**VodactPRO: A FEASIBILITY STUDY OF EXPANDING PASSENGER’S PAYMENT METHOD IN MODERN PUBLIC TRANSPORTATION**

A Feasibility Study

Presented to

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**Chapter I**

**INTRODUCTION**

The emergence of electronic payment systems for public transport worldwide has revolutionized the collection of transportation data, providing valuable insights into urban travel behavior. This paper examines various aspects of smart card-based fare collection systems and their implications for public transit planning and operation. It delves into case studies from cities like Singapore, where smart card activity data are analyzed to characterize public transport systems and travel behaviors. Additionally, it explores innovative solutions such as the IOTApass payment system, designed to streamline public transport payments using distributed ledger technology. The integration of smart card and GPS data further enables real-time forecasting of passenger flows, enhancing the efficiency of bus scheduling and service optimization. Furthermore, the paper discusses the potential of utilizing smart card data to improve transit planning and customer experience, as evidenced by analyses of systems like the Chicago Transit Authority's smart card usage patterns. Through these discussions, the paper highlights the transformative potential of electronic payment systems in shaping the future of public transportation.

In a significant stride towards enhancing public transportation convenience, Mastercard holders in the Philippines can now tap their cards to pay for Metro Rail Transit (MRT) Line 3, Edsa, and Bonifacio Global City bus rides, thanks to a collaboration between Mastercard and AF Payments Inc., the company behind Beep cards. This partnership aims to streamline the commuting experience by allowing passengers to use their Mastercard for both transit fares and regular purchases, eliminating the hassle of purchasing separate tickets. The Department of Transportation (DOTr) is also advocating for a unified fare collection system project worth P4.5 billion, enabling commuters to utilize credit or debit cards across various transportation systems including jeepneys, buses, and trains. Through Beep's network, Mastercard debit, prepaid, or credit cardholders can seamlessly access Philippine public transport without the need for individual tickets. Beep's CEO and President, JJ Moreno, highlighted the initiative's potential to benefit millions of Filipino commuters, aligning local transit systems with global standards. Simon Calasanz, Mastercard's Country Manager for the Philippines, emphasized the partnership's contribution to enhancing the commuting experience, simplifying payment processes, and reducing queues during peak hours. While the rollout date for this payment mode is yet to be officially announced, its introduction is anticipated to further advance smart mobility and improve commuters' payment experiences in Metro Manila.

In line with the Public Utility Vehicle Modernization Program (PUVMP), the province of Oriental Mindoro has embraced the adoption of Vodacto vehicles, marking a significant step towards modernizing its public transportation system. Vodacto buses represent the epitome of modern transportation, boasting state-of-the-art features and amenities tailored to enhance passengers' commuting experience. With the increasing demand for modern PUVs, there's a corresponding need for seamless and efficient ticket payment methods in today's fast-paced world. Introducing the V card, also referred to as a transit or smart card, emerges as a solution to this demand. These cards, equipped with RFID or NFC technology, enable commuters to swiftly pay for their transportation needs by simply tapping or swiping their card upon boarding a Vodacto bus or other forms of public transit. Offering advantages such as cashless transactions, reduced wait times, and potentially discounted fares for regular users, V cards have become integral to streamlining public transportation processes, particularly in rural areas like Oriental Mindoro where Vodacto buses have become a symbol of modernity and efficiency in transportation.

