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E-rrands: An android-based application for shop and ship of concierge services integrating geolocation technology

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ABSTRACT

Economic shutdown in the Philippines caused by COVID19 pandemic leaves an additional five million (5.35%) jobless Filipinos with an overall 17.7 percent unemployment rate as of May 2020. Despite the continuous decrease of global commerce, e-commerce is one of the industries alongside the health industry, which shows opposite results amidst pandemic. However, to adapt to the new post COVID world, micro, small and medium enterprises (the MSME sector) or the surviving entrepreneurs need (advised) to include delivery service operation systems in their businesses. Those who were unable to adapt, especially the non-essential business, resorted to closing permanently or at risk of closing. E-rrands is an android application that can help bridge the gap between customers and businesses by providing a third-service provider through the application. This study adopted the Agile Scrum Methodology phases as the approach in the development of E-rrands. The study utilized the developmental-quantitative research design involving two sets of respondents, the end users and the IT experts. The overall rating of the developed E-rrands android application based on ISO 25010 got a 3.73 mean score and a strongly acceptable rating from the respondents.

KEYWORDS: *delivery service, concierge, unemployment, android-based application, geolocation*

1 INTRODUCTION

COVID-19 pandemic has greatly influenced global traditional commerce as affected countries closed their borders and forced into lockdowns (O'Donnell, Shannon, & Sheehan, 2021). Economic shutdown in the Philippines leaves an additional five million (5.3%) jobless Filipinos with an overall 17.7 percent unemployment rate as of May 2020 according to the Philippine Statistic Authority. However, e-commerce is one of the industries alongside healthcare, which shows the opposite result amidst the pandemic (Saxena, 2021). Internet generated transactions often referred to as E-commerce or electronic commerce is one of the technological advancements in business. E-commerce is the utilization of the internet and other networks to sell, purchase, trade or transport goods data and services (Mazzarol, 2015).

The E-commerce market in the Philippines is growing extremely fast because of the vastly large numbers of Filipino internet users. The Philippines, being the second largest internet users in the Southeast Asia Region contributed to the tremendous growth of e-commerce with 76 million (71%) active internet users among 107.3 million population and 71.4 million (67%) Filipinos are mobile internet users (Benedict, 2019), despite having the slowest internet connection in Southeast Asia (Zialcita, 2019) (Santos, 2014) (Liébana-Cabanillas & Santos, 2017). Social Commerce (S-Commerce) often viewed as Facebook Commerce (F-Commerce), however, is the new form of e-commerce, which involves the use of social media platforms to assist within the context of online selling and buying of services and products (Kurtz, 2016). F-commerce became popular among Filipinos because 96% of the Philippine population have accessed Facebook and the Philippines is among the top users in the world ranked sixth with 76 million users behind countries such as India and the United States, according to Statista research department. Aside from promotion and advertisements of products (Zhang & Ip, 2015), Facebook became a platform for users who offer services such as concierge services to assist those in need. Concierge services are considered as an addition to the constantly changing environment of business (Kang & et. al., 2007). A concierge is an individual or a company, which specializes in personal assistance or any other assistance services such as doing shopping errands. Concierge services become the cynosure of all eyes, especially those who are anxious about risking their health to run any errands.

For an e-commerce business to be considered successful, it has to have a good service delivery system (Boldt, 2018). The delivery-tracking software provides

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all the changing aspects of the delivery with every latest update, and build-up customer delight, which proliferates customer loyalty. Through this software, more customers repurchase of products, repeat sales, and production of higher revenues are possible (Pluta, 2013).

Among the existing biggest e-commerce platforms in the Philippines are Lazada and Shoppee, which have delivery systems as part of the service provided to consumers. Leading e-commerce platforms use geolocation technology for service delivery technique, which allows business owners to know the estimated location of the customers and for customers to keep track of the driver's route to estimate the time arrived (Anisetti, Ardagna, & et.al., 2011).

Geolocation refers to the identification of the geographic location of the user via a variety of data collection mechanisms such as GPS Technology and Google Maps Data (Estes, 2016). Geolocation technology is utilizing the acquired user's data from an individual's mobile device or computer to describe or identify the user's actual physical location (Giang, 2020) (NirmalHaldikar, 2014). Geolocation integration to different multimedia provides the basis for traditional performance-enhancing and recovery disaster solutions (Benedict, 2021) (MacVittie, 2013).

