their bookings, transactions and rental history independently. This improves transparency and increases user satisfaction.

4.3 Economic Feasibility

The initial phase of implementation of the system requires a moderate investment such as the costs for cloud infrastructure, automation development and staff training. However, it is a good investment in the long term since the automation system will reduce the labor cost gradually. The dynamic pricing system allows revenue optimization during peak hours. Customer portal improves user experience and enhances user satisfaction, leading to users having brand loyalty. Overall operational efficiency increases, reducing long-term overhead.

Table 1: Estimated Cost, Estimated Benefits and Assumptions

Table 1.1: Estimated Cost

Estimated Cost	
Hardware	RM5,000
Software	RM5,300
Training	RM1,400
Consultant	RM1,600 per year
Maintenance	RM3,000 per year

Table 1.3: Assumptions

Assumptions	
Discount rate	10%
Sensitivity factor (cost)	1.1
Sensitivity factor (benefits)	1.1
Annual increase in benefits	5%
Annual increase in production cost	5%

Table 1.2: Estimated Benefits

Estimated Benefits	
Reduced Errors	RM4,100
Increased Online Booking	RM3,500
Staff Time Saving	RM2,800
Improved Customer Retention & Satisfaction	RM4,200

Table 2: Cost-Benefit Analysis (CBA)

Costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Costs						
Hardware	5,500					
Software	5,830					
Training	1,540					
Total	12,870					
Production Costs						
Consultant		1,760	1,848	1,940	2,037	2,139
Maintenance		3,300	3,465	3,638	3,820	4,011
Annual Production Costs		5,060	5,313	5,579	5,858	6,150
(Present Value)		4,600	4,391	4,191	4,001	3,819
Accumulated Costs		17,470	21,861	26,052	30,053	33,872
Benefits						
Reduced Errors		4,510	4,736	4,972	5,221	5,482
Increased Online Booking		3,850	4,043	4,245	4,457	4,680
Staff Time Saving		3,080	3,234	3,396	3,565	3,744
Improved Customer Retention & Satisfaction		4,620	4,851	5,094	5,348	5,616
Annual Benefits		16,060	16,863	17,706	18,591	19,251

(Present Value)		14,600	13,936	13,303	12,698	12,121
Accumulated benefits (Present Value)		14,600	28,536	41,839	54,537	66,658
Gain or Loss		-2,870	6,675	15,787	24,484	32,787
Probability Index	2.55					

5.0 Objectives

The objective of this project is to develop a comprehensive Car Rental Management System for Hasta Travel, which focuses on improving the efficiency of operations, customer convenience and financial management. This system provides a user-friendly platform for customers to book vehicles easily, choose their preferred payment method, such as QR code, online banking, or cash, and also receive confirmation through WhatsApp or email. At the same time, it enables staff to manage reservations, payments, fleet availability, vehicle inspections, and customer records systematically.

This system also includes some key features such as automatic late penalty charges, long-term rentals tracking, dynamic pricing during peak periods, and a blacklist module to manage those who have unpaid fines or previous issues. Financial integration will be strengthened through deposit and payment tracking, monthly bills, and support for Malaysia's LHDN auto e-invoice requirements. In addition, this system will ensure all customer and transaction data can be stored and backed up securely to support the audit process.

Through this platform. Hasta Travel will not only simplify its daily rental operations but also build a strong digital foundation for future business growth, improve the quality of service, and maintain financial and regulatory standards.

6.0 Scope of the Project

6.1 In Scope

This project focuses on building a complete Car Rental Management System for Hasta Travel, which covers the following areas:

6.1.1 Booking Management

The system will allow customers to view the availability of vehicles and make bookings based on hourly, daily or monthly easily. After booking, customers will receive quick confirmation through WhatsApp or email. For returning customers, the system will simplify the process by automatically retrieving their information, reducing the requirement to fill in a repetitive form every time. This will improve the efficiency of bookings management and ensure a smoother experience for customers.

6.1.2 Fleet and Customer Management

The system will maintain a detailed record of each vehicle, including types of vehicles, availability and maintenance status. It will also track customer details such as faculty, college and matric number for UTM students, ensuring the related data is readily accessible. Furthermore, the system will manage vehicle inspections before and after each rental, documenting any damage, fuel levels or other problems. This will help to maintain the integrity of vehicles to ensure the vehicles are properly maintained.

6.1.3 Payment and Financial Management

The system will support multiple payment methods such as QR code, online banking and cash. It will track deposits, full payment and installment payment for long-term rentals. The system will also automatically calculate and apply the penalties for late returns. In addition, the system will integrate with bank statements, simplifying the accounting process for payments and deposits. This integration will simplify financial operations and ensure the accuracy of auditing purposes.

