UNIVERSITY OF NAIROBI

SCHOOL OF COMPUTER AND INFORMATICS

USE OF ICT IN EMPOWERING "BODA-BODA" INDUSTRY

BY

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Declaration

This project report is my original work and has not been presented for a degree at any other university or learning institution.

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This project has been submitted for examination with my approval as University Supervisor

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Abstract

Border trade between Kenya and Uganda in Busia town brought a number of innovations (Malmberg, 1994); one such innovations is use of bicycle and motorcycle as a means of public transport commonly known as “boda-boda”. This innovation has so far provided efficient means of transport to many and double-up as source of income to many youths. Even though it provides income to many, the sector has not been optimized. This study was aimed at finding challenges facing boda-boda as means of public transport, developing ICT solution to solve/mitigate the singled-out challenges, test and evaluated the developed solution in real life situation. Preliminary study was conducted where self-administered questionnaire and Focused Group Discussion were used to obtain data from boda-boda riders and their customers, summary of these data was presented inform of percentages. Variables with higher percentages were considered in developing an ICT solution. Open source android application was developed using RAD developmental architecture. The prototype was then uploaded to a server and download link broadcasted electronically, riders and Customers were to download and installed application on their android phones, manual for operation was available for download that gave users instructions on how to use the prototype. The system required all riders to register hence reducing the number of unknown riders in the sector, this mitigated the challenge of uncontrolled growth as was identified in the preliminary study. Usability testing was carried out at the end of two consecutive weeks of system implementation to understand user’s perception towards the developed prototype and their level of satisfaction. 80% of users strongly recommended the application, with 70% reporting strong satisfaction with system overall functionality. Riders also reported reduced customers waiting time from between 1-2 hours to between 30 minutes -1 hour. 84% of the respondents showed improved confidence on personal security during service provision since the system provided means of personal identification between riders and customers. This research therefore recommended the use of self-sustainable open-source technologies to ensure sufficient controls and measures are put to optimize boda-boda business as a source of public transport. Implementation of this prototype was only done within Dagoretti North constituency there is need to implement it in many areas to understand its long term and geographical outcome in optimizing boda-boda operations.

Dedication

This research project is dedicated to my family, which has supported me throughout this research period.

Acknowledgment

My family, whose love and steadfast support throughout the project was greatly needed and deeply appreciated

God the almighty for the strength and grace to accomplish this research project

My supervisor Dr. Christopher Chepken has been the ideal project supervisor. His sage advice, guidance, insightful criticism and encouragement aided me in carrying out this research project

My classmates and friends who shared ideas and provided assistance during this project.

Dagoretti north constituency boda-boda groups who helped me in testing and shaping the project features

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Abbreviations

NTSA	-	National Transport and Safety Authority
ICT	-	Information Communication Technology
PSV	-	Public Service Vehicle
GPS	-	Geographical Positioning System
WHO	-	World Health Organization
FGD	-	Focused group discussion
UK	-	United Kingdom
RAD	-	Rapid Application Development
GSM	-	Global system for Mobile communication
HTML	-	HyperText Markup Language
PHP	-	Personal Home page

Definition of terms

Boda boda – it is a mispronunciation of the word border-border, to mean the use of motorcycle of the bicycle as a means of transport.

Rider- this is the person who rider motorcycles to offer transport services to the general public.

Customer- a person who seeks the services of rider for transportation purposes

Android application- open source application integrating Java and xml files in developing user interfaces for mobile phones

Webserver- is a program that uses HTTP (Hypertext Transfer Protocol) to serve the files that form Web pages to users, in response to their requests, which are forwarded by their computers' or Phones (HTTP clients)

CHAPTER ONE

Introduction

1.1.Introduction and Background Information

Boarder trade between Kenya and Uganda was synonymous in early 1960s (Malmberg, 1994), traders needed cheap, reliable, and quiet way to move goods between Kenya and Uganda border. Cars and motorcycles were non-cost effective and were deemed noisy. Their main choice was to use bicycles with little luggage rack behind the seat providing the perfect way of evading border police while transporting valuable goods. This need gave rise to innovation named "boda-boda" operation between Kenya-Uganda border and spread quickly in east Africa. The name still carries its outlawed origin coming from mispronunciation of the words "border-border". Operators later realized that the innovation can also be used to move people from one point to another, hence becoming a common means of public transportation especially in rural areas. This innovation evolved from use of bicycles to motorcycle which is more robust and has better ability to go longer distances while climbing uphill terrains as compared to bicycle, this first appeared in Ugandan market in 1992, and had rapid growth due to Ugandan government allowing imports of used vehicles with more than five years (Howe, 2007). Fair cost of importing used motorcycles compared to cost of importing cars caused fleet rapid growth. This mode of transport has become fairly reliable and cheap with its ability to maneuver through minor roads which are impassable by cars, go longer distances and steeper terrain that are impossible by bicycles. Functionally, the use of motorbikes for transportation have grown deep roots in the society especially in low income areas, majority of people currently use boda-boda for:- ferrying children and teachers to school, workers and employees to workplaces, traders and goods to marketplaces, transporting sick people to hospitals and movement of people from rural areas to urban cities (Mutiso, 2010). Being boda-boda driver however, is not an easy task it requires long working hours, capability to navigate hilly and muddy roads while carrying heavy loads, currently this industry is men's dominated (Nyachieo, 2013), even-though women have started joining the group, it still stands to be men's industry.

