SECD2613 System Analysis and Design

Semester II 2024/2025

Phase 2:

Information System Gathering and Requirement (11%)

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1.0 Overview of the Project

Hasta Car Rental, operating under Hasta Travel, provides affordable and accessible vehicle rental services, primarily catering to students, staff, and residents in and around Universiti Teknologi Malaysia (UTM). With the increasing demand from the UTM community, the current manual systems for booking, tracking, and record keeping have shown significant limitations in terms of scalability, accuracy, and user convenience.

To better serve the growing client base—especially UTM students who rely on fast, transparent, and trustworthy transport solutions—Hasta Car Rental aims to enhance its operational efficiency by integrating digital solutions. This project focuses on developing a GPS-based tracking system, an online booking platform, and a digital record management system to ensure a more seamless, reliable, and professional customer experience.

2.0 Problem Statement

2.1 Ineffective Use of GPS Tracking System

Currently, GPS devices are installed in the vehicles but are not utilized for tracking the travel routes or stopping points. As a result, valuable data that could be used for fuel tracking, usage analysis, and customer transparency is not being captured.

2.2 Verification Issue

Booking confirmations are handled informally through WhatsApp, which increases the risk of miscommunication and lack of accountability. This method is not scalable and is unsuitable for a growing client base like UTM students who expect a more reliable and professional system.

2.3 Record System

All records, including payments and customer details, are stored manually. This process is prone to human error, difficult to audit, and time-consuming—especially during peak periods or disputes regarding payments (e.g., QR code receipts).

3.0 Proposed Solutions

3.1 Use GPS for Vehicle Monitoring

- Enable real-time location tracking to monitor where the vehicle stops and calculate distances between stops.
- Data can be used for performance reviews, customer billing transparency, and route optimization.

3.2 Create Web Page for Booking (User Portal)

- Users (especially UTM clients) can fill out a digital booking form specifying date, time, and location.
- A confirmation email will be automatically sent to the user within 1–2 days.
- Staff will verify the booking through an admin interface, ensuring double confirmation and reduced errors.

3.3 Create Web Page for Record System (Staff Portal)

- Automate data storage for bookings, payments, and customer information.
- Attachments like QR code payment slips can be uploaded for proof of transaction.
- Easier retrieval and better organization of records for staff.

3.4 Feasibility Study & CBA

3.4.1 Technical Feasibility

The system uses readily available technologies (GPS, web portals, databases) and existing vehicle GPS devices, with the team having the necessary skills and tools.

Conclusion: Development is achievable with current technology and team capabilities.

3.4.2 Operational Feasibility

It solves key issues like manual booking and communication errors, fits user habits, and improves efficiency.

Conclusion: The system fits business goals and user needs for smooth daily use.

3.4.3 Economic Feasibility

Estimated Costs

Category	Estimated Cost (MYR)
Hardware	5,000
Software	15,000
Consultants	4,000
Supplies	1,000
IS Support	3,000
Maintenance	2,000
Training	1,500
Contingency	3,200
Total	34,700

Estimated Benefits (Annual)

Benefit Category	Estimated Value (MYR/year)
Inventory Savings	4,000
Operational Efficiency	5,000
Customer Satisfaction	3,000
Scalability & Revenue	8,000
Fuel Usage Optimization	2,500
Total	22,500

Assumptions

Factor	Value
Discount Rate	7%
Sensitivity Factor (Cost)	10%
Sensitivity Factor (Benefits)	15%
Annual Change in Prod. Costs	3%
Annual Change in Benefits	5%

Cost-Benefit Analysis (CBA)

CBA - Costs

Costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Costs	34,700					
- Hardware	5,000					
- Software	15,000					
- Consultant	4,000					
- Training	1,500					
Production Costs		25,190	26,954	28,650	30,859	33,002
Supplies		2,640	2,825	3,023	3,234	3,461
IS Support		19,800	21,186	22,669	24,256	25,954
Maintenance		2,750	2,943	3,148	3,368	3,587
Annual Prod. Costs (Present Value)		22,900	22,275	21,600	21,077	20,066
Accumulated Costs	34,700	57,600	79,875	101,475	122,552	142,618

