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**NATIONAL UNIVERSITY FAIRVIEW**

**College of Engineering and Technology  
Bachelor of Science in Information Technology**

**with Specialization in Mobile and Internet Technology**

**Smart Fare: Automating modern public utility jeepney (MPUJ) Payment with an Innovative Fare Collection System**

Project Documentation Submitted to the Faculty of

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National University Fairview

In Partial Fulfillment of the Requirements for

PROJMAN – PROJECT MANAGEMENT

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Table of Contents

[1. Executive summary 3](#_Toc146125180)

[1.1. Issue 3](#_Toc146125181)

[1.2. Anticipated Outcomes 4](#_Toc146125182)

[1.3. Recommendation 5](#_Toc146125183)

[1.4. Justification 6](#_Toc146125184)

[2. Business Case Analysis Team 7](#_Toc146125185)

[3. Problem Definition 8](#_Toc146125186)

[3.1. Problem Statement 9](#_Toc146125187)

[3.2. Organizational Impact 10](#_Toc146125188)

[3.3. Technology Integration 11](#_Toc146125189)

[4. Project Overview 12](#_Toc146125190)

[4.1. Project Description 13](#_Toc146125191)

[4.2. Goals and Objectives 13](#_Toc146125192)

[4.3. Project Performance 14](#_Toc146125193)

[4.4. Project Assumptions 16](#_Toc146125194)

[4.5. Project Constraints 17](#_Toc146125195)

[4.6. Major Project Milestones 18](#_Toc146125196)

[5. Strategic Alignment 18](#_Toc146125197)

[6. Cost Benefit Analysis 18](#_Toc146125198)

[7. Alternative Analysis 18](#_Toc146125199)

[8. Approvals 18](#_Toc146125200)

BUSINESS CASE

# Executive summary

Smart fare collection systems are transforming the way passengers pay for their rides, particularly within MODERN PUBLIC UTILITY JEEPNEYS (MPUJ). These systems empower commuters with the option to select their preferred payment method, whether it's using physical cash or an E-wallet, through kiosk machines inside the MPUJ, making fare payment more convenient.

By embracing this technology, numerous advantages emerge, including reduced reliance on cash transactions, enhanced efficiency, and a decrease in instances of fraud. Furthermore, it elevates the overall quality of customer service. Implementing the Smart Fare collection system is straightforward, seamlessly integrating it into existing transportation networks. This not only simplifies payment but also generates valuable data that can fine-tune service patterns, schedules, and pricing for the benefit of commuters.

Public transportation companies worldwide are adopting this concept to enhance service quality, cater to commuter preferences, and optimize operational costs.

## Issue

The operational problems faced by NOVADECI Transport Service may be attributed to its outdated manual fare-collecting method. The current system, which relies on physical paper tickets and manual validations, leads to extended waiting times during peak hours, resulting in delays and dissatisfaction among public transportation users. The lack of efficiency is a significant obstacle to the service's capacity to accommodate the increasing need for public transit and provide a smooth and uninterrupted client experience. The manual approach is susceptible to income leakage caused by fraudulent actions, threatening the business's long-term viability and reputation. The implementation of a modernized fare-collecting system would result in the optimization of operational processes and the improvement of cost-effectiveness. The growing discontent among customers about the cumbersome method is likely to result in a decline in ridership and pose a threat to the image of NOVADECI. The manual process tends to generate substantial amounts of paper waste. It heavily depends on energy-intensive practices, contradicting the escalating need for environmental sustainability. To tackle these concerns, NOVADECI Transport Service should consider the adoption of a Smart Fare Collection System. This system can optimize operational efficiency, mitigate revenue loss, boost customer satisfaction, and promote environmental sustainability.

## Anticipated Outcomes

Novaliches Development Cooperative (NOVADECI) Transport Service is expected to have a significant gain in terms of financial aspects and convenience to both the company and the passengers if the implementation of this project is to happen. The smart fare system could simplify revenue monitoring, eradicate cash, and advanced technology that allows the users to pay using their e-wallets while being able to choose their destination in the designated kiosk, making it more efficient and less time-consuming. On top of that, the system encourages using automated methods that are driver-centered and is also beneficial to the business itself. A user-friendly and structured system would be designed, developed, and implemented to facilitate the passengers’ fare collection and improve the service’s convenience, safety, and dependability for the client's customers. To sum it all up, the smart fare system aids the clients in achieving the business objectives without compromising the satisfaction of their customers.

