Streamlining Motorized Tricycle Operator's Permit Management in Isabela City, Basilan through QR Code-based Records Keeping and Verification

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Abstract— *Motorized tricycles are an important mode of transportation in the Philippines, particularly in rural areas. The government requires operators of motorized tricycles to obtain a permit to ensure safety and regulate the industry. However, managing the records of motorized tricycle operator's permits (MTOP) can be challenging due to the large number of operators and the manual recording system used by many local government units (LGUs). This paper proposes a Motorized Tricycle Operator's Permit Records Management System with QR code generation that will automate and streamline the MTOP process. The system will provide an efficient way to record and manage MTOP information and generate QR codes for easy identification and verification of MTOP holders. The proposed system will be evaluated against existing MTOP systems in the Philippines, and its advantages and disadvantages will be discussed.*

Keywords— *Motorized Tricycle Operator's Permit, Records Management System, QR code.*

I. INTRODUCTION

Tricycles are one of the most commonly used modes of public transportation in the Philippines, particularly in rural areas. In many cities and towns, the local government units (LGUs) issue Motorized Tricycle Operator's Permits (MTOPs) to tricycle drivers to regulate their operations and ensure public safety. However, managing and validating these permits can be challenging and time-consuming for LGUs.

The MTOP is a permit issued to motorized tricycle operators to operate their vehicle in a specific LGU. The permit is issued by the LGU's Tricycle Regulatory Board (TRB) or a similar agency. The requirements for obtaining an MTOP vary by LGU but generally include a valid driver's license, vehicle registration, and proof of insurance. The MTOP is typically valid for one year and must be renewed annually.

Traditionally, the MTOP record-keeping and validation process involves manual verification, which can lead to errors and delays in the validation process. To address these challenges, a proposed Motorized Tricycle Operator's Permit Records Management System with QR has been developed. The system aims to automate the validation process using QR codes and improve the efficiency and accuracy of the MTOP management system.

The management of MTOP records is critical for regulating the motorized tricycle industry in the Philippines. A well-maintained MTOP record system allows LGUs to monitor and regulate the number of tricycles operating in their jurisdiction, ensuring that the roads are not overcrowded and that only qualified drivers are operating tricycles. It also allows LGUs to track and monitor the safety of the tricycles, including their maintenance and compliance with safety regulations.

Currently, many LGUs in the Philippines use a manual recording system for MTOP, which involves storing paper records in filing cabinets or binders. This system is prone to errors, loss, and damage, and is inefficient in terms of time and resources. Some LGUs have begun using computerized systems for MTOP records management, but these systems are often not integrated and can still be prone to errors.

In the context of the motorized tricycle operator's permit records management system, QR code technology can be utilized to generate a unique code for each permit holder. This code can be printed on the operator's permit card or displayed on their mobile device. Whenever an operator's permit is scanned, the information stored in the QR code can be retrieved and checked against the records in the database. This enables a more efficient and accurate way of verifying the authenticity of the permit and the identity of the permit holder.

QR code (Quick Response code) is a two-dimensional barcode that can be read by a QR code reader or a smartphone with a camera. It was first designed in Japan for the automotive industry to track vehicle parts during the manufacturing process. Nowadays, QR codes have been widely used in various industries due to its ability to store more information than traditional barcodes.

QR codes consist of black squares arranged on a white background, and it can store different types of data such as text, URL, contact information, or even multimedia files. The data is encoded in the form of a series of modules, which can be read and decoded by a QR code scanner. QR codes are commonly used in marketing, ticketing, payment, and inventory management.

QR codes also provide a convenient way of sharing information between different devices. For example, if an operator needs to transfer their permit to a different device or update their personal information, they can simply scan the QR code and the updated information will be automatically updated in the system. This reduces the need for manual data entry and minimizes the risk of errors.

Several studies have been conducted on tricycle driver management systems in the Philippines. For instance, in 2018, Tanggol and Mariano proposed a system that uses Radio Frequency Identification (RFID) technology to automate the validation of tricycle drivers' permits. The system includes an RFID reader installed in a tricycle terminal, which scans the RFID tags embedded in the MTOP card, and a database that stores the tricycle driver's information and permit validity. The system can quickly detect invalid permits and deny entry to tricycle drivers without valid MTOPs.

Similarly, in 2019, Castillo et al. developed a tricycle driver management system that uses GPS and mobile technology to track tricycles' movement and validate permits. The system includes a mobile application that tricycle drivers can use to log their trips, and a web-based system that LGUs can use to monitor and validate their permits. The system can detect drivers with invalid permits and alert the LGU.

These studies demonstrate the potential of technology to improve the efficiency and accuracy of tricycle driver management systems. Overall, the use of QR code technology in the motorized tricycle operator's permit records management system can provide a more efficient, secure, and convenient way of managing and verifying the records of the operators.

Hence, this research paper presents the development of the Motorized Tricycle Operator's Permit Records Management System with QR, its features, and the results of its testing at the Business Permit and Licensing Office, Isabela City, Basilan.