CBA – Benefits, Gain/Loss and Profitability Index

Benefits	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Reduced inventory costs		22,500	23,625	24,806	26,046	27,348

(Present Value)						
Accumulated benefits (Present Value)		22,500	46,125	70,931	96,977	124,325
Gain or Loss		35,100	33,750	30,544	25,575	18,293
Profitability Index						0.88

Economic Feasibility Interpretation & Conclusion:

Since PI = 0.88 < 1.0, the project is not economically feasible based on this CBA. The costs outweigh the discounted benefits over the 5-year horizon.

However:

- The PI is close to 1, suggesting that minor cost reductions or increased benefits (higher usage rates, added service tiers) could tip it into feasibility.
- If non-monetary benefits like improved customer satisfaction, automation, and reputation are considered, the project may still be strategically justifiable.

4.0 Information Gathering Process

4.1 Method used

4.1.1 Online Survey

We implement the use of an online survey through Google Form and share it among UTM students and working staff. The survey included both closed and open-ended questions, which are used to gather insights on improving the current system for the clients. Below here are some examples of questions feature:

- How do you currently book a vehicle from Hasta Car Rental?
- How satisfied are you with the current booking and confirmation process?
- Would you find it helpful if Hasta Car Rental offered an online booking system with instant confirmation?
- How important is it for you to receive real-time GPS tracking or travel updates for your rented vehicle?
- What features would you most like to see in a new digital system for Hasta Car Rental?

4.1.2 Interview

We conducted a one-to-one interview with Dr Aryati Binti Bakri who acts as a representative of Hasta Car Rental. The interview was semi-structured, starting with a set of predetermined questions about the current systems and then allowing for follow-up questions based on the interviewee's responses.

4.1.3 Observation

We observed the day-to-day operations at Hasta Car Rental, including the booking process, vehicle handover, and record-keeping procedure. This involved shadowing staff during peak hours to understand the practical challenges they face and to understand the practical challenges they face and to identify any inefficiencies in the current manual systems.

4.2 Summary from method used

4.1.1 Online Survey

Based on our findings from 20 respondents, 57% of respondents rated the current booking process as “Dissatisfied” due to issues like lack of formal confirmation and long response times via WhatsApp. Regarding the proposed GPS-based tracking system, 61% of respondents indicated that they would feel more secure knowing the vehicle’s location in real-time. When asked about new features for the online booking platform, top requests included online booking with payment integration (85% of respondents), and reminders for pickup and return (72%) .

4.1.2 Interview

Based on the interview conducted with Dr. Aryati Binti Bakri, she highlighted that staff members have reported manual record-keeping to be time-consuming, particularly during peak seasons when multiple bookings must be handled simultaneously. She also noted that the absence of a proper GPS-based system hinders effective fuel cost management and accurate monitoring of vehicle usage. As a result, she emphasized the need for a more professional and reliable car rental system that could better serve the UTM community and potentially be recommended as an official transportation option for students and staff. Additionally, she suggested incorporating features such as quick and easy booking modifications and detailed information about the available cars.

4.1.3 Observation

During peak hours, the manual booking process took an average of 15 to 20 minutes per customer, creating a significant bottleneck in operations. The record-keeping process involved multiple steps, including filling out paper forms and manually entering data into spreadsheets, which increased the risk of errors. Besides that, vehicle handover procedures lacked proper verification steps, and there was no real-time monitoring of vehicles once they left the rental premises.