# Recommendation

Our recommendation focuses on implementing an automated fare collection system, including incorporating payment kiosks inside Modern Public Utility Jeepneys. This system presents a contactless payment method that addresses current difficulties and provides various helpful features to improve the entire transportation experience for passengers.

Proposed Features of the Integrated System:

1. Contactless Payments: Enable passengers to make payments effortlessly, eliminating the need for physical cash and expediting the boarding process.
2. Implement NFC for the payment method: Modern payment ecosystems prefer NFC (Near Field Communication) for its simplicity, speed, security, seamless integration, variety, contactless and sanitary transactions, and capacity to interface with other services.
3. Real-time Fare Calculation: The system will calculate fares based on distance traveled, minimizing errors, and ensuring accurate passenger charges.
4. Enhanced Security: Payment kiosks will be equipped with advanced security measures to protect financial transactions and mitigate the risk of fraudulent activities.
5. User-Friendly Interface: The kiosks will be equipped with intuitive touchscreens and clear instructions, making them accessible to passengers of all backgrounds and technological proficiency.
6. Revenue Tracking: NOVADECI will have access to advanced data analytics tools to monitor revenue in real time, enabling proactive measures to detect anomalies or discrepancies.
7. Environmental Sustainability: NOVADECI's integrated system promotes environmental sustainability by minimizing the need for paper tickets and streamlining operations.
8. Monitor the estimated time of the passenger's pick-up and drop-off location: This feature might help the client to determine the time and areas of the passengers for them to handle or maximize their operation properly.
9. Monitor the daily and weekly number of passengers: This feature can help the client make schedules for the operation days of the MPUJ.
10. Display the rates of drop-off locations: This feature can help lessen the interaction between the passengers and the driver so that the driver can focus on their primary work, which is driving.

## Justification

To assist our valued client, Novaliches Development Cooperative (NOVADECI), in streamlining and enhancing their transportation fare management, our team is committed to collaborating closely with them. We will collaboratively design, develop, and implement a highly efficient and intuitive system that will not only optimize the collection of fares but also provide commuters with a seamless and flexible experience. This innovative solution will empower passengers to easily select their destinations and conveniently choose between e-wallet or cash payment options, prioritizing user-friendliness, security, and reliability. Ultimately, our efforts will align with the client's business goals and cater to the diverse needs of their customers.

# Business Case Analysis Team

Table 2 Business Case Analysis Team

|  |  |
| --- | --- |
| Designation | Name |
| Key Stakeholder/Project Sponsor | Mr. Mark Anthony Quiñon  *NOVADECI General Manager of the Transport Service* |
| Quality Assurance | Mr. Jose Eugenio L. Quesada  *Project Management Instructor* |
| Technical Writing Adviser | Ms. Nicole B. Ribano  *EXCOMP 2 Instructor* |
| Project Adviser | Mr. Carpio, Christopher T.  *BSIT Program Chair* |
| Project Manager | Chua, Ronch Amos T.  *Student* |
| Product Engineer | Baltazar, Crisha Maye O.  *Student* |
| Product Designer | Balunsong, April Juliana A.  *Student* |
| Programmer | Bacaling, Domminic T.  *Student* |

# Problem Definition

The current problems encountered by NOVADECI Transport Service are mainly attributed to the outdated structure of its manual fare-collecting system. The primary issue is the lack of efficiency shown by the manual method, resulting in extended lines for passengers, delays in operations, and an overall poor customer experience, particularly during periods of high demand. A further significant concern is the loss of income resulting from fraudulent practices such as counterfeiting and illegal entry inside the manual operational procedures, posing a danger to the financial viability of NOVADECI. Furthermore, the system's reliance on manual labor for collecting and validation processes results in significant operating expenses and poses management difficulties. Customer dissatisfaction is increasing due to passengers' increased demand for a seamless experience, which the existing system cannot provide. The discontent mentioned above can negatively influence the number of individuals using the transportation service and the overall standing of NOVADECI in the eyes of the public.