**Chapter II**

**Market Study**

**2.1 Name and description of the product**

Taking the stress out of your commute, VodactPRO is a handy prepaid card made specifically for easy bus fare payments. You can board buses without having to worry about carrying cash or looking for exact change when you have a VodactPRO with you. Unmatched convenience and adaptability are provided by VodactPRO. Customers can load money onto the card via a number of channels, including authorized kiosks, online portals, and affiliated retail stores. After being loaded, the card becomes your ticket to hassle-free travel. It's never been easier to find your way around city transit systems. Whether you're a frequent traveler or a daily commuter, VodactPRO guarantees quick access to public transportation services without making you wait in line at vending machines or ticket counters. All you have to do to board is tap your card on the assigned reader, and you're off and running. VodactPRO offers advantages that go beyond ease of use. Because the card eliminates the need to carry large amounts of cash, users benefit from increased security as there is less chance of theft or loss. Furthermore, VodactPRO transactions offer real-time usage insights and transaction history for effective budget management through seamless integration with automated fare collection systems. With VodactPRO, embrace the urban mobility of the future. Join the innumerable commuters who have already embraced our prepaid card solution's ease of use and effectiveness, which is revolutionizing the way you pay for transit.

**2.2 Uses of the product**

VodactPRO simplifies daily commuting for students and working professionals by eliminating the need for daily cash transactions. Users can preload their cards with sufficient funds for regular bus fares, ensuring convenience and efficiency. Additionally, VodactPRO can be integrated with specialized transportation services tailored to specific groups, such as students, senior citizens, or people with disabilities, offering easy access to subsidized or discounted transportation. Promoting public transportation over private vehicles, VodactPRO contributes to environmental sustainability initiatives by reducing carbon emissions and alleviating urban traffic congestion.

**2.3 User of the product**

VodactPRO simplifies daily commuting for individuals reliant on public transportation for their work, school, or other daily destinations, offering a cashless solution for bus fare payments. Specifically tailored for students, VodactPRO provides an effortless way to pay for bus fares, streamlining travel to and from educational institutions. Families benefit from VodactPRO's convenience, facilitating cost management for group commutes and leisure outings. For senior citizens, VodactPRO offers a secure and hassle-free payment option, enhancing accessibility to public transportation without the need for cash. Similarly, people with disabilities find VodactPRO's user-friendly features and accessibility options invaluable for navigating public transportation, providing a dependable method for accessing specialized transportation services tailored to their specific needs.

**2.4 Demand and supply analysis**

**Demand analysis**

The demand for VodactPRO increases as its price drops, offering competitive pricing compared to other payment methods, particularly appealing to higher-income earners due to its accessibility and convenience.

**Supply analysis**

Cost of Production: Materials, labor, technology, and distribution costs influence VodactPRO supply, with lower production costs resulting in higher supply levels. Adequate technology and infrastructure support higher supply levels by facilitating production, distribution, and transaction handling. Competition from alternative payment methods such as cash, credit/debit cards, and mobile payment apps can impact VodactPRO supply through adjustments in pricing strategies and supply levels. Collaborations and partnerships with companies, organizations, or transportation authorities can enhance supply levels, brand visibility, and distribution channels for VodactPRO.

**2.5 Marketing Program**

**2.5.1 Target Market**

VodactPRO's target market encompasses daily commuters, including professionals, students, and individuals without personal vehicles, residing in cities with well-developed public transportation systems. Additionally, students in high school, college, or vocational programs seeking convenient payment methods for bus fares are targeted, along with families requiring economical transportation solutions for group travel. Moreover, senior individuals, retirees, and those with mobility issues who rely on public transit are targeted, as well as individuals with disabilities needing accessible payment methods and specialized transportation services.

**2.5.2 Channel Distribution**

To test how good and well distributed the quality of the limited Modern Bus Load Card; the business will implement survey for the first week of the implementation. Whatever the result is will surely make the business improve.

**2.5.3 Marketing Strategies/promotion**

VodactPRO aims to revolutionize transportation payments by offering a convenient solution, targeting daily commuters, including professionals, students, families, seniors, and those with disabilities. Leveraging social media and partnerships with transportation authorities and educational institutions, VodactPRO will promote its benefits of ease, accessibility, and security, positioning itself as the preferred cashless bus fare payment choice and ensuring increased adoption and market penetration among modern commuters.