5.0 Requirement Analysis

5.1 Current business process

Although the company provides an important service to UTM students and staff, the way bookings, payments, and vehicle tracking are handled lacks a structured system. Below is the detailed step-by-step workflow of the current operations:

Step 1: Booking Request

Customers, who are mainly UTM students and staff, send a booking request by filling up a digital form on the Hasta Travel website. The form usually includes full name, date and time of booking, type of car requested, duration of the rental, etc. After filling up the details, the customer will submit the form on Whatsapp.

Step 2: Manual Verification and confirmation

A staff member from Hasta Car Rental manually checks WhatsApp messages. If the vehicle is available, the staff replies to the customer to confirm the booking. The confirmation is also done through WhatsApp, and no digital record is created at this stage.

Step 3: Payment and Receipt

The customer makes payment manually via bank transfer or QR code. After payment, the customer takes a screenshot or photo of the receipt and sends it through WhatsApp. The staff then checks the image and notes the payment details in a physical notebook or Excel file.

Step 4: Vehicle Handover

On the day of the booking, the customer goes to the company's office to collect the car. A staff member verifies their name and rental details manually from notes or WhatsApp messages. The car keys are handed over without using any system to register the pickup.

Step 5: Manual Return Process

Although each car is equipped with a GPS device, the company does not actively use it. There is no platform to view the live location, route, or duration of vehicle usage. If a car is delayed or lost, the staff depends on calling the customer or checking WhatsApp updates.

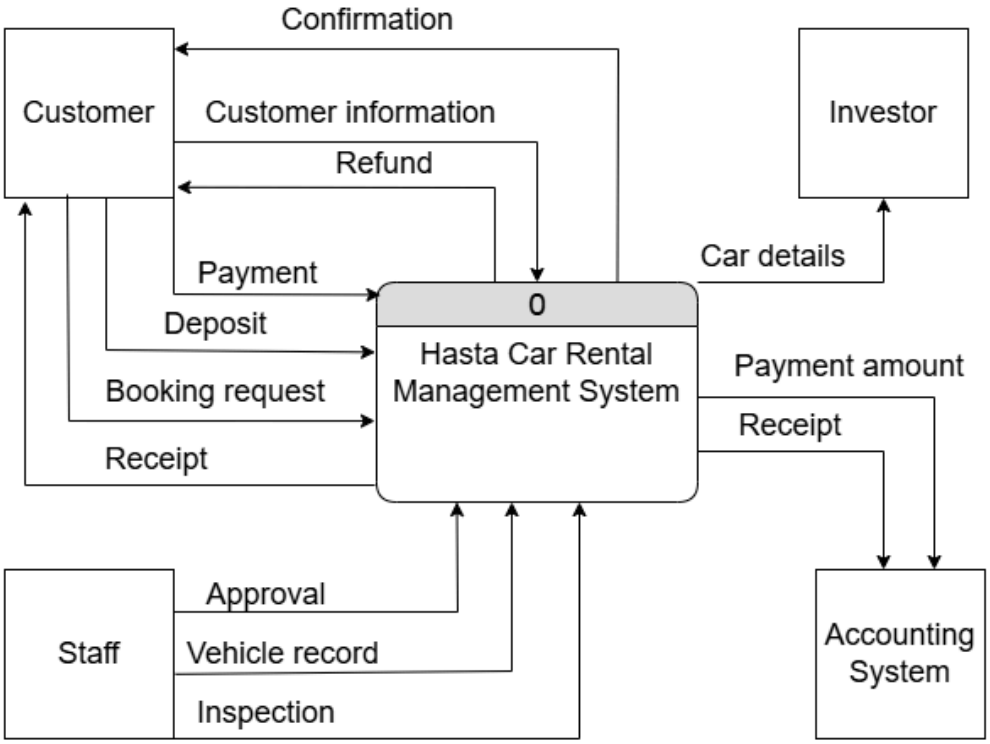
Step 6: Car Return and Record

When the customer returns the vehicle, the staff checks the condition of the car manually. Return time and condition are sometimes written down, but not stored in any official system. There is no automatic logging of the car's total travel distance, fuel usage, or route taken.