Technological innovation of boda-boda as means of public transport has bridge the gap of missing middle (Pankaj 1991) which has been a dilemma in the transport sector especially in Africa.

Movement of people and goods goes from walking head loading to truck and bus in one technological leap. The innovation of "boda-boda" provided valuable way of bridging the gap. Despite noble innovation the industry is faced with many challenges both negative and positive (Gamberini, G., 2014): -

1.2.Factors contributing to the rapid growth of boda-boda industry

Door to door services: **-** boda-boda riders usually drop and pick customers at their requesting places on arrangements giving them more preference to commuter-bus transport system that drop customers at specific designated road stops and pick them at those points. Customers have to walk from bus-stops to their final destinations or for pickups.

Improved mobility**: -** boda-boda as means of transport is conceived to be the cheapest way of navigating the roads and paths, especially in rural areas where there are no proper or paved roads that can easily be passed by taxis or buses. In town areas, they offer a quicker way of navigating jam's hence preferred for emergency cases and rush hours' occasions.

Demand responsive/easily available: **-** many youths have joined boda-boda industry, providing transport services to customers, steady increase in the number of youth joining the sector makes it more reachable especially in demand by the general public. Boda-boda are everywhere customers can get them at any time. Their prices are relatively cheaper than that of single sourced taxi and slightly more expensive than that for commuter busses. The prices usually vary depending on many factors that includes: - distance, bargaining power and security of the place.

Lack of government regulations: - Steady regulatory system is key in any sector for it to thrive in its objectives, this is lacking in boda-boda sector, Kenyan government haven't effectively implemented proper regulations in boda-boda sector. It's against the Kenya laws to carry two or more adult passengers on motorcycles, but motorist does carry more than one which has now become a norm, a good number of boda-boda riders drive on Kenyan roads without valid driving licenses, proper cycling attires for themselves and their passengers. Kenyan laws and directives

for use on motorcycles as a means of transport aren't being implemented, the police usually turn a blind eye on riders making industry more user friendly for riders and dangerous for customers.

Uncontrolled growth: - Daily growth has become the norm of the day in boda-boda sector occasioned by a large number of youth unemployed and constant demand for source of leaving. Cost of acquisition, customer demand, lack of law enforcement, unemployment for youths are some of the major driving force of the steady growth of the industry. Many riders find it easy to become riders since there are no strict formal requirements in venturing into business, the issue is to own motorcycle either through direct purchase or rent. These have made it more lucrative and easy for many youths to actively participate and earn a source of leaving.

Delivering goods: - innovation of boda-boda as means of transport has taken business steps ahead, boda-boda are used to offers delivery services, many business owners have developed trust with individual boda-boda riders and do use them for delivery of goods at cheap, effective and efficient way, some of business areas that have directly benefit from this innovation are: Pizza, meat, fish and many more. There is need to have added elements of coordination aspects of proper management and optimum performance of this industry.

1.3. Factors contributing negatively to the management of boda-boda industry

Careless riding: - boda-boda industry has been associated with careless driving exposing customers to extreme danger. National Transport and Safety Authority (NTSA) reported in Kenya Daily Nation newspaper on 15th November 2015 that "Boda-boda riders are the leading traffic offenders in the county forming the highest number of casualties" he further explained that most of the riders, who are aged between 19 and 39, are reckless and not professionally trained. Giving examples of Baringo County, for instance, "71 people who died in road accidents this year (2015) were either boda-boda riders or passengers". The statistics indicate that 3000 people die every day due to boda-boda related cases. The Kenyan government enacted laws to govern this industry, but enforcement hasn't been easy many riders overload and doesn't follow any riding rules, thus making it a loose area that requires proper management for effective growth of the industry.

Robbery: - structural build-up of motorcycles and its ability to navigate path have brought a lot of challenges, armed robbers have used this mode of transport to robber off Kenyans their

valuables and speed off without hindrance, making it more lethal for such kind of activities, many riders have also been hijacked and their motorcycles used to ferry robbers after robbery.

Management/Coordination deficit: - management has been defined as the act or skill of controlling and making decisions about a business, department, sports team, on the other hand it has been defined as the interlocking functions of creating corporate policy and organizing, planning, controlling, and directing an organization's resources in order to achieve the objectives of that policy, management in short has been major problem in boda-boda industry, starting from the government no proper managerial policies are in place. Boda-boda riders have formed their own informal groups and registered them under Sacco's which does not provide uniform and holistic management principles and practices for the entire industry. Lack of proper management structures has turned boda-boda industry to be chaotic starting from road accidents, robberies, unregulated operational environment which can be eliminated if proper managerial structures are put in use.

