SECD2613 System Analysis and Design

Semester II 2024/2025

Phase 1:

Project Proposal and Planning (11%)

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1.0 Introduction

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 Background Study

Hasta Car Rental,operating under Hasta Travel,serves as a crucial provider of vehicle rental services primarily for the community associated with University Teknologi Malaysia(UTM),including students,staff, and local residents. In an era where digital transformation is revolutionizing service - based industries,the current operational setup of Hasta Car Rental has become a bottleneck.

The traditional manual systems for booking,tracking,and record - keeping that the company has been relying on are ill - equipped to handle the escalating demands from the UTM community. As the client base expends, issues related to scalability, accuracy,and user convenience have come to the fore.

In terms of vehicle tracking, although GPS devices are installed in the vehicles, their potential remains largely untapped. They are not being used to track travel routes or stopping points, thereby missing out on valuable data that could be instrumental in fuel tracking,usage analysis, and enhancing customer transparency.This inefficiency not only affects the company's ability to manage resources effectively but also undermines customer trust, as clients expect transparency regarding the services they are paying for.

Booking confirmations are currently managed informally through WhatsApp. This ad - hoc approach is fraught with risks such as miscommunication and lack of accountability. It is not a sustainable solution for a growing clientele, especially students at UTM who are accustomed to and expect more reliable and professional digital systems.

Manual record - keeping of payments and customer details is another area of concern.This process is highly prone to human error making it difficult to audit and time - consuming,particularly during peak business periods or when disputes regarding payments arise.

To remain competitive and meet the evolving needs of its customers, Hasta Car Rental must embrace digital solutions.Implementing a GPS - based tracking system, an online booking platform,and a digital record management system is not just a matter of improving operational efficiency but also of providing a seamless, reliable,and professional customer experience. This digital transformation will enable the company to better serve its existing client base and position itself for future growth,catering to an even larger audience from UTM and beyond.

3.0 Problem Statement

3.1 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.

3.2 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.

3.3 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).

4.0 Proposed Solutions

4.1.1 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.

4.1.2 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.

4.1.3 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.

4.2 Feasibility Study & CBA

4.2.1 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.

4.2.2 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.

4.2.3 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.

5.0 Objectives

- To provide UTM students and staff with a reliable and professional booking system.
- To fully utilize existing GPS hardware for real-time vehicle tracking and route data analysis.
- To minimize manual errors and improve efficiency through digital record keeping.
- To create an intuitive, web-based booking platform that simplifies the process for users.
- To implement a verification system that ensures accuracy and builds user trust.
- To allow staff to easily manage bookings, verify payments, and track user data through a secure dashboard.
- To enhance transparency and accountability in the booking and rental process.
- To support future scalability, allowing the system to handle increased users from UTM and beyond.

6.0 Scope of the Project

The aim of this project is to create a user-friendly digital car rental system for Hasta Car Rental, focusing on customers from Universiti Teknologi Malaysia (UTM). Right now, the company uses manual methods for booking, confirming, and tracking cars. These methods are time-consuming, error-prone, and not practical as the number of users increases. The new system will make things faster, easier, and more organized.

Features included in the system:
1. Online Booking Platform: Students and staff will be able to visit a website and fill out a booking form. They can choose the date, time, and car they want to rent. This makes the process easier than sending messages back and forth. The system will send a confirmation email, and the staff can view and approve the request through an admin page.

2. GPS Tracking System: Each car already has a GPS device installed, but it is not used fully. This system will allow staff to track where each car goes in real time. For example, if a car stops for a long time in one place, it can be noticed. It also helps in checking the total distance traveled, which may help in deciding the rental cost or vehicle service schedule.

3. Record Management System: Staff will be able to see all bookings in one place. Each record includes customer details, booking information, and uploaded payment slips (such as QR code receipts). The system will have a search bar to find any booking fast, especially when there are many records.

What is not included in this system:
- There will be no automatic online payments. Customers will still upload their receipts manually.
- There is no mobile app version at this stage. The platform is only web-based.
- The system will not include car maintenance features.