In conclusion, the use of manual systems conflicts with environmental sustainability objectives due to the generation of paper waste and the implementation of energy-intensive procedures.

Considering the challenges mentioned above, it is crucial to implement a Smart Fare Collection System, as it provides several benefits such as enhanced operational efficiency, safeguarding of income, decreased costs, heightened customer pleasure, and a commitment to environmental sustainability. This thesis aims to provide a persuasive argument for the adoption and execution of its proposed implementation.

## Problem Statement

The client, Novaliches Development Cooperative (NOVADECI), is facing the following problems:

* Currently, the NOVADECI cooperative transportation services only provide salaries to the drivers in accordance with the budget.
* The NOVADECI Cooperatives Modern Public Utility Jeepney drivers are having trouble computing and collecting fares from the passengers.
* The NOVADECI Cooperative is having difficulty keeping up with and managing the needs of monitoring the quotas of its Modern Public Utility Jeepney drivers.

## Organizational Impact

Implementing the Smart Fare Collecting System in Modern Public Utility Jeepney could have a big advantage for NOVADECI Cooperatives Transport Service. The Smart Fare Collecting System can monitor daily profits and combine devices that accept the e currency, which provisional authorities can monitor. Here are three key impacts:

1. Enhanced Operational Efficiency: By streamlining the fare collection procedure, the system saves time and effort on human cash handling and ticket issuing. Shorter turnaround times for MPUJs might come from faster passenger boarding and disembarking due to this efficiency. Instead of managing monetary transactions, drivers may concentrate more on driving safely and providing excellent customer service.
2. Greater Revenue and Transparency: By allowing customers to pay with e-wallets, the business may reach a wider market and draw in tech-savvy commuters who favor electronic payment methods. The technology also increases transparency in fare collecting, lowers the possibility of revenue leakage, and makes sure that all fares are correctly recorded and accounted for.
3. Enhanced Passenger Experience: Thanks to the system's user-friendly interface and destination selection function, commuters may now enjoy a convenient and up-to-date commute. By making it simple for commuters to pick their destinations, check fare information, and select their preferred payment method, NOVADECI’s MPUJs may end up attracting more passengers than other forms of transportation and increasing customer satisfaction.

Therefore, the Smart Fare Collecting System of the Novaliches Development Cooperative (NOVADECI) Transport Service can enhance revenue monitoring and reduce the need for cash. In addition, the system encourages using automated methods that benefit both the company and the Modern Public Utility Jeepney drivers.

## Technology Integration

A more traditional approach is taking the place of the conventional system, which used conductors and cash payments to collect fares on public transit. The necessity for a more user-friendly and effective fare collection mechanism is what motivated this development. The previous approach had certain disadvantages, including lengthier boarding delays, security threats, and less flexibility for travelers who prefer using digital wallets.

The new fare collecting system includes electronic wallets and a web-based system, giving customers easier and safer payment options. Additionally, it enables users to quickly choose their destinations using digital interfaces, eliminating the need for physical meeting with collectors and accelerating the boarding procedure. The technology also gathers information on passenger travel, which aids in route and schedule optimization for authorities.

The overall goal of this transition to advanced fare collecting technologies is to improve operational effectiveness, strengthen revenue security, and improve the customer experience. It is an important step toward upgrading public transit and enhancing everyone's commuting experience.

# Project Overview

The Smart Fare Collecting System, which is being presented, presents a contemporary resolution to address the inefficiencies associated with the manual fare-collecting procedure now used by NOVADECI Transport Service. This initiative aims to enhance operational effectiveness, enhance security measures, and promote environmental sustainability by implementing contactless payment systems and integrating real-time fare computation mechanisms. The proposed system aims to include payment kiosks in the Modern Public Utility Jeepneys fleet, enabling passengers to engage in cashless transactions. Furthermore, The project emphasizes using data analytics and security measures, facilitating the real-time monitoring of income and guaranteeing the safety of financial transactions. The system follows NOVADECI's dedication to environmental sustainability by mitigating using paper and advocating for environmentally responsible behaviors. This project signifies a noteworthy advancement in the modernization and streamlining of the fare-collecting procedure, showcasing the commitment of the firm to delivering transportation services that are efficient, safe, and ecologically sustainable.