1.4.Problem Statement

Transport sector in Kenya suffers a great deal with only 13% of Kenyan national roads paved. In the past commuters had to walk for long distances to urban centers or to road sides where they could get taxi or bus, advancement of technologies has come to play in bridging the gap by introduction of motorcycles as means of public transport (Malmberg, 1994). The use of motorcycles as means of transport has gained massive popularity in Kenya especially after Kenyan government waived duty on motorcycles below 250cc in 2007. Motorcycle are synonymous in providing short-distance, low-capacity services that serves low density demands or areas where access is restricted by the width or quality of the route. Many Kenyan have benefited from this technological advancement through provision of employment, quick means of movement to destinations boosting trade, transport to schools and hospitals.

Despite all its capabilities, the industry has not exploited its potential strength, many motorcycle riders group themselves along road sides and points' waiting for customers at times riders takes several hours without attending to any customer at the expense of attending to other activities that may generated income. In rural areas many youths have neglected agricultural activities and embarked on boda-boda business as their sole source of income which has now resulted to economic instability for many households. There is need to look into problems that are facing

boda-boda riders and their customers as means of public transport, single out challenges that can be solved by Information Communication Technology (ICT) and develop a system that could help solve the singled out challenges. Considering the problems in this industry the researcher deemed it necessary to research on viable mechanisms that would help motorcycle riders provide efficient services to customers, provide central repository data for all riders.

1.5.Aim of the study

This project is aimed at finding out challenges that are faced by boda-boda riders and their customers as a means of public transport, in order to single out problems that can be solved using ICT and developing suitable ICT solutions for the identified problem, the developed system will then be tested and evaluated in real life situation to check on its usability.

1.6.Objectives of the study

- To find out challenges facing boda-boda as means of transport.
- To single out challenges that can be solved using ICT solution from objective one.

1.6.1. System objective

- To develop system that could help solve singled out problems.
- To test and evaluate developed system in real life situation.

1.7.Project Justification

Economic stability of community is key necessity to the development of any country, boda-boda industry is one such sector that provide daily earnings to massive group of youth(Christopher Eraye Michael, 2013). This industry has not fully exploited its capacity. There has been lack of proper coordination system between boda-boda riders and their customers especially at points of customers' pick-ups, rider's movement tracking, ridings competencies, this has caused lack of trust, there is potential need to have formal management system for boda-boda at all points, this will solve the issue of scrambling, reduce riders waiting time for customers hence bringing sanity to all riders and improve efficiency in the industry.

CHAPTER TWO

Literature review

2.1.Introduction

This chapter provides literature review done by researcher in relation to what other researchers have done. The reviewed literature covers background information, related mobile applications, operational policy, challenges in operation management and socioeconomic impacts on health standards

2.2.Initiation of boda-boda

(Howe, 2007) in his paper "*boda-boda*: - Uganda's rural and urban low-capacity transport services" traced back boda-boda innovation to early 1960's when traders at the boarder of Kenya and Uganda in Busia town wanted cheaper and efficient way to transport goods from one border to another. The innovation made use of bicycles as means of transport with cushion at the back. In 1990 there was introduction of motorcycles that could be used to carry larger load compared to bicycles. Their capacities ranges from 50cc to 250cc with low fuel consumption. Motorcycles riders discovered that they can also use their motorcycles in transporting Customers to their destination, the innovation provided many youths with employment as they get their daily earning from the business (Olawo, 2014). The innovation spark rapidly to urban and rural areas receiving overwhelming support due to its capability of navigating paths, steep and hilly terrains.

(Kenya Roads Board, 2013) estimated 89 percent of Kenyan roads aren't paved rendering them impassable by vehicles, providing good opportunity for boda-boda to become versatile, quick, and reliable means of transportation. In Kenya, it is estimated that 14.4 million people ride on motorcycles daily (motorcycle asocial limited of Kenya) and creating about 140 million job opportunities for the youth on daily basis, this industry has created big impact to economic development of low economically empowered members of communities, cutting down on social problems such as crime, promiscuity, and drug abuse.

2.3.Current Organizational and Regulatory structures

Becoming boda-boda operator is seen to be simple and easy, the only requirement is to buy or rent motorbike, in recent days boda-boda riders have grouped themselves into Sacco's and Social welfares, this is due to harsh operation environment encountered by riders to help them cope with situations, many riders collect monthly agreed amounts to help in running their welfare's. In Kenya, the government implemented laws that could help in regulating this industry, among the newly formulated regulations dated February 5th, 2015, includes: - 1) Riders must have Public Service Vehicle (PSV) insurance, 2) Valid riding/driving license and 3) Minimum third party insurance. The regulation also restricts carriage of loads to 15 centimeters width beyond handle bars height or two meters from ground, no rear projection beyond 60 centimeters off length of motorcycle and no load dragging on the road. Riders must also carry only one passenger at a time and passengers must sit astride and use foot rests except for persons with disability. Regulations formulated by the government seemed to be good and could help reduce major cases of fatalities caused by boda-boda riders, the only challenging bit is the implementation of these new laws hasn't been fully embraced by boda-boda riders, many haven't taken the initiative to even try adhering to them, once an operator acquires motorcycles they start the business, scramble for Customers without any order creating total menace in the industry. In Uganda boda-boda riders are required to belong to associations which is an administrative tool created by the Ugandan Government to regulate the industry. Each member is required to contribute an annual membership fee ranging between $6 and $10 which comprises of a municipal operating license (plate) and actual association membership subscription. The associations act as an insurance agent and legally represent the riders in case of accidents. Good legislation has been passed in Kenya but sensitization to the community, implementation and adherence still remain a tall order, thus rendering them information poor, boda-boda riders take this advantage to continue with their daily routine business without following the due diligence of the laws. They used all means possible to invade the police hence resulting in lawlessness industry, promoting all kinds of mischief ranging from fatal accidents, source or lethal robbery.