System users:
- Students and staff at UTM: They will use the system to make bookings and upload payment receipts.
- Hasta Car Rental employees: They will manage the bookings, approve requests, track vehicles, and keep the records updated.

In short, this system will help make car rental smoother for everyone. It reduces the work for staff and gives customers a better way to book and use the service. It is also flexible and can be improved in the future by adding more features.

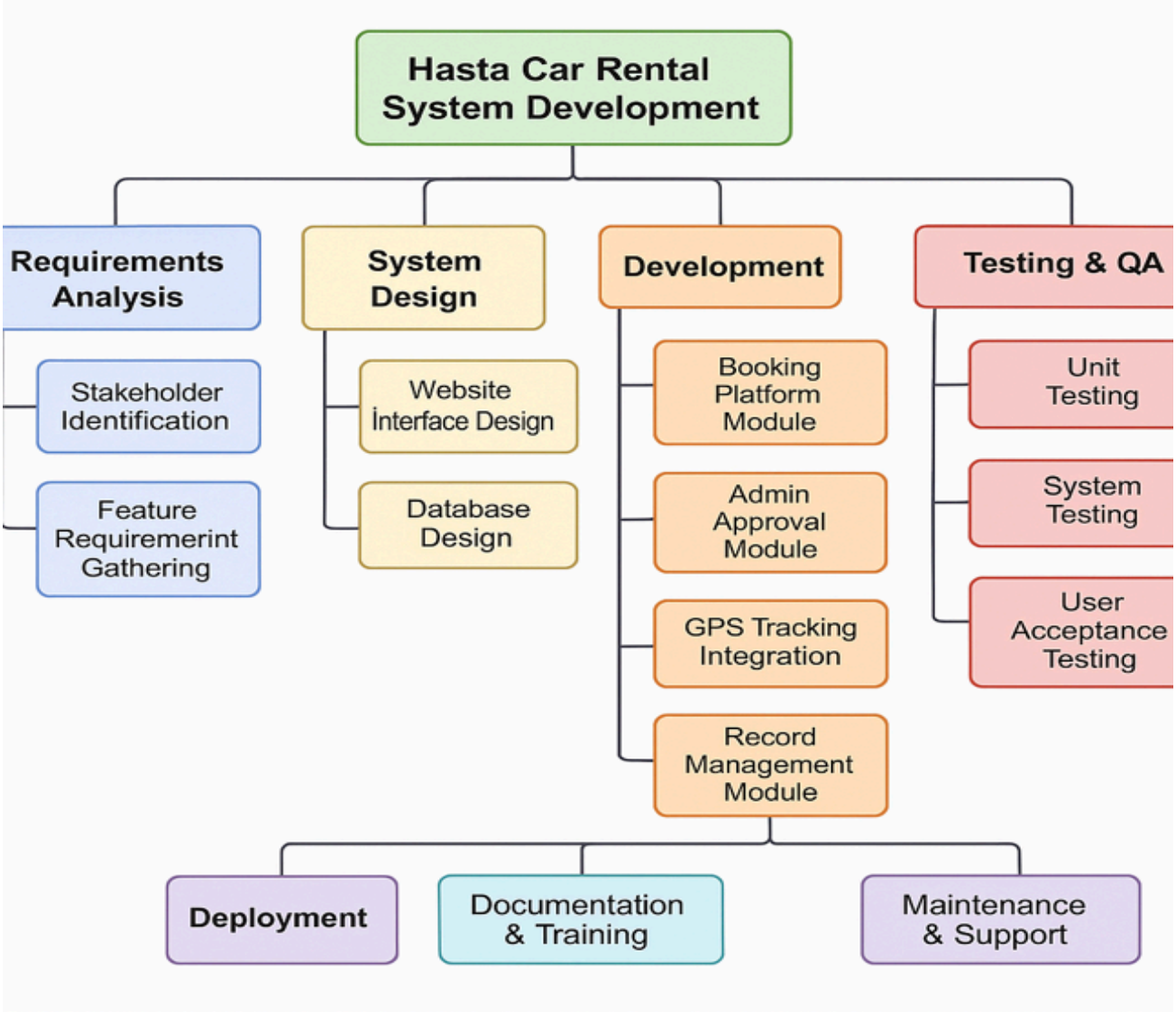
7.0 Project Planning

7.1 Human Resource

Role	Responsibilities	Estimated Involvement
Project Manager	- Oversee project timeline, budget, and deliverables - Coordinate all teams	Full Project Duration
System Analyst	- Gather and analyze requirements - Translate business needs into technical specs	Planning & Design Phases
UI/UX Designer	- Design user-friendly interface for booking & admin pages	Design Phase
