



Tryke: A Tricycle Driver Conduct Reporting Mobile Application

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ABSTRACT

In this study, a mobile application to provide tricycle commuters a medium to report good and bad conduct of tricycle drivers was developed. Ionic Framework was used to develop the Graphical User Interface (GUI) while the Laravel framework served as the backend of the mobile application. The rates and reports are transmitted into a web admin system that was developed using Vue.js with an SQLite database. For the mobile application and web admin system to work online Heroku was used. The mobile application that was named “Tryke” is a beta version. For the beta testing of the mobile application, in-house information technology and computer science experts used it. The in-house experts evaluated the mobile application after using it. The tool used in the evaluation was the ISO 9126-1 software quality model however, only the functionality, usability, efficiency, and maintainability characteristic were measured since the application is still on beta version. The in-house experts gave a mean score of 4.3 for functionality, 4.4 for usability, 4.5 for efficiency, and 4.4 for maintainability. The evaluation of the in-house technical experts overall proved that Tryke can be released for the public used.

Key words: QR coding, database, mobile application, web application.

1. INTRODUCTION

Nowadays, many people visit Tuguegarao City because it is the only city in Cagayan. People from different places is visiting the city to process their documents in the different Regional Offices, shop in the malls, and study in the different prestigious schools in the city.

The primary mode of transportation in Tuguegarao City is the tricycle. It was first introduced in the early 1960s and by 2010 it has reached a shocking number of 12,000 tricycles circulating around the city. With this large amount of tricycle drivers, drivers who behave corruptly are inevitable. Some visitors and residents in Tuguegarao are complaining about

drivers who are overcharging. This is the reason why Tuguegarao City was branded as “City of Capacity”. Because of this behavior, the mayor of the city urged passengers to report to Tricycle Regulation Unit (TRU) the abuses by drivers, particularly those negotiating the fare. [1]. However, the existing method on reporting drivers requires the commuter to file a complaint on the TRU personally that requires too much effort and time. Commuters can also report tricycle drivers via text to TRU but keeping records with this method involves a lot of recording manually.

Tricycle drivers in Tuguegarao however, are not all the same. From time to time, there are several reports of good deeds by tricycle drivers. They return things that are left by commuters in their tricycles. Some tricycle drivers also offer free ride especially to those who are old and with disabilities. Although the local government of Tuguegarao City gives monetary award and certificate of recognition to nominated tricycle drivers who exemplified good deeds to commuters [2], not all deserving tricycle drivers benefit from these awards because of poor reporting mechanism.

Technologies were so helpful in improving life. Smartphones are one of the most commonly deployed devices nowadays, helping several individuals in every type of institution. In fact, nearly every single person [3] uses a mobile device to update themselves. The introduction of 3G and 4G cellular network technologies [4] have also improved the communication of mobile users.

With the obvious advantage of using mobile applications and the difficulties of reporting as well as commending tricycle drivers, the mobile application “Tryke” was developed. It is intended for tricycle commuters so that they can report violations of tricycle drivers. This mobile application will also allow the tricycle commuters to commend the good deeds of tricycle drivers by giving them ratings. The report and rates are transmitted into a web application system for easy management of data. The managed data will allow TRU to track abusive drivers faster as well as commend the responsible ones. At present, it's not only in Tuguegarao City to which the problem is being experienced, other LGUs may benefit from the mobile application. This will serve as basis of other LGUs in rating and reporting PUVs in their locality.

2. METHODOLOGY

2.1 Participants of the Study

The research participants consisted of seven (7) in-house experts who are adept in developing mobile applications. Four of the experts work in the Center for Information and Computing Technology while the other three are Instructors of the Information and Technology Education Program.

When the application was developed, there was no driver information used. The information of the tricycle drivers were just dummy data for testing purposes. Currently, there are no policies that allow this kind of measures but the goal of the study is to present this to the Local Government for an appropriate policy to protect driver’s rights.

2.2 ISO 9126

ISO 9126 is one of the internationally recognized assessment standards for software assessment from the perspective of software engineering [5-6]. This model is considered a standard with a software quality assessment that is reliable, valid and efficient. This assessment is performed to assess if the features of a given system need to be improved. The standard ISO/IEC 9126 [7] developed by ISO/IEC JTC1 SC7 (Subcommittee SC7 - Software and Systems Engineering of International Organization for Standardization) is divided into four parts: ISO/IEC 9126-1, Quality model; ISO/IEC 9126-2, External metrics; ISO/IEC 9126-3, Internal metrics; and ISO/IEC 9126-4, Quality in use metrics.