2.4.Related technologies used in transport industry

There are many mobile technological interventions that have been implemented in the transport industry, majority of these applications are only in the Taxi (small cars), and none has been tried in boda-boda industry in Kenya

2.4.1. Uber

Uber is a technology company that offers free software-platform available on mobile device for those wishing to request rides. At its core, Uber seeks to match passengers to drivers. The platform is able to track user's GPS coordinates, even if the user does not know where he/she is. The user is able to track arrival of her/his ride, and receives text message confirming when the Uber driver is arriving. From the driver's end, the driver is able to hit a button on his own app that says "Arriving Now" which sends the text message. The driver is never given the user's phone number directly, but is able to contact the user if he is unable to find the user. Uber typically costs less than a normal taxi in most markets. However, in times of high demand, like New Year's Eve prices goes high.

No cash is exchanged when using Uber since signing up for an account requires providing credit card information. After the ride, the user is charged electronically and a receipt is immediately emailed, providing details of the trip. The user can then rate the driver (and the driver can also rate the user) and check a map of the route taken.

2.4.2. Boda fix

This innovation was invented in Uganda to bring safety to boda-boda riders and users, the application shows searches of all boda-boda according to names and location in Kampala and users can contact them for services. Security wise, the app has details of the boda-boda whereby it makes it easier to trace one in case of anything. This system has mobile money integration where fares can also be made directly to their mobile money accounts. The application is intended to save time, no need of going to the market, making payment of commodities electronically no need to carry cash.

2.4.3. Safeboda

Safe-Boda was a technological invention which was aimed to offer safe and secure moto-taxi experience in Uganda. It was believed that a market-based solution that incentivizes road safety can prevent injury and death and significantly reduce public health costs. Boda-boda riders were provided with trainings, quality helmets, and help users find the Safe-Boda drivers using a mobile application. Wearing a quality helmet reduces risks of death by 40% and risk of severe injury by 70% (WHO 2013). This model seemed to work because of aligned incentives of all stakeholders in the transportation market by increasing value, efficiency and safety. Safe-Boda provided a safe working environment for riders and increase their income. Safe transportation market was created for customers and support government authorities in improving transportation efficiency.

2.5.Cyclist behavior/training

Operation of any locomotive device and machines require training, Motorcycle training trains motorcycle rider's skills for riding on public roads. It is the equivalent of drivers' education for a car driver Proper training as recommended by the government to motorcycle riders has not been implemented (Manyara, 2013) in his report he indicated that "Kenya Police reports reveal that 85.5% of crashes are caused by poor driver behavior, of which driver error represents 44.4%" (Odero 2013). In many occasions youths get trained by their peers on how to ride motorcycles, this usually lasts for hours and one become a cyclist, these kind of training does not include road safety and standard road use. 70% of all cyclist in Kenya do not own valid driving license. In many developed countries riders are now either required or encouraged to attend safety classes in order to obtain a separate motorcycle driving license. Training can help to bridge the gap between a novice and experienced rider as well as improving the skills and behavior of a more experienced rider. Training brings a lot of advantageous practice to industry like for boda-boda it's the key to ease in accidents, disciple to riders hence improved management and operation of the entire industry.

2.6.Riders data transmission and reporting of incidences

There is greater need for any association that is involved in provision of transport services to communities to have formal systematic and reliable ways in which incidences can be reported either to their management group of to any recommended authority especially in case of accidents. Many riders and Customers have fallen into circumstances that they are an able to get help from service providers when accidents occur in areas where they are not known, many times Customers have been abandoned by riders and seek help from good Samaritans as riders flee away after accidents living their passengers in great pain just because they are sure nobody will be able to identify or trace them for cause accident. The current boda-boda management setups has not implemented any technological ways and means of reporting instances that riders and their customers experience on their daily operations.

2.7.Other related studies literature

Over the past decade there has been a significant growth in the use of motorcycles as a commercial public transport mode in countries in sub-Saharan Africa, Latin America and Asia. While offering certain transport advantages in the form of easy accessibility, ability to travel on poor roads, and demand responsiveness, commercial motorcycle service growth have led to increase in road accidents, traffic management problems, pervasive noise and increases in local air pollution and greenhouse gas emissions. Government efforts to regulate the market have had the contrary impact of compounding the problem by distorting market structures. Current riders have a vested interest in maintaining the status quo and they use their considerable economic and political power to obtain political influence which, in turn, promotes policies to protect the interests of select few.

