PROJECT PHASE 2

SECD2613 - SYSTEM ANALYSIS AND DESIGN

SEMESTER II 2024/2025

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1.0 Overview of the Project

Hasta Travel and Tours Sdn. Bhd., a car rental company primarily serving Universiti Teknologi Malaysia (UTM) students, currently manages its entire booking process manually. This reliance on manual methods has led to significant operational challenges, including human errors, fragmented workflows, lack of real-time fleet visibility, and difficulties in data management. These issues collectively impede operational efficiency, hinder growth, and affect customer satisfaction. To address these systemic inefficiencies, a web-based booking system with an integrated invoice reporting system is proposed. This new system aims to automate the booking and accounting processes, thereby modernizing operations, minimizing errors, and enhancing overall efficiency and customer satisfaction. A comprehensive feasibility study has affirmed the technical, economic, and operational viability of this proposed solution, projecting a positive return on investment and enabling the company to scale effectively.

2.0 Problem Statement

The reliance on manual methods for car rental bookings at Hasta Travel and Tours Sdn. Bhd. has introduced several critical operational problems and inefficiencies:

- **The Booking Process is a Bit Clunky:** Right now, the whole booking process relies on old-school methods like paper forms and messaging apps. This setup is a recipe for human error—think wrong entries, missed bookings, or even double-booking the same time slot. All of this can really put a damper on the customer experience.
- **Scheduling Conflicts Are Common:** Without a centralized platform to keep track of availability, it's not uncommon for scheduling conflicts to pop up. When multiple customers try to book the same vehicle at once, it creates a lot of frustration and confusion for everyone involved.
- **Lack of Real-Time Updates:** The current system doesn't provide real-time updates on vehicle availability, which leaves customers in the dark about whether the car they want is actually free. This often leads to delayed responses and, at times, booking cancellations.
- **Keeping Records Manually:** Juggling customer information, bookings, and vehicle statuses by hand makes it tough to keep accurate records. It's hard to access customer data and generate useful reports quickly, and this manual approach also raises the risk of losing important data.
- **Hindrance to Business Growth:** Because of the inefficiencies tied to the manual system, the business is hitting a wall when it comes to growth. As rental demand increases, the current setup struggles to keep up with the higher volume of transactions, resulting in more mistakes and delays.

3.0 Proposed Solution

To overcome the problems currently faced by Hasta Travel and Tour Sdn. Bhd., we proposed to make a web-based booking system with an invoice reporting system where the system may automate the booking process and accounting process for invoice reporting.

Feasibility Study :

The aim of this feasibility study is to evaluate the practicality of developing a web-based booking system for a car rental business. The business currently relies on manual methods, which are prone to errors and inefficiencies. This system seeks to streamline operations and improve scalability.

1. Technical Feasibility

   Technology Stack: The system can be built using widely available technologies such as:

   - Frontend: HTML, CSS, JavaScript, React or Vue.js
   - Backend: Node.js, PHP, or Python with frameworks like Express or Django
   - Database: MySQL, PostgreSQL, or MongoDB
   - Hosting: Cloud platforms such as AWS, Google Cloud, or DigitalOcean

   Availability of Skills: The required development skills are common in the industry, and hiring developers or outsourcing is viable.

   Infrastructure: The business will need internet access and basic hardware (PC or laptop) for the admin dashboard. No specialized infrastructure is required.

   Conclusion: Technically feasible

2. Economic Feasibility

- **Estimated Costs:**
    - Development Cost: RM75,000
    - Operational Cost : RM18,000

- **Expected Benefits:**
    - Reduced administrative workload
    - Improved booking accuracy
    - Enhanced customer satisfaction
    - Better data tracking and reporting
    - Scalability for business growth

- **Return on Investment (ROI):**
    - Faster booking cycles can increase the number of customers served.
    - Reduced labor costs and fewer errors lead to long-term savings.

Conclusion: Economically feasible with positive ROI

3. Operational Feasibility

- **Ease of Use:** User interfaces can be designed to be intuitive for both customers and staff.
- **Training Requirements:** Minimal training needed for staff to use the admin panel.
- **Customer Adoption**: Online booking is a familiar process for most users, so adoption should be smooth.