In this study, the ISO/IEC 9126-1 was used. It has a standard 6 top-level characteristics: functionality, reliability, usability, efficiency, maintainability, and portability [8]. However, the reliability and portability of the mobile application in this study were not yet evaluated because it is still on its beta version. Upon completion of the full release version, it will be re-evaluated using the six standard characteristics.

The software quality characteristics that were used by the in-house experts in the evaluation of the mobile application were functionality, usability, efficiency, and maintainability. The functionality characteristic of software is assessed to verify the essential purpose. [9]. The usability characteristic is evaluated to determine the ease of use for a given function [10]. The efficiency characteristic is evaluated to know how mobile application resources are used when providing a required functionality [11]. The maintainability characteristic is evaluated to check if in the mobile application identifying and fixing errors can be done [12].

2.3 Evaluation of the Mobile App

The evaluation of the mobile app was done separately per participant. The installer of the mobile application is sent to

them and they installed it on their personal mobile devices. The researchers briefly discussed what the mobile application is. Then, the participants used the mobile application without any supervision from the researchers. They were also shown the programming platforms that were used together with the source code of the mobile application. After using, the mobile application they rated it in terms of functionality, usability, efficiency, and maintainability. A five-point scale rating was used in the evaluation. The lowest score that the participant can give is one while the highest score is five as shown in Table 1. The mean of the scores per characteristic was computed after the evaluation of all the participants.

Table 1: Interpretation of the Scores used in the Evaluation

Score	Interpretation
1	Bad
2	Poor
3	Moderate
4	Good
5	Excellent

2.4 System Development

The framework of the whole system is shown in Figure 1. The Tryke app will be used to scan a QR Code that is proposed to be added in the Mayor’s Permit of every tricycle in Tuguegarao City. The Mayor’s Permit is usually posted inside the tricycle fronting the passengers. After scanning the QR Code provided inside the tricycle, the user will be prompted to the home page of the Tryke app where the tricycle driver’s information will be shown. The user will now rate or report the driver and will be sent to the web admin with the use of the internet. There is a Web Admin where tricycle information, ratings/reports, users’ accounts are being stored. It is where the QR Codes are also being generated. The Vue-QRcode to the Vue.js file was installed using the chenfengyuan/vue-qrcode. The researchers used Javascript and Vue components to generate the QR code.

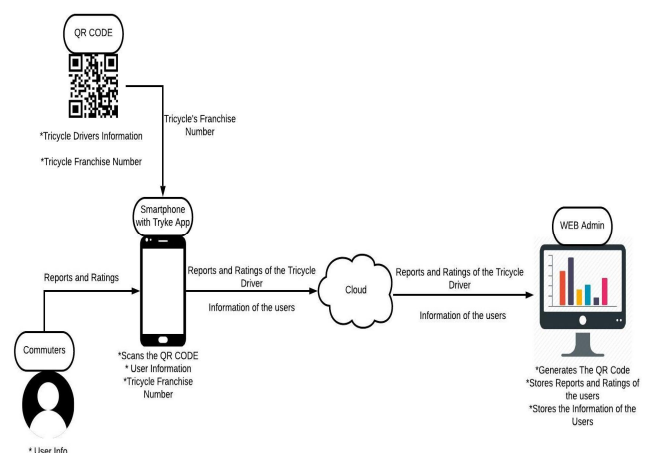


Figure 1: System Framework

The mobile application “Tryke” is conduct reporting mobile application that can be run through both Android and iOS. The user interface of the mobile application was developed using the Ionic Framework that works for both Android and iOS. The Ionic framework focused on the frontend user experience or User Interface of the application (interactions, gestures, animations, and buttons). Laravel framework was used for the backend of the mobile application to be able to make a Restful API for both the mobile application and web admin. Laravel was also used for the different functionalities of the web admin. Researchers used Vue.js for the user interface of the web admin panel and used SQLite for the database.

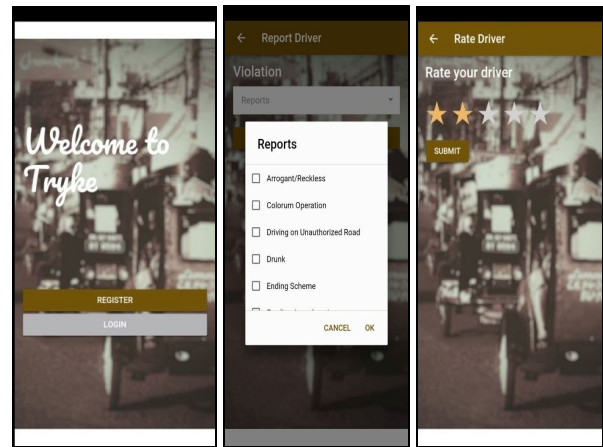


Figure 2: The mobile application named “Tryke”

The Heroku cloud platform was used to host the web admin panel. It is the cloud server of both the mobile application and the web admin. Heroku uses a Git-based deployment [13]. Heroku is a platform as a service (PaaS) that allows developers to build, manage and execute cloud-based applications.