In Kenya a number of studies have been done on the use of boda-boda as means of transport (Olawo, 2014) did study on effect of increased investment in boda-boda business on economic empowerment of people in Kisumu west district. The study results showed male youth dominance, in terms of ownership 67% of riders were employed and did not own their own motorcycles. (W. Mutiso, 2011) indicated the significances of innovation as source of economic development to youths, this study showed several challenges that this industry faces in its implementation. In Nigeria, a number studies have also been done on the use of motorcycles as

means of public transportation. Adamawa State, this study identified economic depression and inadequate transport facilities as some of the factors that gave rise to the use of motorcycles as means of public transportation in Nigeria (Oladipo O. Olubomehin, 2012). (Christopher Eraye Michael, 2013) focused on the abolition of commercial motorbikes and its implication on transportation and criminality in caliber metropolis. A number of studies have also been done in Uganda on boda-boda, all this studies shows the importance of boda-boda industry in relation to economic development and empowerment of youths. These studies also provide major loop holes that exists in the entire operations that when properly addressed could bring dignity and sanity to the entire industry.

2.8.Conceptual structure

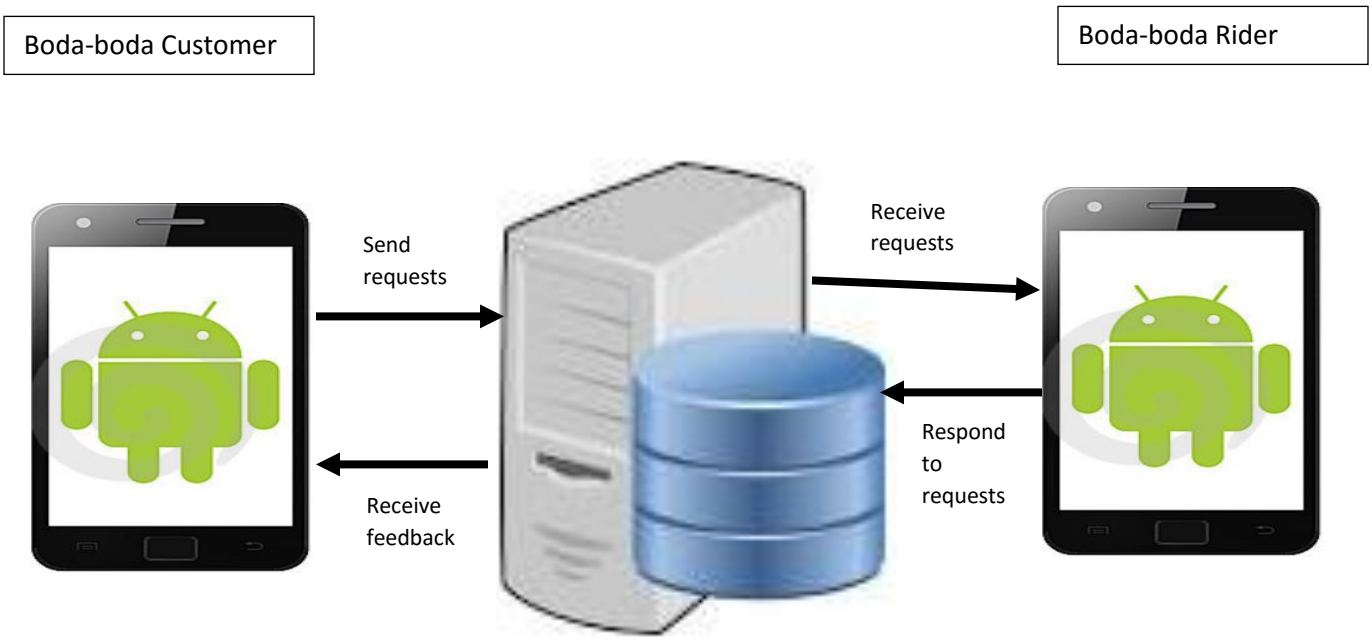

Figure 1. Conceptual Architecture

2.9.Conceptual framework

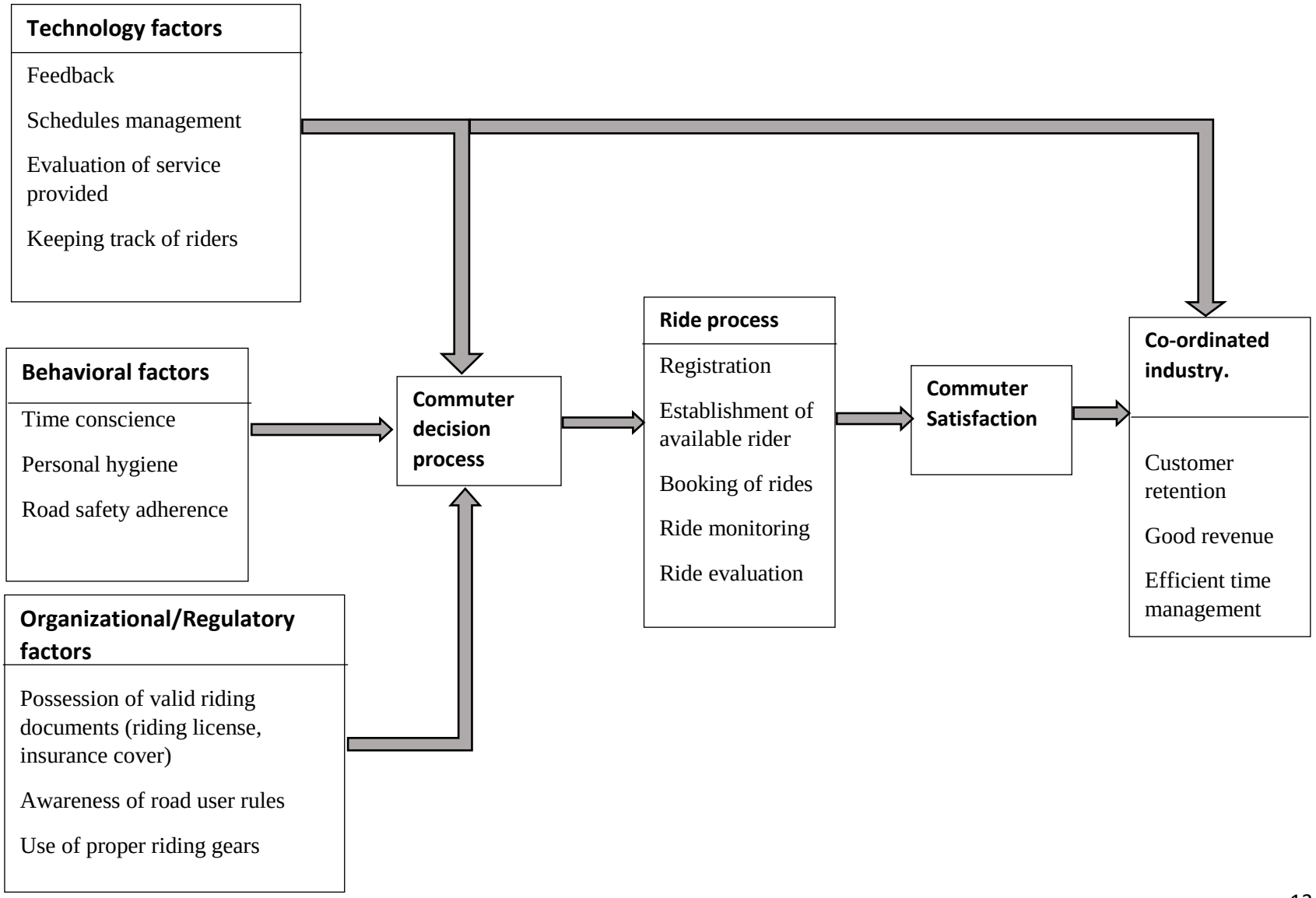

Figure 2. Conceptual framework

CHAPTER THREE

Methodology

3.1.Introduction

This research work had three major components: -

1. Information gathering on the challenges facing boda-boda industry as a means of public transport
2. Design and development of prototype