## 4.1. Project Description

This project focuses on the need of the Novaliches Development Cooperative (NOVADECI) transport service to adopt their Modern Public Utility Jeepneys payment system to be more effective on managing and collecting passengers’ fares. This system utilizes advanced technologies to provide passengers with a convenient and secure way to pay their fares. The project will eliminate the need to manually collect fares, which results in a procedure that is not only quicker but also more efficient and dependable. To facilitate the client's fare collection and enhance the service's accessibility, security, and reliability for the client's consumers, a user-friendly and effective system will be created, developed, and implemented. This project seeks to develop an Automated Fare Collection System to provide Modern Public Utility Jeepney drivers and passengers with inconvenient experiences.

## 4.2. Goals and Objectives

* To reduce the client's expense in paying wages in utilization by 20% within the first 3 months of implementing the smart fare project.
* To minimize the losses of fare by 10% within the first 3 months of implementing the smart fare project.
* To establish a centralized system that allows the client to manage all of the fare related documents from the Smart Fare Device within the first 3 months of implementation of the Smart Fare project.
* Increase the cash flow by 10% within the first 3 months of implementing the smart fare project.

## Project Performance

To gauge the project's performance and outcomes, the team will set the following metrics based on ISO 9126:

|  |  |  |
| --- | --- | --- |
| Functionality | Suitability | Can software perform the tasks required? |
| Accuracy | Is the result as expected? |
| Interoperability | Can the system interact with another system? |
| Security | Does the software prevent unauthorized access? |
| Reliability | Maturity | Have most of the faults in the software been eliminated over time? |
| Fault tolerance | Is the software capable of handling errors? |
| Recoverability | Can the software resume working and restore lost data after failure? |
| Usability | Understandability | Does the user comprehend how to use the system easily? |
| Learnability | Can the user learn to use the system easily? |
| Operability | Can the user use the system without much effort? |
| Attractiveness | Does the interface look good? |
| Efficiency | Time Behavior | How quickly does the system respond? |
| Resource Utilization | Does the system utilize resources efficiently? |
| Maintainability | Analyzability | Can faults be easily diagnosed? |
| Changeability | Can the software be easily modified? |
| Stability | Can the software continue functioning if changes are made? |
| Testability | Can the software be tested easily? |
| Portability | Adaptability | Can the software be moved to other environments? |
| Installability | Can the software be installed easily? |
| Conformance | Does the software comply with portability standards? |
| Replaceability | Can the software easily replace other software? |
| All  characteristics | Compliance | Does the software comply with laws or regulations? |

## Project Assumptions

The following assumptions must be made for the proposed undertaking to be effective:

* The digital fare system will be compatible with all existing transportation for vehicles and fare collection systems.
* Costs associated with implementing a smart fare are anticipated to be economically viable and in line with the anticipated rate of return.
* It will adhere to all mandatory specifications for the market of interest.
* The project team will efficiently instruct employees and passengers on how to use the smart fare.

## Project Constraints

Here are the following constraints of the proposed project:

Smart fare collecting system is only exclusive to the NOVADECI company.

* Compatibility Constraint: The digital fare system must be compatible with all existing transportation vehicles and fare collection systems. This constraint sets a requirement that the system should seamlessly integrate with various modes of transportation and existing fare collection infrastructure.
* Cost Constraint: The costs associated with implementing the smart fare system must be economically viable and aligned with the anticipated rate of return. This constraint ensures that the project budget remains within a reasonable range and is justifiable based on the expected financial benefits.
* Specification Constraint: The smart fare system must adhere to all mandatory specifications for the market of interest. This constraint establishes the need for the system to meet all necessary regulatory requirements, industry standards, and any other relevant specifications in the target market.
* Training Constraint: The project team must efficiently instruct employees and passengers on how to use the smart fare system. This constraint emphasizes the importance of providing effective training programs and materials to ensure that both employees and passengers can easily understand and use the smart fare system.

## Major Project Milestones

# Strategic Alignment

# Cost Benefit Analysis

# Alternative Analysis

# Approvals