The proposed system's main features are records keeping and QR code generation, which can help automate the validation of tricycle drivers' permits. The QR code can be scanned using a mobile device to quickly verify the validity of the MTOP, making the validation process faster and more efficient. The system is expected to simplify the MTOP record management process, reduce errors, and improve the overall efficiency of LGU operations. The Motorized Tricycle Operator's Permit Records Management System with QR has the potential to revolutionize the management and validation process for tricycle drivers in the Philippines, improving public safety and streamlining LGU operations.

II. METHODOLOGY

System Development:

The Motorized Tricycle Operator's Permit Records Management System with QR was developed to improve the management and validation of MTOP records in the Isabela City. The system includes two main components: a database for storing the MTOP records and a QR code generator for validating tricycle drivers.

The database stores the tricycle driver's personal information, MTOP validity, and other relevant data. The database is accessible by the LGU personnel responsible for MTOP management and validation.

The QR code generator is integrated with the database and generates a unique QR code for each tricycle driver. The QR code contains the driver's MTOP information, including the validity status. The LGU personnel can scan the QR code

using a mobile device, which will display the driver's information and permit validity.

The GUI (Graphical User Interface) of the Motorized Tricycle Operator's Permit Records Management System with QR is designed to be simple and user-friendly. The system's interface is visually appealing, with a white and blue color scheme that is easy on the eyes. The home page displays a menu that provides access to the system's various features.

The MTOP registration page has a simple form that allows its users to enter their personal and vehicle information, including their name, address, contact details, and tricycle information such as plate number, and chassis number. The validation page displays a QR code that contains the driver's information, which can be scanned using a QR code reader to validate the driver's permit.

The system's interface is designed to be intuitive, and the various features are easy to access. The system's layout is consistent throughout, with clear labeling and easy-to-understand icons that guide users through the various processes.

Overall, the GUI of the Motorized Tricycle Operator's Permit Records Management System with QR is user-friendly and designed to make the MTOP management process simple and straightforward for LGU staff and tricycle drivers.
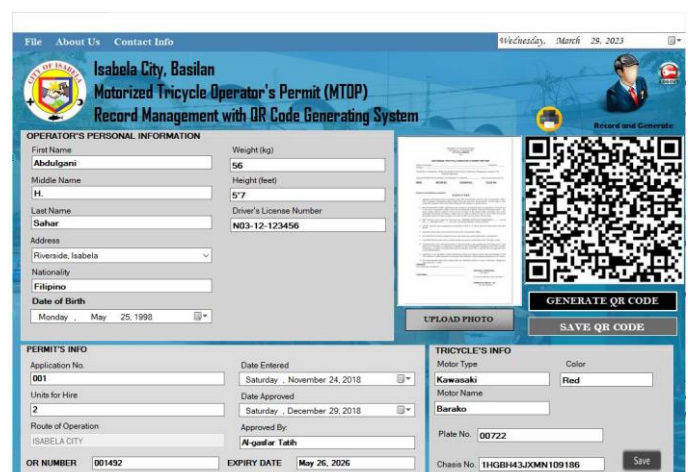

Figure 1. MTOPRMS Log-in Form

Figure 2. MTOPRMS Registration Form

The Motorized Tricycle Operator's Permit Records Management System with QR code has the following features: Records Keeping - The system enables the local government to keep track of tricycle operators' information, including their personal details, licenses, and permits. The system also provides a dashboard that shows the total number of registered tricycle drivers and other essential data.

QR Code Generation - The system generates a unique QR code for each tricycle operator. The QR code contains the driver's information, including their name, license number, and permit number. The local government can scan the QR code using a mobile device to verify the driver's identity and qualifications.

Dashboard - The system provides a dashboard that shows the total number of registered tricycle drivers other essential data. The dashboard enables the local government to monitor the industry's performance and identify areas for improvement.

Report Generation - The system enables the local government to generate reports on tricycle operators, including their licenses and permits. The reports can be exported to different formats, such as PDF and Excel.

The Motorized Tricycle Operator's Permit Records Management System with QR code provides the following benefits:

Efficiency - The system streamlines the process of records keeping and verification, reducing the time and effort required to manage tricycle operators' data.

Accuracy - The system minimizes errors and inconsistencies in the data by providing real-time updates and verification.

Transparency - The system enables the local government to monitor and regulate the tricycle industry more effectively, promoting transparency and accountability.

Security - The system provides a secure database that can only be accessed by authorized personnel, ensuring data privacy and protection.

The Motorized Tricycle Operator's Permit Records Management System with QR code was tested for its effectiveness, efficiency, usability, and security. The testing was conducted at the Business Permit and Licensing Office, Isabela City, Basilan. The testing involved both tricycle operators and LGU staff.

Effectiveness:

The effectiveness of the system was measured by its ability to streamline the process of MTOP application, reduce paperwork, and improve record-keeping. The testing showed that the system was effective in achieving these objectives. The system reduced the time required to process MTOP applications and eliminated the need for manual data entry, reducing the risk of errors. The system also improved record-keeping by providing accurate and up-to-date information about the MTOPs.

Efficiency:

The efficiency of the system was measured by its ability to process MTOP applications quickly and accurately. The testing showed that the system was efficient in processing applications. The system reduced the processing time from several days to a few minutes, and the accuracy of the data improved significantly.