The purpose of the study was to develop an android-based application for shop and ship concierge services intended to bridge consumers and businesses in Los Baños, Laguna by providing a third-party service provider through the application.

2 MATERIALS AND METHODS

Agile Scrum Methodology is followed in the development of E-rrands software application. It involves (4) phases of software development: (1) analysis and planning phase, (2) design phase, (3) development phase and (4) testing and evaluation phase (Asor & Sapin, 2020).

Analysis and Planning Phase

The proponents reviewed existing e-commerce platforms from websites to mobile applications to understand better how an e-commerce platform works and interview customers and drivers who have prior experience using e-commerce platforms. This is the initial stage where the developers discussed project vision, and determined the required time and work resources.

Design Phase

Figure 1 illustrates the conceptual flow of E-rrands android application. Users are required to provide necessary information before accessing the application. The customer and driver are allowed to place and receive service requests and send messages for communication and monitoring purposes. The system will authenticate users' accounts via SMS, automatically calculate the transaction amount for customers and be able to track location. Once the transaction/service is completed, the customer and driver are required to rate each other's experience service. The feedback/rates will reflect in the users' profile for future so that future users can review first their profile (history) before making or placing a transaction. All data will be saved in an online database called Google Firebase Database.

Figure1. Conceptual Framework

Development Phase

It is where the developers start writing the code of the program. React Native Framework, Visual Studio (VS) Code and Node JS are software used as raw materials in developing the application. It is also the phase where the modules were integrated into the system. Initial testing was also performed to anticipate the bugs and test the modules' functionality. E-rrands android application software consists of four (4) main modules as the required essential components of the project.

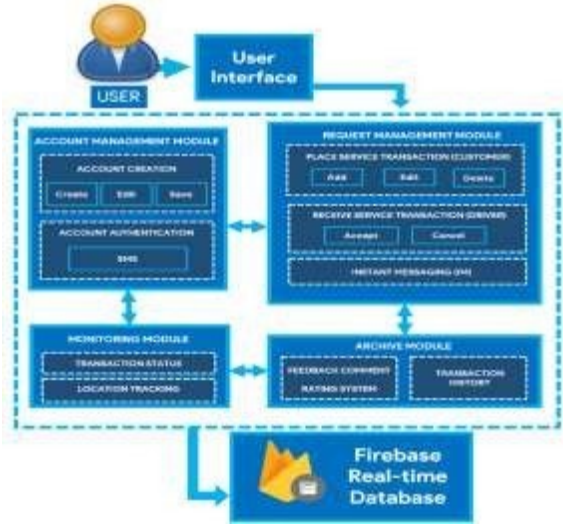

Figure 2. System Architecture

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a. Account Management Module

It has a User Information sub-module and Account Authentication sub-module. This module allows the user to create a personal account. Users need to authenticate their personal account via SMS before accessing the full features of the application.

b. Request Management Module

Service transactions such as *'pabili'*, *'padeliver'*, and '*pasuyo'* take place. Service transaction type would be chosen by the customer, fill up necessary information requirements, and the system would send a request to the Driver to do the necessary service. However, the Driver would receive the service transaction.

c. Monitoring Module

This allows the customer and the Driver to track each other's location for monitoring of the item or product. This would be made possible by the Geolocation technology of the user's mobile phone. Users can be able to monitor the status of the transaction if pending, canceled, or completed.

d. Archive Module

It consists of Feedback/Rate and History sub-modules. All transactions of the users are recorded and can be found in the History submodule. The application allows feedback (rating system) and history for both customers and drivers, which would reference future users of the application.

e. Geolocation Integration

Since one of the important features of a concierge service application is the ability to locate (track) the driver or customer's position, E-rrands Mobile Application would be using Geolocation technology for customers or drivers to monitor each other's location if there are pending transactions. Maps SDK for Android is utilized to add maps based on Google Maps data to the E-rrands Android Application. GPS installed in the users' smartphone mobile would be utilized to enable the system to identify the user's location. For real-time tracking, the E-rrands application requires a cellular network (mobile data or Wi-Fi) of the android devices where the application is installed.

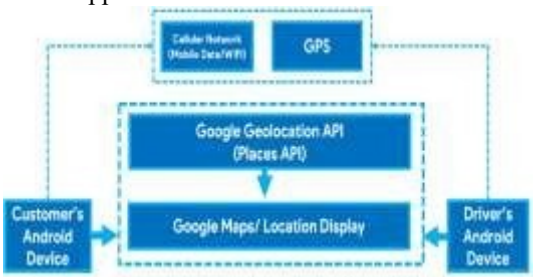

Figure 3. Geolocation Integration to E-rrands Application

3 RESULTS AND DISCUSSIONS

Results are presented based on software development and system testing and evaluation.