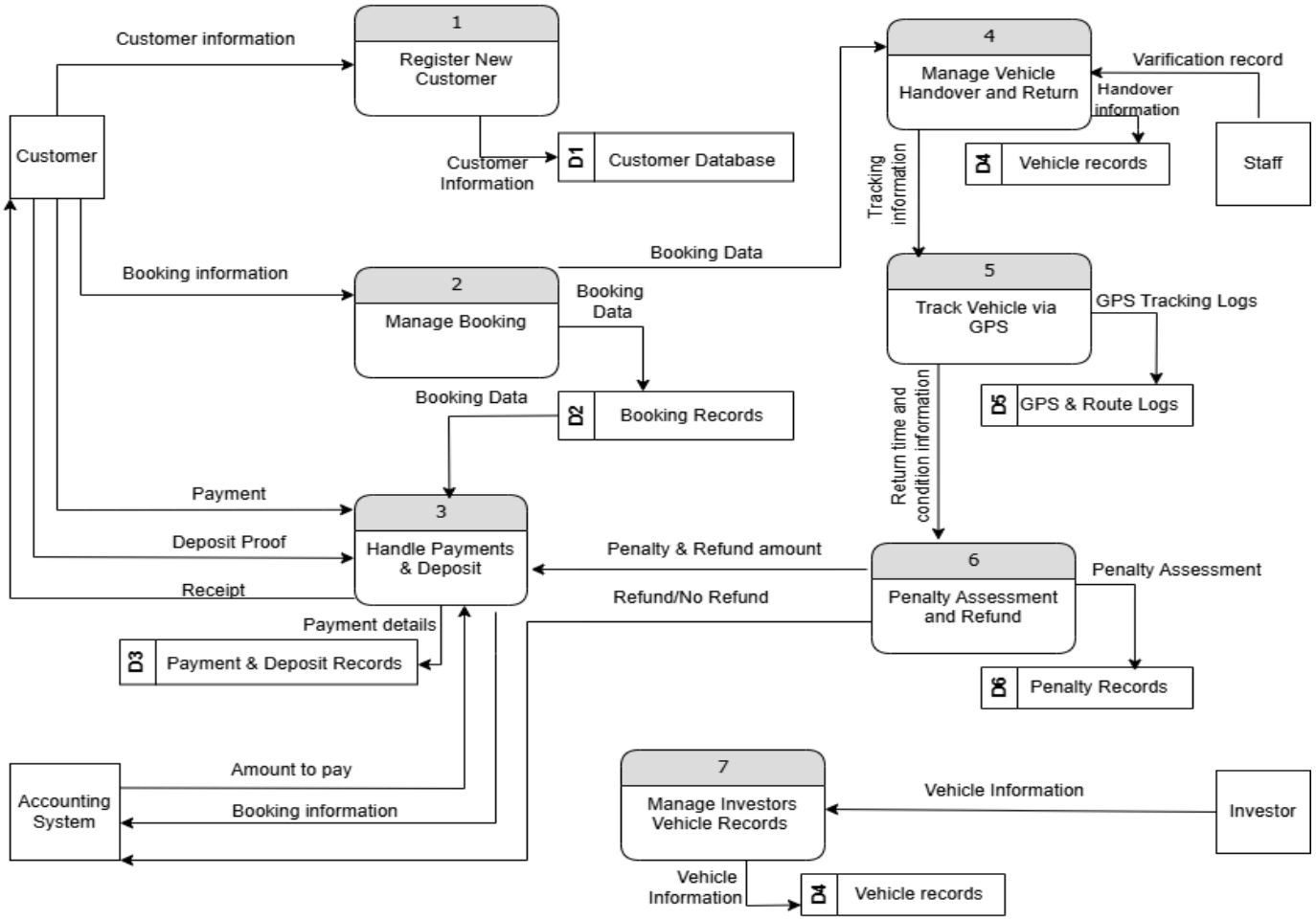
Summary of Current Issues in AS-IS System

- Bookings and confirmations are handled through WhatsApp, resulting in lack of formal records.
- Customer and payment information is recorded manually which can increase the risk of errors and data loss.
- GPS devices are installed but not used, making vehicle tracking and usage monitoring ineffective.
- Vehicle handovers and returns are done without digital logging which reduces accountability and efficiency.