Web Developer (Frontend)	- Develop booking form, admin dashboard, record views	Development Phase
Web Developer (Backend)	- Set up server logic, APIs, database integration	Development Phase
Database Administrator	- Design and manage database schema for users, bookings, GPS data	Design & Development
GPS Integration Engineer	- Integrate and test GPS tracking feature with existing hardware	Development Phase
Quality Assurance Tester	- Conduct system testing, bug tracking, and UAT coordination	Testing Phase
Technical Writer	- Create user guides, manuals, and training material	Documentation Phase

Trainer/Support Staff	- Train Hasta Car Rental employees - Provide post-launch support	Deployment & Support
Customer Representative	- Provide feedback from UTM students/staff - Assist in UAT sessions	UAT & Testing

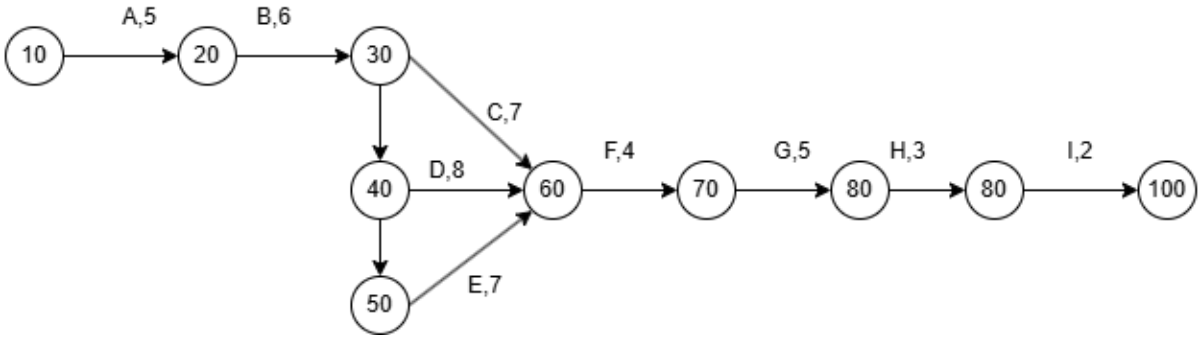
7.2 Work Breakdown Structure (WBS)