Software Development Result

The developers named the application as E-rrands Application since it performs three important services that are considered as errands.

Landing page of the customer system consists of *pabili*, *padeliver* and *pasuyo* errands as illustrated in Figure 4A. These are the three errand service choices that the customer wants the third-party service provider (driver) to do. *Pabili* service is a kind of e-rrands service that allows customers to ask or request E-rrands drivers to purchase items for them. *Padeliver* service is an e-rrands service that allows customers to deliver or transport an item or goods (Courier service) to a specific location, while *Pasuyo* service is an e-rrands service that allows customers to run a specific errand that is not available in pabili or padeliver services such as bill payment. However, these services has limitations and conditions for both customers and drivers.

Landing page of the driver system is the list of requests from customers that have been set on queue as illustrated in Figure 4B. Drivers can select these requests on a first-come, first-served basis. However, if the customer chooses a specific driver to be his/her third-party service provider, a request notification will be seen in the 'request field' in the driver's taskbar.

A.

B.

Figure 4. Request Management Module (A) Customers' Request System, (B) Drivers' Request System.

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In the 'transaction field' located in the customer's taskbar illustrated in Figure 5A, the customer can view his/her pending transaction and is able to track the driver's location, which is one of the most vital functions of the E-rrands application. In the tracking of the driver's location, three positions are displayed in the map.

The (A) drop-off position for customer's location, (B) driver's position, and the (C) pick-up position, where the customer wants his/her items to be bought or pick-up. The distance between the drop-off, pick-up and driver's route is highlighted and displayed in the map in order for both users to know real-time position of each other for monitoring purposes.

In the driver's taskbar is located a 'Transaction field' illustrated in Figure 5B, where the list of the driver's accepted requests from customers can be found. Requests that the driver fetch from the queueing page (homepage) and the direct request from a specific customer. Once the service has been completed by the driver, a 'track order' button redirect to a map where the positions of two pick-up requests can be found, as well as the location of the customer.

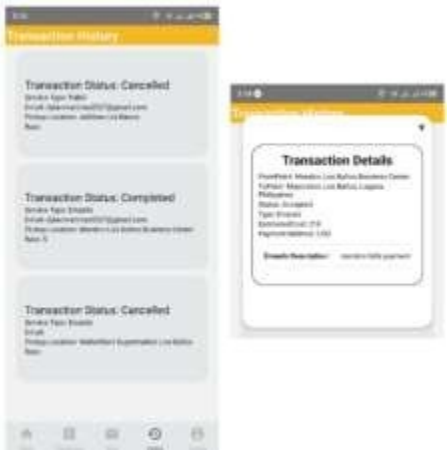
A.

B.

Figure 5. E-rrands Monitoring Module, (A) Location-Based Tracking for Customer, (B) Location-Based Tracking for Driver.

Feedbacks and ratings are located in the users' profile. Once a transaction (for customer) or service is completed (for driver), a feedback and rating is required to both users. It will serve as a reference for future users if they want to avail a service from the driver or for the driver to have a glance of what kind of a customer based on the feedback comments and star rating of the drivers.

A.



B.

Figure 6. E-rrands Archive Module, (A) History, (B) Feedback/Rate.

In account verification, users will receive a code via SMS and input it in the required field in profile settings as illustrated in Figure 7. Once the account has been verified, the users can now be able to use the full functions of placing and receiving service transactions of E-rrands application. 'Verified Account', 'Input Code', and 'Verified' buttons are the three indicators of two-factor authentication in E-rrands Application. By clicking (A) 'Verified Account' button, the user will be redirected to a (B) browser to authenticate his/her identity by a (C) CAPTCHA code. An (D) SMS will be sent to user's phone number as (E) a code to be inputted in the (F) 'Input Code' field. The (G) button indicator will be change to 'Verified' once the account has been verified.

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System Evaluation and Testing Results

For system Evaluation, the questionnaires disseminated were adapted from ISO 25010, a software standard evaluation to identify if the project meets the objectives of the study. Likert Scalar Technique is used to interpret and measure the characteristics of the android application software. The respondents were 27 Customers, 5 Drivers and 3 IT Professionals. Customers and Drivers are categorized as the Non- Technical Users (NTU) while IT Professional as Technical Users (TU). Geolocation testing is done to ensure that the real-time location of users is properly displayed in the map. Compatibility testing is done to check whether the developed software application is working as expected and/or capable of running on different versions of android devices.