Conclusion: Operationally feasible

CBA (COST-BENEFITS ANALYSIS)

COST	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
DEVELOPMENT COST						
HARDWARE	30,000					
SOFTWARE	20,000					
CONSULTANT FEES	15,000					
STAFF TRAINING	10,000					
TOTAL DEVELOPMENT	**75,000**					
OPERATIONAL COST						
CLOUD LICENSES		5,000	5,250	5,513	5,789	6,078
IT SUPPORT & MAINTENANCES		10,000	10,500	11,025	11,576	12,154
SUPPLIES COST		3,000	3,150	3,308	3,473	3,647
TOTAL		**18,000**	**18,900**	**19,846**	**20,838**	**21,879**
TOTAL PRESENT VALUE		**17,100**	**16,245**	**15,433**	**14,661**	**13,928**
ACCUMULATED COST		**92,100**	**108,345**	**123,778**	**138,439**	**152,367**

BENEFITS	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
OPERATIONAL GAINS		30,000	31,800	33,708	35,730	37,874
INCREASED BOOKING		17,000	18,020	19,101	20,247	21,462
CUSTOMER LOYALTY		10,000	10,600	11,236	11,910	12,625
TOTAL BENEFITS		**57,000**	**60,420**	**64,045**	**67,887**	**71,961**
PRESENT VALUE (5% DISCOUNT)		**54,150**	**57,399**	**60,843**	**64,493**	**68,363**
ACCUMULATED BENEFITS (PV)		**54,150**	**111,549**	**172,392**	**238,885**	**305,248**
GAIN/LOSS		**(37,950)**	**3,204**	**48,614**	**114,554**	**152,881**
PROFITABILITY INDEX	**152,881 / 75,000 = 2.04**					

Discount rate = 5%

Operational costs annual increase = 5%

Operational gains and benefits annual increase 6%

4.0 Information Gathering Process

4.1 Method Used

To gather information, there are various ways that we may conduct to obtain information required to analyse the current system in use by Hasta Travel And Tour Sdn. Bhd. , that includes interactive methods and unobtrusive methods. For interactive method, we decide to obtain information by conducting interviews with Hasta Travel and Tour Sdn. Bhd. representative, meanwhile for unobtrusive methods, we decide to use two methods which are observation and document analysis.

1) **Structured Interviews** – Conducted meetings with Hasta Travel and Tours Sdn. Bhd.'s operations team, management, and IT professionals to better understand the manual workflow and difficulties. The interview was conducted on 23 April 2025 and 22 May 2025, where the location of the interview is at N28a, Faculty of Computing.

2) **Observations** – Observe the manual booking and car dispatching process, focused on how information gets transferred among WhatsApp and paper records.

3) **Document Analysis** – Internal documentation, vehicle inspection reports, and past booking data were reviewed to identify inefficiencies and redundancies. All these documents were provided by Hasta Travel And Tours Sdn. Bhd. and are also available on their social media.

4.2 Summary from Method Used

Structured Interview:

From the interview with the representative of Hasta Travel and Tours Sdn Bhd, It is found that Hasta Travel and Tours Sdn Bhd present system is fragmented and relies heavily on human processes. The primary mode of communication and booking confirmation is through WhatsApp, which, although convenient for quick messaging, but it does not integrate with any of the internal database or record-keeping systems. This requires employees to manually record customers' data from WhatsApp into spreadsheets or paper logs, which is time-consuming and error-prone.

Structured interviews with the operations and management teams also revealed that double bookings and missed reservations are typical and reoccurring issues, particularly during busy periods. There is no coordinated infrastructure for checking vehicle availability in real time, resulting in conflicting schedules and customer dissatisfaction. Furthermore, the whole process of verifying car conditions before and after rentals is done manually with paper checklists. These checklists are kept in folders with inconsistent filing systems, making it impossible to track down previous records in the event of a dispute over damages or security deposits.

Customers expressed great dissatisfaction with the current method. Many customers noted delays in booking confirmation and a lack of confidence in the accuracy of available automobiles. Customers stated a desire for an online platform with features such as real-time availability of information on car rental, email or SMS confirmations, and a simple and interactive user interface. Most significantly, clients felt anxious about the status of their reservations and would like a system that could provide frequent updates.