3. RESULTS AND DISCUSSION

3.1 Developed Mobile Application

The mobile application shown in Figure 2 has a simple [14] and user-friendly [15] user interface design which is preferred by many. In using the mobile application, the user must register his credentials first and after registration, the user must log onto their account. After logging into their account, the user will be directed to the application’s home page. The home page contains the Scan QR Code button, Report button, Rate button, and a Logout button. The user must first click the scan QR button to scan the tricycle’s QR Code. After scanning the QR Code the user will be directed back to the home page to perform an action to the tricycle driver. When the user clicks the Report button, the user will be directed to a reporting page where the user can choose multiple violations depending on the number of violations the driver violated. After submitting the report the user will be prompted to rating page where the user can rate the driver based on the driver’s behavior. Lastly, after submitting the report together with the rating, the user will be directed to the confirmation page where they can see that their rate/report was successfully submitted.

3.2 Developed Web Admin

The web admin shown in Figure 3 shows the generated QR codes. QR codes were generated with the following inputs: Name, Franchise Number and Model of the tricycle. The reports and ratings of the tricycle drivers can also be viewed and printed in the web admin. These conduct reports from the commuters are recommended to be managed by the Technical Staff of the TRU of Tuguegarao City. The Technical Staff is also responsible for notifying the commuters regarding their actions to the report or complaints.

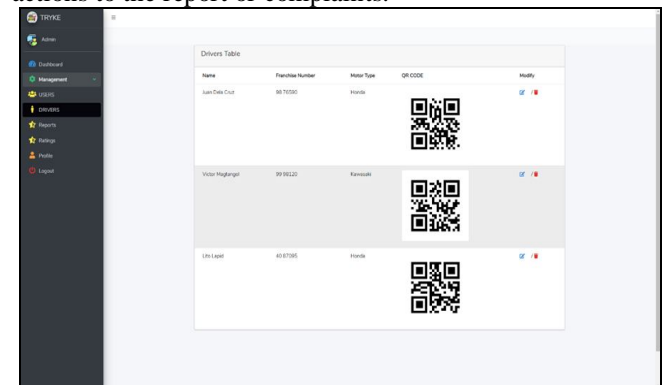


Figure 3: Tryke Web Admin

3.3 Software Quality Scores of Tryke

The four (4) software quality characteristics of the ISO 9126-1 Software Quality Model that includes functionality, usability, efficiency, and maintainability were used to evaluate the mobile application. The mean scores given by the in-house experts are shown in Table 2.

Table 2: Mean Score of the Software Quality Characteristic

Characteristic	Score	Interpretation
Functionality	4.3	Excellent
Usability	4.4	Excellent
Efficiency	4.5	Excellent
Maintainability	4.4	Excellent
Overall	4.4	Excellent

Overall, the in-house experts perceived that the mobile application is excellent in the four characteristics of software. The functionality of the mobile application was rated excellent because it was able to serve its purpose that is to allow users to report or rate tricycle drivers. It should be noted that the functionality characteristic is the most important characteristic because the other characteristics can only be measured if it exists from a given system [6-7]. The ability of a user to learn how to use a given system is the major factor in determining its usability [6, 8]. This was evident when the experts were able to use the system without any supervision from the researchers. The excellent score that the experts gave is another justification for the usability of the mobile application. For the efficiency characteristic, the in-house experts rated the mobile application as excellent because it was able to run smoothly on their mobile phones. The efficiency characteristic is measured based on the performance of a given system when it is used [6, 7, 9] and during the testing of the mobile application, the in-house experts did not experience any lags which is the reason why they gave the highest score on efficiency compared to the other characteristic. The absence of lags is worth mentioning because the locale of the study is in the Philippines, one of the countries with the slowest internet connection [16]. The maintainability score given by the experts was also excellent. They gave this score because they were able to read the codes of the mobile application easily. Several studies [6-10] say that maintainability is impacted by the readability of code.

4. CONCLUSION

In this study, a beta version of the mobile application named Tryke was developed. Tryke was able to serve its purpose as a system to which tricycle commuters can report the conduct of tricycle drivers. The evaluation of the in-house technical experts overall proved that Tryke can be released for the public used. However, this should undergo User Acceptance Test by the end-user of Tryke. End-users of Tryke will include tourists, students, employees, and mall-goers. For the improvement of the mobile application, the researchers recommend to include a notification tab for the users for them to know what actions were done by the authorities to the driver they have reported.

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