Figure 7. Account Management Module.

Table 1. Evaluation Results Based on ISO25010

Respondents	Characteristics	Rating	Interpretation
Non-Technical Users (NTU) (Drivers & Customers)	Functional Suitability	3.65	Strongly Acceptable
	Performance Efficiency	3.60	Strongly Acceptable
	Compatibility	3.62	Strongly Acceptable
	Usability	3.64	Strongly Acceptable
	Reliability	3.62	Strongly Acceptable
NTU Total Rating		***3.63***	***Strongly Acceptable***
TechnicalUsers (TU) (IT people)	Security	3.80	Strongly Acceptable
	Maintainability	3.87	Strongly Acceptable
	Portability	3.78	Strongly Acceptable
TU Total Rating		***3.82***	***Strongly Acceptable***
Overall Rating		**3.73**	Strongly Acceptable

Based on Table 1, the non-technical users gave an average of 3.63 with a strongly acceptable rating for the functional suitability, performance efficiency, compatibility, usability and reliability criteria. On the other hand, technical users gave an average of 3.82 with a strongly responsible rating for security, maintainability and portability criteria. E-rrands application got a 3.73 score with strongly acceptable rating from technical and non-technical users.

Table 2 shows the parameter conditions set by the developers to test the functionality of displaying the real-time location of the users in the map.

In Parameter 1, the location point being displayed in the map is every 100m of distance reach by the driver. Even if the100m is not met, an interval parameter of 10 seconds is set. In this case, the position being displayed in the map is not accurate in the driver's real-time position (for both driver and customer system).

Table 2. Geolocation Tests Results

	Parameter	Consumed Data	Distance	Remarks
1	100 meters, 10 seconds	3.5 MB	2.1 km	The position being displayed in the map is not accurate in the driver's real-time position (for both driver and customer system).
2	10 meters, 5 seconds	33.6 MB	2.1 km	Consumes too much mobile data.
3	10 meters, 10 seconds	1.5 MB	2.1 km	Smooth movement of driver's real-time position in the map.

Lastly, in parameter 3, the distance filter is also 10m. The location being displayed in the map is every 10m of distance reached by the driver, however, if the 10m is not met, the distance reached by the driver will be displayed every 10 seconds. Because the interval is changed to 10 seconds, there is enough time for the database to process the data being sent by the application and it consumes the least amount of mobile data of the driver's android application (Pluta, 2013).

Table 3 shows the results of the compatibility test procedures based on E-rrands system modules (Catedrilla, Lerios, & Sapin, 2021). The application is tested in Android 6, Android 9 and Android 10 since these are the available android phones of the developers.

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The developing team used React Native Framework, which is capable of rendering the application to different android OS versions. The developing team tried to run the application in Android 5 through React Native Framework. The application is running; however, the tracking feature is lagging, or the map is not running smoothly.

Table 3. Compatibility Test Results

Android Version	Process	Expected Result	Actual Result	Remarks
Version 6.0 (Marshmallow)	Install	Will successfully installed	Installed	Success
Version 9.0 (Pie)	Install	Will successfully installed	Installed	Success
Android 10	Install	Will successfully installed	Installed	Success

4 CONCLUIONS AND RECOMMENDATIONS

E-rrands android application serve as a medium that connects customer and driver in placing and receiving of errands service requests as well as serve as a bridge between consumers and businesses in Los Baños Laguna by providing a third-party service provider though the application. The mobile application is reliable in assisting the users to place and receive service requests in every transaction. Two-way communication between the users is one of the most vital functions of an e-commerce platform. The mobile application provides instant messaging that helps the users to monitor and confirm the request through open communication. The feedback mechanism serves as a reference to the future users before placing and accepting a service request. Geolocation is a promising technology for mobile applications that requires tracking or monitoring of places, people or routes.

For future usage and continuous improvement and development of the project, it is suggested to use image processing to automatically analyze the IDs being uploaded by the user as an additional security in the account verification process.

It is also recommended that the application undergoes volume testing to analyze the system's response time, performance and behavior and also to identify the most likely to occur problems in a large amount of data since the e-rrands application is using an online database.

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