Observations:

Observation on the workflow of Hasta Travel And Tour Sdn Bhd showed inefficiencies in areas such as repeated data entry, long turnaround times for booking confirmations, as well as limited visibility on fleet conditions. Before confirming a vehicle's availability, staff workers had to check numerous sources, which may include manual logs, WhatsApp discussions, and physical car keys. The lack of solid and centralised reports also had an impact on management's capacity to make data-driven decisions.

5.0 Requirement Analysis

5.1 Current Business Process

The current process (AS-IS) for Hasta Travel & Tours involves several manual steps that lead to inefficiencies. Here's an outline of the current business process:
Key Steps:

1. Customer Booking:
- Customers reach out via WhatsApp or phone calls to inquire about car availability.
- Staff manually checks vehicle availability and confirms the booking by text or phone call.
- Details are manually recorded on paper or in spreadsheets.

2. Vehicle Status Reporting:
- Before and after rental, customers must report the condition of the car, often manually written down.
- There is no real-time vehicle status update in the system.

3. Invoice & Payment:
- Invoices are manually created after each booking.
- Payments are tracked manually, and refunds are issued after verifying the vehicle condition.

4. Operational Issues:
- Double bookings may occur due to the lack of a centralized booking system.
- Scheduling conflicts may arise, especially when multiple customers want to book the same vehicle at the same time.
- Manual data entry increases the risk of mistakes in booking details, vehicle status, and payment information.
- Current pricing for car rental are not dynamically updated, which causes pricing to remain fixed and not enticing for student to rent car

5.2 Logical DFD AS-IS System

To analyse in detail on the data flow of the system, logical DFD of AS-IS system is illustrated as followed:

Context Diagram:

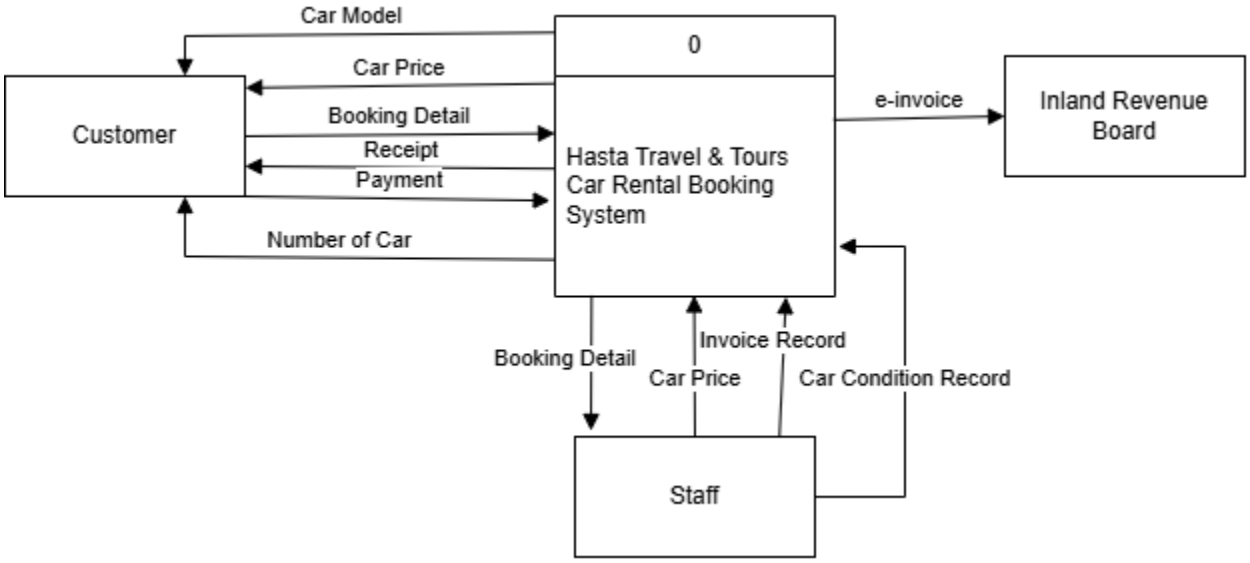
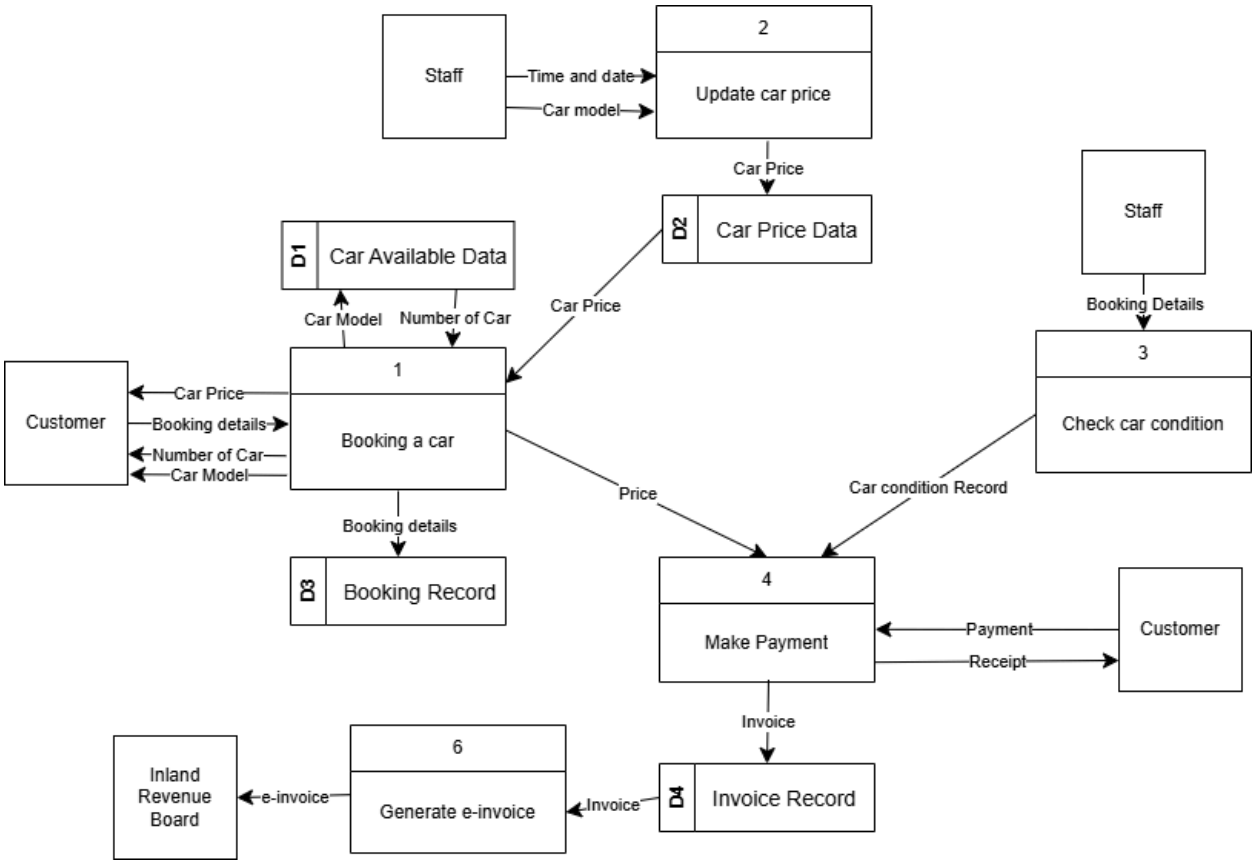
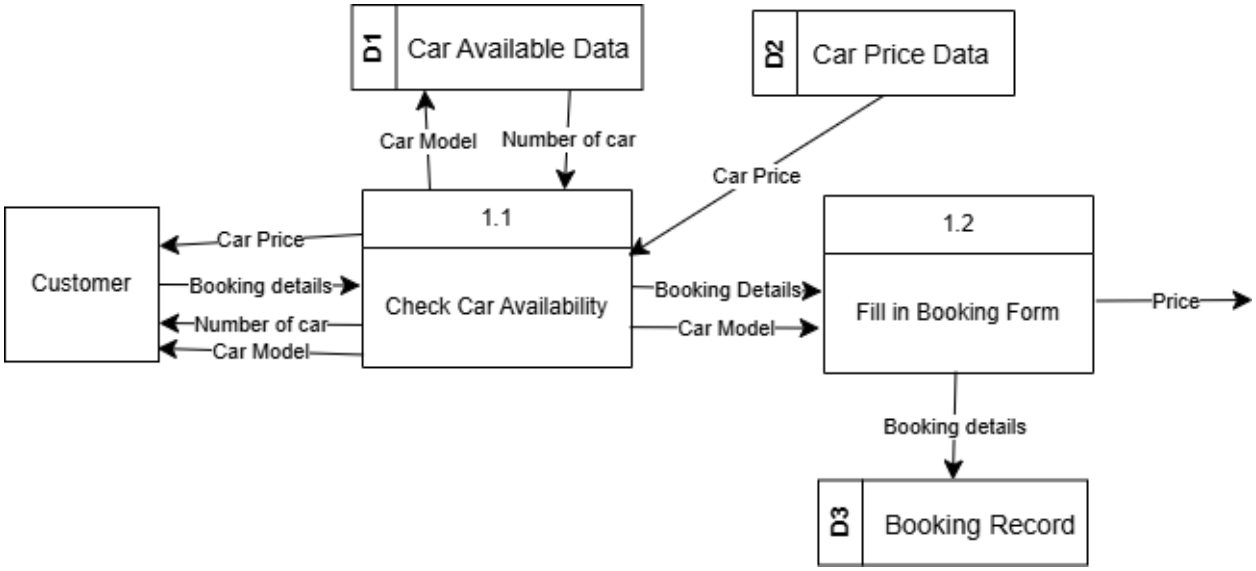