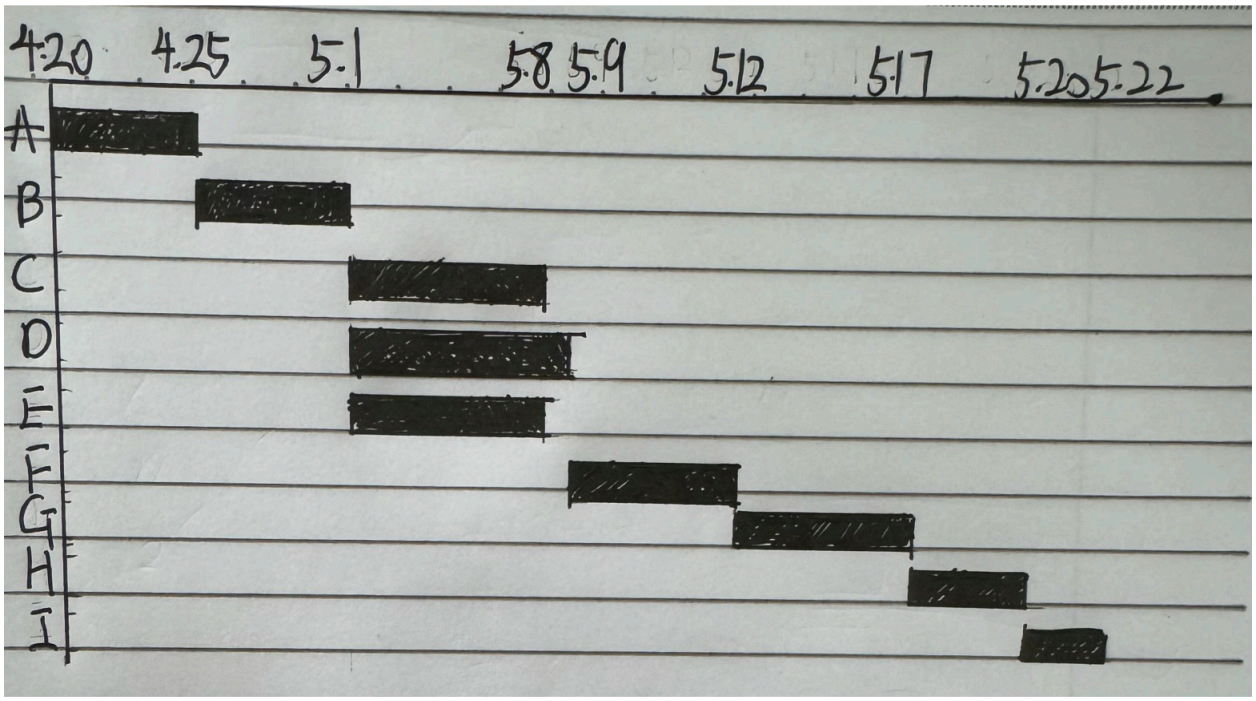
7.3 PERT Chart

Task Details Table

Task ID	Task Description	Estimated Duration (Days)	Predecessor (s)
A	Project Planning & Requirement Analysis	5	-
B	System Design	6	A
C	GPS Tracking Module Design & Development	7	B
D	Booking Platform Design & Development	8	B
E	Record Management System Development	7	B
F	Integration of All Modules	4	C, D, E
G	System Testing	5	F
H	User Training & Documentation	3	G
I	Deployment & Feedback Collection	2	H



7.4 Gantt Chart



8.0 Benefit and Overall Summary of Proposed System

The proposed system brings many benefits to both customers and staff. It replaces the old manual process with a clear, step-by-step digital system. Here's how it helps:

- Faster Booking Process: Instead of using WhatsApp or paper forms, customers can make bookings anytime through a website. They will receive a confirmation email, which makes the process more professional and trustworthy.

- Fewer Mistakes: With everything saved in a proper system, there will be less chance of losing information or mixing up booking times. This is very important when many people want to book cars at the same time.

- Better Tracking: GPS allows staff to know where each car is. This is helpful if a customer calls with a question or if the car is not returned on time. It also helps the company see how much the car is used and plan for maintenance.

- Easy to Manage Records: Staff don't need to go through notebooks or messages. They can search for a name, booking date, or phone number and find all the details in seconds. This saves time and keeps things neat.

- Good for the Future: Even though this is just the first version, the system is designed in a way that it can grow. Later, they can add mobile access, payment options, or new services without changing everything.

- Better Experience for UTM Students and Staff: Since most users are from UTM, it's important to give them a smooth and fast service. This system helps with that by making car rental easier and more modern.

In conclusion, this project is a simple but very useful system. It helps solve real problems, saves time, and prepares Hasta Car Rental for more customers in the future. Both users and employees will benefit from this change.

9.0 Project Management

- URL of the GitHub Repository:
  https://github.com/Joyce-Puyang/Group2_Project1_SAD_20242025

- Repository Snapshot