**2.5.4 Competition**

In the competitive landscape of transportation payment solutions in the City of Calapan, Oriental Mindoro, VodactPRO stands out as a pioneering venture, possibly the first of its kind in the entire region. With its innovative approach to using smartphones for public transportation payments, VodactPRO currently faces minimal competition as there are no similar businesses in operation. However, as with any business, competition may arise in the future.

**2.5.5 Pricing**

The amount of money that will be getting in this business is just the same as the prices in Local Gift Shops. The expected price of the business is in the range of 30-50 pesos per card, since this business also uses scanning to access your mode of payment it’ll be faster and will have an automatic range of payment you need to pay depending on the place you are going or from.

**2.5.6 Packaging**

The packaging for VodactPRO is simply just the same as other payment method cards/credit cards you have seen in public transport. With its purple/white color it’ll help you determine which card it is from basing it from its choice of color.

**Chapter III**

**TECHNICAL STUDY**

**3.1 The Product**

A bus transportation card is a convenient and efficient way for passengers to pay for their bus fares. Usually, these cards are contactless or smart cards having a microchip integrated with them. Passengers can load credit or funds onto the card either at ticketing booths or at designated terminals. When boarding a bus, passengers simply tap their card on the card reader located near the driver or at the entrance, and the fare is automatically deducted from the card's balance. These cards often offer benefits such as discounted fares for frequent travelers, easy balance management through online platforms or mobile apps, and the ability to track usage for budgeting purposes. They are widely used in urban areas to streamline the payment process and reduce reliance on cash transactions.

**3.2 Machinery and Equipment**

Here's a simplified manufacturing process for a card and load of a bus transportation:

Manufacturing Process for Cards:

* Card Printing: The design and information, including logos, serial numbers, and any security features, are printed onto the card surface using specialized printers. This process may involve offset printing, digital printing, or screen printing depending on the complexity of the design.
* Encoding: For smart cards or contactless cards, encoding involves embedding a microchip or antenna into the card and programming it with relevant data such as card balance, user information, and security keys.
* Lamination: The printed cards are typically laminated to protect the surface and increase durability. This process involves applying a thin layer of protective film over the printed surface using heat and pressure.
* Die-cutting and Finishing: Once laminated, the cards are die-cut into the desired shape and size using precision cutting machines. Any excess material is removed, and the edges of the cards are smoothed to ensure a clean finish.
* Quality Control: Throughout the manufacturing process, quality control checks are conducted to ensure that the cards meet industry standards for durability, readability, and security features.
* Packaging: Finally, the finished cards are packaged in batches and prepared for distribution to transportation agencies, retailers, or directly to end-users.

Manufacturing Process for Load:

* Software Development: Load products often rely on software systems to manage purchases, account balances, and transactions. The manufacturing process begins with the development and testing of the software platform that will support the load product.
* Integration with Payment Systems: Load products typically involve payment processing systems to handle transactions securely.
* Maintenance and Updates: Continuous maintenance and updates are performed to keep the load product system running smoothly and to address any issues or enhancements identified over time. This includes regular software updates, security patches, and improvements to the user experience.

**3.3 Time and Motion Study**

This study involves observing and recording the time taken to complete each specific step of the manufacturing process for a card and load of bus transportation.

Time and Motion for Card Usage:

Boarding Time: Time taken by passengers to tap or swipe their cards at the card reader when boarding the bus.

Transaction Processing: Time taken by the card reader to process the transaction and deduct the fare from the card balance.

Response Time: Time taken for the card reader to respond to the card tap or swipe.

Error Handling: Time is taken to resolve any errors encountered during the transaction, such as insufficient balance or card malfunction.

Queue Time: Time spent by passengers waiting in line to board the bus and tap their cards.

Verification Time: Time taken by bus drivers or inspectors to visually verify the validity of the card and ensure proper fare payment.

Customer Service: Time taken by customer service representatives to address any issues related to card usage, such as lost cards, balance inquiries, or card replacements.