Diagram 0:



Child Diagram (Process 1):



5.3 Functional Requirement

➔ User Registration & Authentication:
Customers and staff can register and log in securely. Role-based access: admin, customer, operations staff.

➔ Vehicle Browsing & Search:
Customers may search vehicles by model, price, availability, or destination. Allow option to filter results (e.g., SUV, manual/automatic).

➔ Online Booking & Payment
Customers are allowed real-time booking for car rental with date/time selection. Centralised database that may store payments made by customers and automatically produce invoice.

➔ Rental Management
Managers may track active, upcoming, and completed rentals. Manager may set rules for late return, cancellations, and refunds.

➔ Fleet Management
Managers can add, update, or remove vehicle listings. Manager able to track vehicle condition, maintenance, availability through digitalised database.

➔ Customer Feedback & Support
Managers may collect ratings and reviews from customers after rentals for feedback. May provide a chat or ticketing system for support.

➔ Report Generation
System may generate usage statistics, financial summaries (invoice report), and customer reports and reviews.

➔ Discounts & Loyalty System
Provide promo codes, discounts and dynamic pricing for car rental. Track customer history and reward repeat customers.

➔ Notification System
Send emails/SMS for booking confirmations, reminders, or alerts.

➔ Location Services
Integrate Google Maps API to show car pickup/drop-off points.

5.4 Non-functional Requirement

★ Performance
Support at least 500 concurrent users with <3s page load time.

★ Scalability
Must accommodate new features (e.g., car subscription plans) and more users.

★ Security
Use HTTPS, input validation, and role-based access. Encrypt sensitive user and payment data (PCI DSS compliance).

★ Usability
Mobile-first responsive UI. Simple, intuitive navigation for all age groups.

★ Availability
Ensure 24/7 access with minimal downtime (<0.5% monthly).

★ Maintainability
Use a modular codebase (MVC architecture) for easy updates.

★ Portability
Accessible via web browsers and mobile devices (Android/iOS).

★ Interoperability
Integrate with external APIs (payment, map, vehicle tracking, CRM).

★ Compliance
Adhere to local laws (e.g., driver's license validation, rental terms). GDPR compliance for user data privacy in applicable regions.

★ Agility
Development should follow Agile methods (Scrum sprints, CI/CD pipelines).

6.0 Summary of Requirement Analysis Process

After conducting the requirement analysis process, it is found that there are many manual processes in the workflow of Hasta Travel And Tour Sdn Bhd car rental system. From the requirement analysis process, we have also identified a few processes that can be computerised to increase workflow efficiency and improve business processes. Those processes are as follows:

- ➢ Car Rental Booking Process

1. Car Availability Update
2. Dynamic Pricing
3. Booking Record Management

- ➢ Invoice System

1. Automatic Report Generation
2. Booking Payment Calculation
3. Invoice Record Management

Hence, from the gatherings from the requirement analysis process, a useful and intuitive car rental system can be designed and developed by fulfilling the requirements that have been analysed.