6.1.4 Dynamic Pricing Management

This feature will enable the system to adjust the rental prices of vehicles based on non-peak and peak periods, ensuring the prices remain competitive and align with demand. Through this management, Hasta Travel can provide more flexible pricing at peak periods and ensure affordability during non-peak periods. This feature can also manage promotions and discounts within the system easily.

6.1.5 Blacklist and Risk Management

The system will track unpaid fines, damages or other problems associated with customers which may pose a risk to the company. Customers who are on the blacklist will not be able to make future bookings, providing protection to the company. This feature also helps manage customer relationships by recognizing previous disruptions caused by customers, to provide better decision-making for future rentals.

6.1.6 Auto Reporting and Compliance

The system will provide real-time reports for the marketing and financial team, helping them track the performance of the business, customer satisfaction and financial health status. The system also ensures compliance with Malaysia's legal requirements by automatically generating and submitting an e-invoice to LHDN. This will help maintain transparency and simplify the tax reporting process.

6.1.7 Security and Data Management

The system will include robust data protection features such as regular backup and secure storage of sensitive information. It will also track staff within the system operation to ensure accountability. This platform will securely store all customer and transaction data, enabling Hasta Travel to manage both softcopy and hardcopy records for the auditing process, and maintain a high level of security for all operations.

This system will be developed independently from the current Hasta Travel accounting software and will serve as a useful solution to improve booking management, financial tracking, customer satisfaction, and overall business operations.

6.2 Out of Scope

The scope of the project will not include the following components:

6.2.1 User Review and Rating Functionality

This project will not include product and service feedback, review and star rating functions from users.

6.2.2 Third-Party Loyalty and Reward Integration

This project does not include integration with external loyalty planning or point reward systems such as membership benefits and e-wallets.

6.2.3 Post-Handover Maintenance and Support

When the project is handed over, ongoing system support including future updates, error fixes or system upgrades, are not covered in the project scope.

These exclusions can help define the boundaries of the project, ensure achievable deliverables within the agreed timeline and resources.

7.0 Project Planning

7.1 Human Resources

Position	Responsibilities	Person in charge
1. Advisor	● Give advice and guide the team in every phase ● Stakeholder communication guidance	Dr. Muhammad Iqbal Tariq Bin Idris

2. Leader	● Handles System Integration & Deployment
	● Manages the complete project life cycle (planning, execution, delivery).
	● Cross-team coordination
	● Manages timelines and stakeholder communication.
	● Risk & Quality Control
	   ○ Ensure testing is conducted
	   ○ Ensures documentation and user training are completed.
		Toh Shee Thong

3. Team Member (Booking & Management Specialist)	● WBS 2: Booking Management Module ● WBS 3: Customer Management Module	Gwee Zi Ni
4. Team Member (Payment & Pricing Engine Developer)	● WBS 4: Payment & Financial Management Module ● WBS 5: Dynamic Pricing Management Module	Lee Jia Yee
5. Team Member (Security & Risk Management Engineer)	● WBS 1: Log In Module ● WBS 7: Security & Data Management Module	Angela Ngu Xin Yi
6. Team member (Reporting & Integration Developer)	● WBS 6: Auto Reporting & Compliance Module	Teoh Xin Yee

7.2 Work Breakdown Structure(WBS)

Level 1: Web-Based Booking System

Level 2: Core System Components

1. Log In
   1.1. Authenticate users
   1.2. Create user sessions
   1.3. Autofill and personalize returning users
   1.4. Check blacklist status
   1.5. Evaluate risk and enforce booking controls
   1.6. Generate risk reports for review
2. Booking Management Module
   2.1. Check Vehicle availability
   2.2. Manage bookings (hourly/daily/monthly)
   2.3. Smart booking suggestions
   2.4. Confirm bookings and notify users
   2.5. Automatically send notifications via WhatsApp and email
   2.6. Support multiple languages
3. Customer Management Module
   3.1. Manage vehicle records, inventory, and maintenance status
   3.2. Manage customer profiles and store-related information
   3.3. Capture and log inspection data (pre- and post-rental)
4. Payment and Financial Management Module
   4.1. Select the payment method and process via the gateway
   4.2. Track payments, deposits, and installments
   4.3. Calculate and display penalties for late returns
   4.4. Integrate bank statements for reconciliation
5. Dynamic Pricing Management Module
   5.1. Define and apply time-based pricing rules (peak/non-peak)
   5.2. Configure and apply cashback rules
   5.3. Predict demand using AI for dynamic pricing
6. Auto Reporting and Compliance Module
   6.1. Monitor and Visualize Performance
   6.2. Automate Reporting and Communication
   6.3. Manage Financial Compliance
7. Security and Data Management Module
   7.1. Monitor and Audit Activities
   7.2. Control Data Access
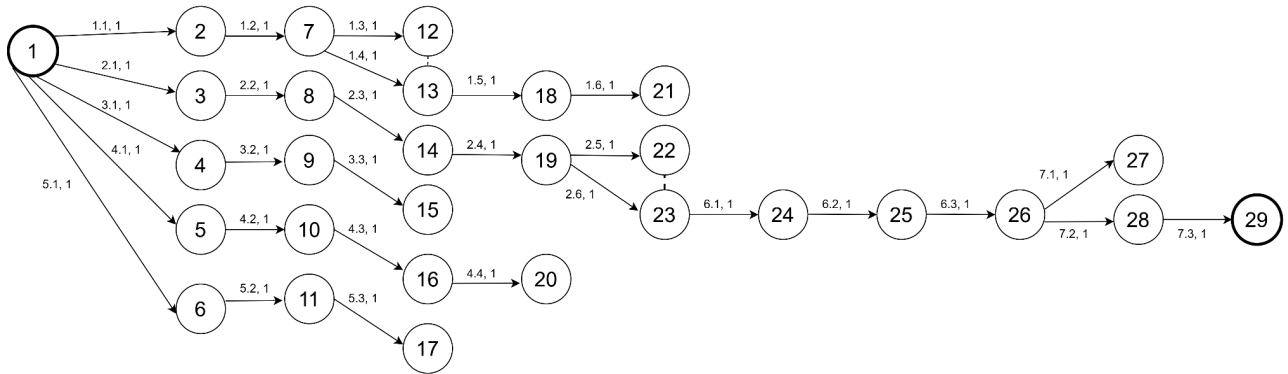   7.3. Protect and Secure Data