Time and Motion for Load Product Usage:

Purchase Time: Time taken by users to purchase load credits or tickets through various channels, such as mobile apps, kiosks, or ticketing booths.

Transaction Processing: Time taken by the payment system to process the load purchase transaction and update the user's account balance.

Confirmation Time: Time taken for users to receive confirmation of their load purchase, either through a digital receipt, SMS, or email.

Redemption Time: Time taken by users to redeem their purchased load credits or tickets when boarding the bus.

Account Management: Time taken by users to manage their load accounts, such as checking balances, reloading credits, or updating personal information.

Technical Support: Time taken by users to seek technical support for any issues related to load product usage, such as payment processing errors or account discrepancies.

Refund Processing: Time taken by users to request refunds for unused load credits or tickets, as well as the time taken by the system to process refund requests.

**3.4 Plant Size and Production Schedule**

**Plant Size**

This study's focus area is determined by a number of factors, including demand forecasting, production capacity, lead times, and inventory management.

**Production Schedule:**

| **Month** | **Demand (Cards)** | **Production Schedule (Cards)** | **Production Status** |
| --- | --- | --- | --- |
| January | 50,000 | 50,000 | On schedule |
| February | 55,000 | 55,000 | On schedule |
| March | 60,500 | 60,000 | On schedule |
| April | 66,550 | 66,000 | On schedule |
| May | 73,205 | 73,000 | On schedule |
| June | 80,526 | 80,000 | On schedule |
| July | 88,578 | 88,000 | On schedule |
| August | 97,436 | 97,000 | On schedule |
| September | 107,180 | 107,000 | On schedule |
| October | 117,898 | 117,000 | On schedule |
| November | 129,688 | 129,000 | On schedule |
| December | 142,657 | 142,000 | On schedule |

**3.5 Building and Facilities**

**Table 1.** **Machinery and Equipment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Machineries and Equipment** | **Description** | **Cost Per Unit** | **Quantity** | **Estimated Cost** |
| **Card Printing Machines** | VodactoPass cards are made using specialized machinery called card printing machines. These devices make it possible to print logos, card designs, and other graphical components onto card surfaces in a high-quality manner. | **20,000** | **1** | **20,000** |
| **RFID Chip Embedding Equipment** | In order to improve the security and functionality of VodactoPass cards and facilitate safe, contactless transactions during bus transportation payments, RFID chip embedding equipment is essential. | **150,000** | **1** | **150,000** |
| **Lamination Equipment** | Lamination equipment is necessary to keep VodactoPass cards reliable and high-quality under a variety of environmental circumstances. These devices enhance durability and resilience to wear and tear by securely bonding laminate layers to card substrates using heat and pressure. It ensures that VodactoPass cards maintain their longevity and integrity, continuing to be both aesthetically beautiful and practical for prolonged usage. | **15,000** | **3** | **45,000** |
| **Card Punching and Cutting Machines** | Card punching and cutting machines ensure that VodactoPass cards are sized and finished uniformly and precisely, making them easier to use and compatible with card readers and accessories. These devices improve the overall quality and functionality of VodactoPass cards by allowing for efficient and precise card finishing. | **10,000** | **1** | **10,000** |

**3.6 Plant Location**

An optimal factory location for VodactoPass card manufacture would be in a strategically favorable place, considering aspects such as supply chain efficiency, labor availability, market proximity, and regulatory concerns.

Location: Calapan City   
Cialapan City is located near major raw material and component sources for VodactoPass card production. This proximity lowers transportation costs and lead times for procuring materials, resulting in a smooth and efficient supply chain. Calapan's total business costs are competitive, with low land, utility, and tax rates. Furthermore, the local government may provide incentives or tax cuts to encourage manufacturing investments, hence increasing cost-effectiveness.