3. Testing and evaluation of developed prototype- this enables us to test our concept on the use of ICT to empower boda-boda industry in real life situation

3.2.Study Design

(Mugenda & Mugenda, 1999) describes study design as an outline or blueprint for carrying out the study in a way that there is maximum control over factors that could influence validity of the study results. Study design is seen as researcher's independent plan for obtaining credible results to the research questions guiding the research. (Burns and Grove, 2001) expounds that study design helps researchers to plan and implement the study in such a way that help in obtaining the intended results, this further increases the chances of obtaining reliable information that could be associated with the real-life situation. In this study, the researcher used qualitative, quantitative and exploratory design to identify, analyze and explain the challenges facing boda-boda riders with a view of using ICT in improving their daily operations. Identified challenges were then categorized into perception, factors and variables affecting the likelihood of boda-boda rider and the use of ICT in running boda-boda business.

3.3. Research Setting

Research setting primarily refers to the place/region or geographical location where research data are collected. For this study, research data were gathered at Lavingtone boda-boda stage and Dagoretti Nakumatt junction boda-boda stage within Dagoreti North constituency.

3.4.Research population and sample size

Polit and Hunger (1999), “population as the totality of all subjects that conform to a set of specifications, comprising the entire group of persons that is of interest to the researcher and to whom the research results can be generalized”. Lobiondo-wood and Haber (1998), “describe a sample as a portion or a subset of the research population selected to participate in a study, representing the research population”.