7.3 PERT Chart

Figure 3: PERT Diagram

7.4 Gantt Chart

Activity	1	2	3	4	5	6	7	8	9	10
1. Log In										
1.1. Authenticate users	■									
1.2. Create user sessions		■								
1.3. Autofill and personalize returning users			■							
1.4. Check blacklist status			■							
1.5. Evaluate risk and enforce booking controls				■						
1.6. Generate risk reports for review					■					
2. Booking Management Module										
2.1. Check Vehicle availability	■									
2.2. Manage bookings (hourly/daily/monthly)		■								
2.3. Smart booking suggestions			■							
2.4. Confirm bookings and notify users				■						
2.5. Automatically send notifications via WhatsApp and email					■					
2.6. Support multiple languages					■					
3. Customer Management Module										
3.1. Manage vehicle records, inventory, and maintenance status	■									
3.2. Manage customer profiles and store related information		■								
3.3. Capture and log inspection data (pre- and post-rental)			■							
4. Payment and Financial Management Module										
4.1. Select payment method and process via gateway	■									
4.2. Track payments, deposits, and installments		■								
4.3. Calculate and display penalties for late returns			■							
4.4. Integrate bank statements for reconciliation				■						
5. Dynamic Pricing Management Module										
5.1. Define and apply time-based pricing rules (peak/non-peak)	■									
5.2. Configure and apply cashback rules		■								
5.3. Predict demand using AI for dynamic pricing			■							
6. Auto Reporting and Compliance Module										
6.1. Monitor and Visualize Performance						■				
6.2. Automate Reporting and Communication							■			
6.3. Manage Financial Compliance								■		
7. Security and Data Management Module										
7.1. Monitor and Audit Activities									■	
7.2. Control Data Access									■	
7.3. Protect and Secure Data										■

Figure 4: GANTT Chart

8.0 Benefits and Overall Summary of Proposed System

8.1 Benefits

8.1.1 Operational Efficiency

The proposed Car Rental Management System offers significant improvements in operational efficiency by automating key processes such as booking confirmations, payment verification, and fleet monitoring. This reduces the likelihood of manual errors and enhances the overall processing speed of daily operations. Real-time integration between the booking system, payment modules, and fleet management ensures that all components communicate seamlessly, providing up-to-date and synchronized data across the platform.

8.1.2 Financial Management

This system features automated penalty charges for late returns and real-time tracking of deposits and payments. It also supports the generation and submission of e-Invoices in compliance with Malaysia's LHDN requirements. Furthermore, the integration with bank statements enhances the efficiency and accuracy of accounting processes, which is crucial for audit readiness.

8.1.3 Data Security

With the adoption of cloud-based storage solutions, data is automatically backed up and securely stored, ensuring resilience against data loss and breaches. The implementation of role-based access controls and system activity tracking helps maintain accountability and protects sensitive information, supporting Hasta Travel's long-term digital growth and sustainability.

8.2 Conclusion

In conclusion, this system transforms Hasta Travels's operations by replacing outdated manual processes with a fully digital, AI-enhanced platform. By integrating intelligent automation, the system ensures faster bookings, accurate payments, and regulatory compliance. By enabling seamless self-service for customers for example, bookings and payment tracking and automating critical staff workflows such as deposit reconciliation, the system significantly reduces human error, accelerates operations, and enhances data security.