5.2 Logical DFD AS-IS system

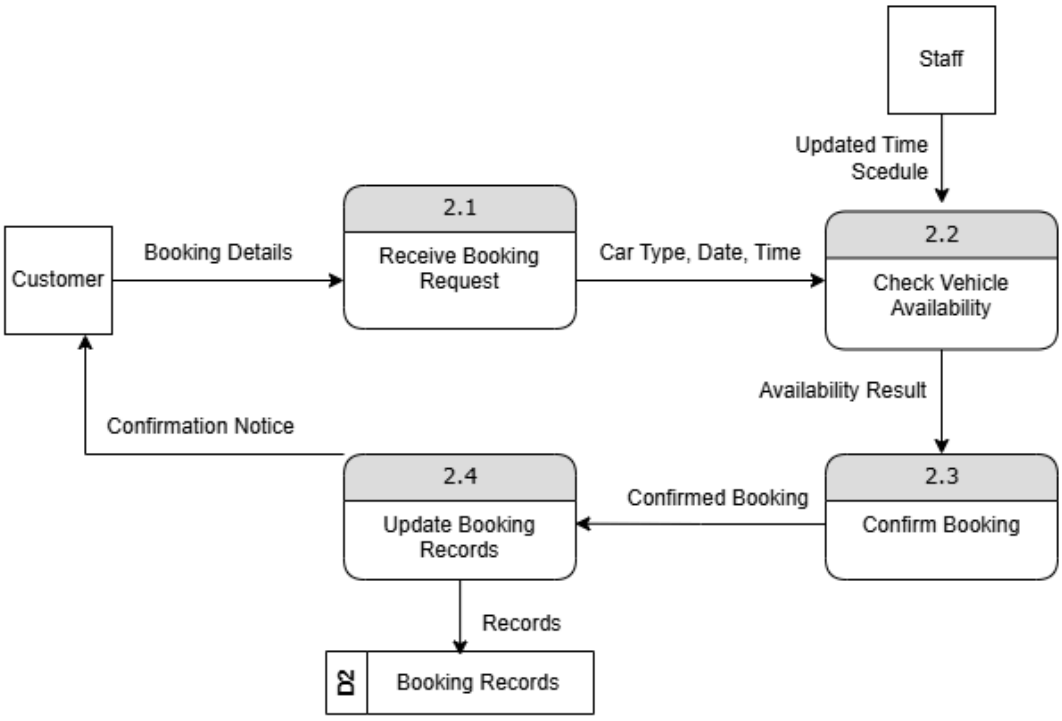


Context Diagram

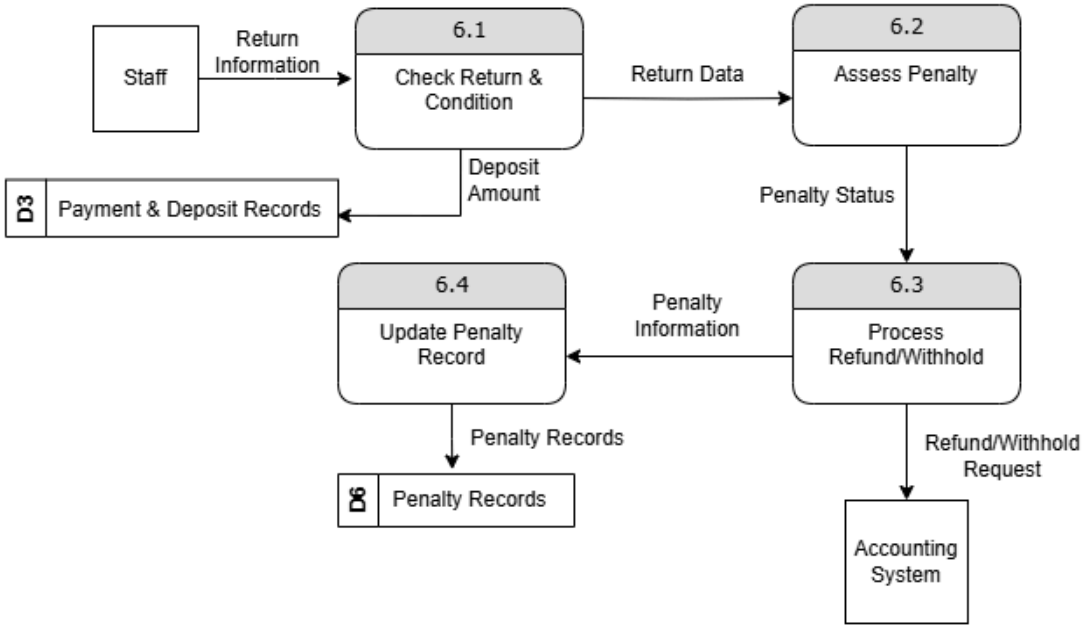


[Booking information: Time, Distance, Period]
[Vehicle Information: Vehicle number, Insurance Details, Owner Details(if provided my investors)]

Diagram 0



Child Diagram for Process 2



Child Diagram for Process 6

5.3 Functional Requirement

Functional Requirements
1. GPS for Vehicle Monitoring ● Track real-time vehicle location. ● Monitor vehicle stop locations. ● Calculate distances between stops. ● Store tracking data for analysis for example performance reviews, billing, route optimization.
2. Web Page for Booking ● Allow users to submit a digital booking form with date, time, and location. ● Automatically send confirmation email to users within 1–2 days. ● Allow staff to verify and confirm bookings through an admin interface.
3. Web Page for Record System ● Automatically store booking, payment, and customer data. ● Allow uploading of attachments for example QR code payment slips. ● Provide a system for staff to retrieve and manage records easily.

5.4 Non-functional Requirement

Non- Functional Requirements
1. Performance ● Confirmation emails must be sent within 1–2 days (timely response). ● Real-time GPS tracking should update without much significant lagging.
2. Usability ● Booking and staff portals should have user-friendly interfaces to reduce errors and training needs.
3. Reliability ● Ensure accurate and consistent storage/retrieval of booking and payment records. ● Double confirmation process minimizes booking errors.
4. Security ● User and customer data including payment info must be securely stored. ● File uploads for example QR slips should be protected from unauthorized access.
5. Maintainability ● The system should allow easy updates to forms, data structure, and interfaces.
6. Scalability ● The system should handle an increasing number of bookings and vehicle tracking data as service grows.

6.0 Summary of Requirement Analysis Process

In summary, we focused on understanding the current system used by Hasta Car Rental and what the users really want in the new system. We started by examining how things are being done now, which rely mostly on WhatsApp and manual methods. From there, we found several problems like booking confusion, lost receipts, and no use of GPS even though it is available.

To gather more insights, we distributed an online survey to UTM students and staff who have previously used the service. We asked about their usual booking methods, payment processes, and any challenges they encountered. Most respondents agreed that the process is time-consuming and that bookings are sometimes not properly confirmed.

Based on the information we have, we listed the functional and non-functional requirements. For example, the users want a faster way to book and receive confirmation, while the staff need something to help them manage bookings and payments better. Everyone wants the system to be easy to use and reduce manual work. We also drew the AS-IS process and created a DFD to help visualize how things work right now. This helps us see which parts of the system need to be automated.

Overall, this phase gave us a clear understanding of the current issues and planned the features we need in the new system. It gave us a better picture of what we're building so that we can improve user experience, streamline operations, and drive the project's success.