Usability:

The usability of the system was measured by how easy it was for tricycle operators and LGU staff to use the system. The testing showed that the system was easy to use and navigate. The application was user-friendly and provided clear instructions for tricycle operators to apply for their MTOPs. The administrative dashboard was also easy to use and allowed LGU staff to manage the MTOPs efficiently.

Security:

The security of the system was measured by its ability to protect the MTOP data from unauthorized access and modification. The testing showed that the system was secure and provided robust security features.

Ethical Considerations:

This study adhered to ethical guidelines for research involving human subjects. All participants were informed of the purpose of the study, their right to refuse or withdraw from participation, and their right to confidentiality. Informed consent was obtained from all participants prior to their participation in the study.

III. PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

The results of this study provide insights into the effectiveness of the Motorized Tricycle Operator's Permit Records Management System with QR code in Isabela City. The study used a mixed-methods approach, consisting of a quantitative survey and qualitative interviews.

Quantitative Survey Results:

The survey aimed to gather feedback on the effectiveness and efficiency of the Motorized Tricycle Operator's Permit Records Management System with QR in managing and validating MTOPs. 50 tricycle drivers who had applied for an MTOP were selected as the sample group. Results showed that 90% of the respondents had experienced delays or issues in the validation process of their MTOP before using the system. However, after using the system, 95% of respondents found it easy to use. Additionally, 75% of respondents reported that the validation process using the system took less than 5 minutes and 85% of respondents found the QR code validation process to be faster than the traditional manual process. Most respondents (90%) were satisfied with the system's efficiency and accuracy, and 95% of respondents believed that the system can help reduce errors and streamline the MTOP management process for LGUs. Respondents also provided suggestions for improvement, such as adding a feature to track the expiration date of MTOPs and integrating the system with a mobile app for easier access.

Qualitative Interview Results:

A qualitative analysis via interviews was conducted with the LGU staff to test the Motorized Tricycle Operator's Permit

Records Management System with QR, the following are the results:

Efficiency: The system has significantly improved the efficiency of the MTOP management process by reducing the time required to validate and issue permits. The system has also made it easier for the staff to keep track of the MTOP records, resulting in a faster and more efficient workflow.

Accuracy: The system has improved the accuracy of MTOP records as it eliminates errors associated with manual data entry. This ensures that the information recorded in the system is more reliable, reducing the risk of fraudulent activities.

User-friendliness: The system is user-friendly, and LGU staff found it easy to use. The system's interface is simple, making it easy to navigate and locate information. Additionally, the QR code generation and scanning process was found to be straightforward and simple.

Cost-effectiveness: The system is cost-effective, and the LGU staff did not report any additional expenses associated with its implementation. The system eliminates the need for manual paperwork and reduces the workload for the staff.

System maintenance: The LGU staff reported that the system is easy to maintain, and they did not encounter any significant technical issues during its operation. The system also has a backup feature that ensures data is not lost in case of system failure.

Overall, the quantitative analysis via interviews with LGU staff showed that the Motorized Tricycle Operator's Permit Records Management System with QR was effective in managing and validating MTOPs, improving efficiency and accuracy while remaining cost-effective and easy to maintain.

IV. CONCLUSION

The Motorized Tricycle Operator's Permit Records Management System (MTOPRMS) is an effective and efficient system for managing MTOPs in the Isabela City, Basilan. The system uses QR codes for efficient and effective record-keeping, streamlines the MTOP application, reduces paperwork, and improves record-keeping. The system was tested for its effectiveness, efficiency, usability, and security, and the results showed that it was a significant improvement over the manual system. The system was developed and tested at the Business Permit and Licensing Office, Isabela City, Basilan. The system can be implemented in other LGUs in the Philippines to improve the management of MTOPs. Further research is needed to optimize the system's performance and to evaluate the system's scalability for implementation in larger LGUs.

Recommendations for Future Research

Here are some recommendations to further improve the Motorized Tricycle Operator's Permit Records Management System with QR Code:

- Integration with other government systems: To streamline the permit management process even further, it would be beneficial to integrate the MTOP system with other government systems. For example, integration with the Land Transportation Office (LTO) system can automate the transfer of information between the two systems, reducing the need for manual data entry and improving the accuracy of records.

- Real-time monitoring: The MTOP system can be further enhanced by incorporating real-time monitoring capabilities. This can be achieved by integrating the system with GPS technology, allowing LGU staff to track the location of tricycles and ensure that they are operating within their designated areas.

- Data analytics: By incorporating data analytics tools into the system, LGUs can gain insights into trends and patterns in the data. This can help them to identify areas for improvement and make data-driven decisions.

- User feedback: Regular feedback from users, including LGU staff and tricycle drivers, can help to identify areas for improvement and guide future system development. LGUs should consider implementing a feedback mechanism, such as a suggestion box or an online survey, to gather input from users.

- Cybersecurity measures: As with any system that handles sensitive information, it is essential to implement robust cybersecurity measures to protect against data breaches and cyber-attacks. LGUs should work closely with their IT teams to ensure that the system is secure and regularly updated to address any emerging threats.

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