3.4.1. Population

The study population for this research comprised of all boda-boda riders at Lavingtone boda-boda stage and Dagoretti Junction boda-boda stage within Dagoretti North constituency. (Polite & hunger 1999), describes eligibility criteria as specification of characteristics of the people in the population that must be possessed in order to be included in the study”. This study only included boda-boda rider operating within or from either Dagoretti boda-boda stage or Lavingtone boda-boda stage as its participants, the individual had to be active operators in the boda-boda business at the time of the study and willing to contribute to the study.

3.4.2. Sample

Convenience or non-probability sampling design was used; this is because the researcher could not find any reference document containing clear information/data regarding the operation of boda-boda riders in the study area. Not every boda-boda rider had an equal probability of being included in the study sample because there was no complete list or census of all boda-boda riders in the area. In addition, the researcher did not have sampling framework from which a sample could be drawn randomly to ensure equality of boda-boda rider included in the sample, this study used convenience and non-probabilistic sampling frame in drawing its sample. (De Vos, 1998) states that “convenience sampling is the rational choice in case where it is impossible to identify all the members of a given population”.

3.4.2.1.Characteristics of non-probability sample

In non-probability sampling, everybody who meets the study inclusion criteria is requested to participate in the study. Example all boda-boda riders operating within Lavingtone stage and Dagoretti Junction stage were asked to participate in the study.

It is seen to be more economical and less complicated procedure than random sampling

Study subjects are selected based on researchers own judgement once they all meet study inclusion criteria

3.4.3. Data collection

(Polit and Hunger, 1999) defines data as "information obtained during the course of study investigation. For data collection Questionnaires and Focused discussion guides were used to collect/obtain relevant data and information to study objectives. The purpose of this study was to identify challenges facing boda-boda riders with the aim of developing ICT solution that could help mitigate or reduce the single-out challenge. The researcher approached every boda-boda rider operating within Lavingtone stage and Dagoretti junction stage to be included in the study. Boda-boda operator who were willing to be included in the study received informed consent detailing what the study is about and the questionnaire. When 48 questionnaires were completed the researched serially coded them and entered all the responses in Ms Access database in readiness for analysis.

3.4.3.1.Data collection instruments

(Seaman, 1991) defines data gathering instruments as "devices used to collect data, e.g. structured interviews, questionnaires and checklist. While, (Polite and hunger, 1997) defined a questionnaire as "a method of gathering information from participants about attitudes, knowledge, beliefs and feelings". The questionnaire was designed to gather information about challenges facing boda-boda riders with intention of single out challenges that can be solved using ICT and develop a prototype for the singled out challenges.

3.4.3.2.Development of questionnaire

The literature reviewed indicates that the use of ICT can stream-line boda-boda operations. This study attempt to find challenges faced by boda-boda riders with the aim of introducing ICT as a contributor to the operational process. Development of the questionnaire was based on the literature reviewed and other instruments used in similar studies. The questionnaire was compiled and discussed with classmates and a small group of boda-boda riders. Changes

suggested by these persons were implemented into the revised questionnaire. A pilot was done and those riders who participated in the pilot were excluded from the main study. No apparent problem was experienced during the compilation of the questionnaire, except that issues surrounding boda-boda were seen to be many, hence required clear focus to study aim and objective.

3.4.3.3.Focused Group Discussion

Focused groups are small groups of people discussing or addressing a specific topic, in this study the topic was challenges facing boda-boda rider as a means of providing public transport. FGD was used to complement the main study questionnaire. FGD was used to gather qualitative information that could not be better obtained by structured questionnaire. Two FGD's were conducted, one at Lavingtone stage with riders and their management and another one conducted at Dagoretti junction stage, the discussions were proposed to take 30 minutes, but on the real day they took more time, since participant were willing to share information on challengers facing them.

3.4.4. Reliability of the research instrument

Reliability refers to the degree of consistency or accuracy with which an instrument measures the attribute it's designed to measure (Polit &hunger 1997). If a study and its instruments are reliable, it means the same results would be obtained if the study were to be replicated by other researchers using the same method. A pretest using a group of boda-boda riders who were later excluded from the main research, with similar characteristics to the study sample was conducted to determine the clarity of the items and consistency of the responses. The a normally detected was that since the questionnaire was self-administered, it was not easy to verify some responses, especially when the question is touching on possession of valid documents and issues of economic status.

3.4.5. Validity of the research

Validity refers to the degree to which an instrument measures what it is supposed to measure (Mugenda and Mugenda 1999). Validity can be sub-categorized as external and internal validity

3.4.5.1.External validity

Burns and grove (1999) describe external validity as the extent to which the results can be generalized beyond the sample used in the study. This depends on the degree to which the sample represents the population. This study had low external validity implying the results can apply only to boda-boda riders within Dagoretii junction stage and Lavingtone boda-boda stage within Dagoretti North constituency. The external validity of this study may have been compromised by selecting a non-random, convenient sample. There was no guarantee that boda-boda riders operating in these two stages had the same and similar challenges regarding their operations that could be solved using ICT, the sample was not randomly drawn implying that not every boda-boda rider within the constituency had similar chances of inclusion in the study.