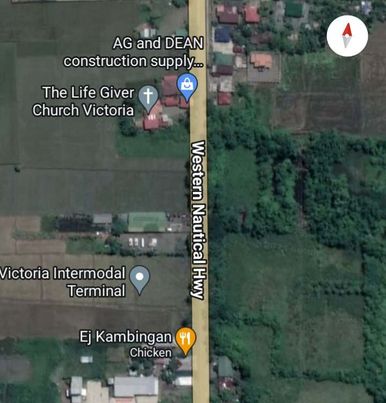


**Figure 1. Plant Location**

**3.7 Plant Layout**

Bus in Victoria has its card scanner placed in a convenient location close to the entry, making it simple for riders to use. Its height allows standing and seated customers to reach it, making it convenient for everyone. Passengers are guided to the scanner by clear signs, which reduces confusion and promotes quick boarding. The arrangement leaves enough room around the

scanner to handle lines at rush hour without impeding passenger traffic. In addition, the scanner has a visible display that shows if the card has been successfully read, giving travelers quick feedback. Overall, passenger comfort and efficiency were taken into consideration when designing the card scanner configuration on Victoria's Bus.

**Figure 2. Plant Layout**

**3.8 Building and Facilities**

VodactPRO's infrastructure includes a Ticketing Office for purchasing or topping up cards, a Card Distribution Center for obtaining or reloading cards, Scanner Stations for card reading at entry and exit points, a Waiting Area with amenities, and an Information Desk staffed with personnel to assist with inquiries and troubleshooting.

**3.9 Raw Materials and Suppliers**

In the context of a bus card and scanner system, raw materials encompass the physical components utilized in manufacturing the cards and scanners, such as plastic for the cards and electronic components for the scanners, among others necessary for assembly. Suppliers are the entities furnishing these raw materials to the manufacturer of the cards and scanners, which may include specialized manufacturers of plastic, electronics, or other essential components. Reliable suppliers are essential for maintaining the quality and timely production of the bus cards.

**3.10 Utilities**

**Table 2. Utilities**

|  |  |  |
| --- | --- | --- |
| **Utilities** | **Description** | **Estimated Monthly Cost** |
| **VodactPRO** | Oriental Mindoro’s card used for another way of payment method when transporting to Public Modern Buses. One Swope, and you’re good to go! | ₱ 50 |
| **Scanner** | The Corporations of the public modern bus in Oriental Mindoro provides the scanner where you swipe your VodactPRO when paying. | ₱ 5,000(per bus) |
| **Total Cost** |  | **₱5,050** |

**3.11 Waste Disposal**

In a place that is surrounded by active people, waste disposal should be properly disposed of. To maintain the cleanliness inside the bus, the business provides a bin that can catch the trash that all customers have. In the current time that cleanliness is the most important thing, the business also put a sign inside the bus that tells the location of the bin. The Public Bus community will also contact the nearest track in Oriental Mindoro that collects the trash to keep the buses clean in accordance with the city transportation rules.

**3.12 Labor Requirements**

To establish this type of business the requirement of the laborers should have the characteristic of having an experience on knowing the quantity and balance of a customer’s/commuter’s load when paying. This will make sure that every student or worker with a status will have good fairness when paying for a certain distance from their destination.

**Chapter IV**

**MANAGEMENT ASPECTS**

In this chapter of the business of VodactPRO, the best handling of these products is crucial. The community would be able to draw and keep consumers by managing inventories as well as offering top-notch customer service by putting successful marketing plans into practice. This comprised organizational concerns, corporate type for the product, including the structure and requirements salary for the product.

**4.1 Basic Considerations Informing the Organization**

Before the company/business may formally launch, the owner must study the profound purpose of the product, considering the following considerations.

**Location**

The location of the business is in the scope of Oriental Mindoro’s land, more specifically aims the landmarks from Calapan City to Victoria. The location was chosen so that the commuters should have no trouble finding it. Additionally, the establishment's location is clear to be prominent and accessible to potential clients such as the gas/bus stations for the recharging or reloading of their card.

**Target Customer**

The students and workers or every individual who commutes within Calapan – Victoria of Oriental Mindoro since the purpose of our product is to give them a faster and efficient time to pay without worrying about getting change from bus drivers.

**Capital**

The amount of total funding needed will vary depending on the interest that commuters give to the product and its purpose. To accurately project startup costs and investigate available finance options, including loans, grants, and investors, it is critical to develop a thorough business plan.

**Hiring People**

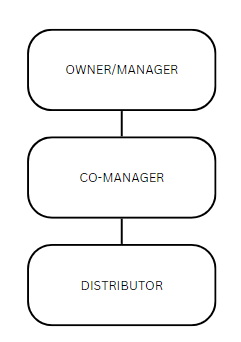
To guarantee that new hires can successfully carry out their work responsibilities and contribute to the growth of the community, the staff must also be trained and well knowledgeable about the product to meet the success of the business.

**4.2 Forms of Business Ownership**

The business's decisions, earnings, and liabilities are entirely under the distributor’s control, yet the community maker is also responsible for the debts and responsibilities of the company personally. This type of ownership involves one or more people who divide the costs, obligations, and decision-making duties. All partners in a general partnership are equally liable and responsible for the business.

**4.3 Organization Structure**

An organizational structure is the hierarchy and connection system that establishes how a business is set up and runs. It includes formal connections, job duties, and avenues of business communication.

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**Figure 3. Organizational structure**

The numerous organizational ranks are shown in the figure above. Furthermore, it tells them who to contact in case something goes wrong at work. Beginning with the owner/manager, the power extends to the staff of the organizational structure.

**4.4 Manpower Requirements**

**Table 3. Manpower Requirements**

|  |  |
| --- | --- |
| **Position** | **Number of Employees** |
| **Owner/Manager** | 1 |
| **Co-Manager** | 1 |
| **Distributor** | 1 per bus |

**Owner/Manager**

Managers oversee allocating an organization's (human, financial, and operational) resources in a way that advances its goals and objectives. Leading the team, creating goals, monitoring results, making choices, and analyzing performance are just a few examples of managerial responsibilities.

Qualifications

* Leadership mentality
* Time-management skills
* Problem-solving capability
* Decision-making skills
* Team-oriented mindset
* Effective feedback delivery

**Co-Manager**

A Co-Manager serves as a company's initial point of contact with its customers if the Owner/Manager is out of contact. Just like a Front Desk admin, they carry out crucial front desk administrative tasks, such as welcoming clients and managing the business budget. Additionally, referred to as a receptionist.

Qualifications

* Excellent communication skills
* Exceptional interpersonal skills
* Ability to work with different groups of people.
* Multitasking abilities
* Efficient time management skills
* Proficiency in computer programs

**Distributor**

The Distributors are the ones who will give out the product to the commuters/customers. It’s either they are the conductors who promote and give out the products to the passengers or the clerk or a business owner within a loading station of a gas/bus stations.

Qualifications

* Communication Skills
* Strong problem-solving skills
* Interpersonal skills
* Creative thinking
* Team working

**4.5 Compensation**

To attract and retain qualified individuals, the company has a pay policy that promotes excellent performance while maintaining labor market competitiveness. For salary payments to be sent via bank transfers, employees must provide the manager with their bank account information. If they do not, the management will work something out to pay their salaries. Employees are eligible to incentives when the company is established, which encourages them to report for duty.

**4.6 Project Schedule**

The business hours of operation will be 6:00 a.m. to 8:00 p.m.

**Table 4. Work Schedules**

|  |  |  |
| --- | --- | --- |
| **POSITION** | **Work start time** | **Work end time** |
| **Owner/Manager** | 6:00 a.m. | 8:00 p.m. |
| **Front Desk Staff** | 6:00 a.m. | 8:00 p.m. |
| **Technical Assistant Staff** | 6:00 a.m. | 8:00 p.m. |