3.4.5.2.Internal validity

This is the extent to which challenges experienced by boda-boda riders are a true reflection of the reality, rather than the results of the effects from extraneous variables/factors not necessarily related to challenges on boda-boda operation.

3.5.Ethical consideration

In any research, the wellbeing of the respondent is a key component, in this research informed consent was prepared detailing all what the research is about. Respondents were given and researcher explained areas where respondents were not clear on, the questionnaire was self-administered with no individual identification variable giving respondents surety of anonymity to the responses given.

3.6.Conclusion

This chapter discussed research methodology of the study and describe research design, population sample data collection instruments and ethical consideration for the study.

CHAPTER FOUR

Analysis and Design

4.1.Introduction

This chapter describes the analysis of data followed by discussion of the research findings and design of proposed prototype. The findings relate to the research questions that guided the study. Data were analyzed to single out major challenges faced by boda-boda riders that could be solved using ICT. Data were obtained from self-administered questionnaires, completed by 48 boda-boda riders. Descriptive statistical analysis was used to identify frequencies and percentages to answer all of the questions in the questionnaire. Not all the respondents answered all questions in the questionnaire hence the percentages reported correspond to the total number of boda-boda riders who answered that individual question.

4.2.Demographic Information

Although it was not part of the purpose of the study, this set of data was intended to describe demographic information of the sample and to assess for any influence on the research findings. The demographic consisted of age, gender, marital status and the highest level of education.

4.2.1. Age range of participants in the sample

Participants were asked to tick age category appropriate to them, all respondents responded to this question representing 100% response rate

Table 1. Summary by age group

Age group	Number (%)
Under 18Yrs	1(2.08%)
18-25Yrs	10(20.8%)
26-30Yrs	9(18.8%)
31-35Yrs	21(43.8%)
36-40Yrs	4(8.3%)
41-45Yrs	3(6.3%)
Total	48(100%)

Majority of the respondents in this study were between 31-35 years representing 43.8% of the study respondents, the study also had good number of youth's bellow 25years and one respondent below the age of 18 years.

All the respondents were male, fulfilling literature reviewed that this is still male dominated field.

4.2.2. Highest level of Education

One of the key demographic information collected was the highest level of education attained, this variable was categorized into completed primary, some secondary, completed secondary, vocational training, some collage, completed college and university.

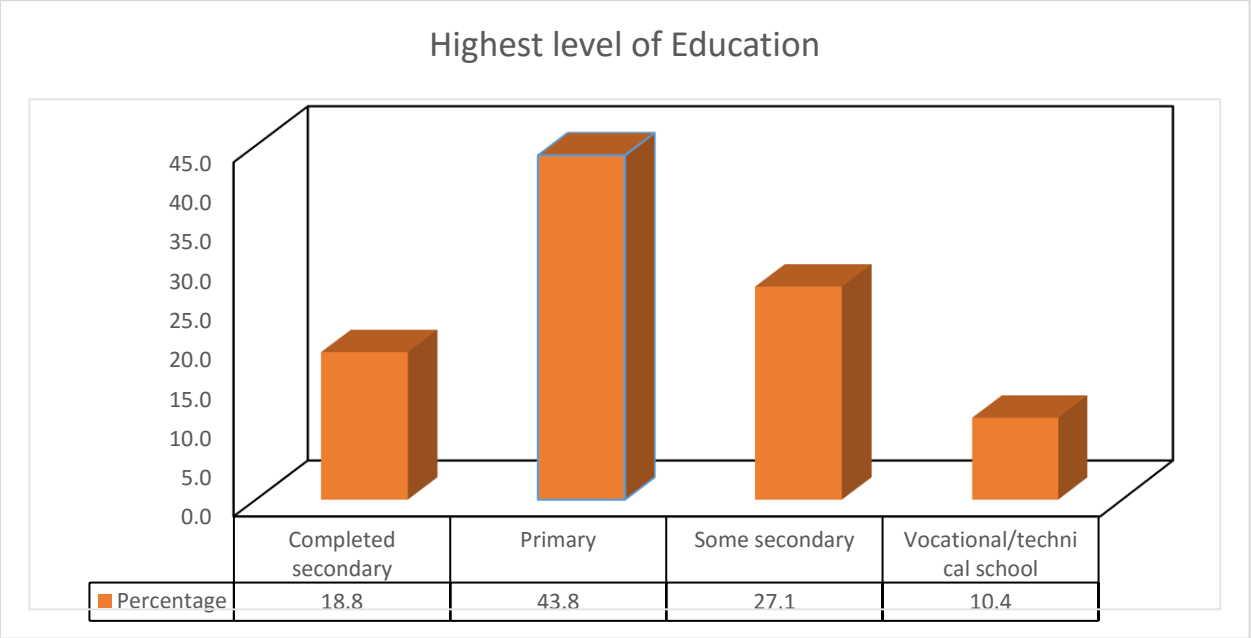

Figure 3. Highest level of education

Majority of the people interviewed had their highest level of education as primary level, contributing to 43.8% with a good number being secondary drop outs or had completed secondary education, 10.4% of the respondents had knowledge of technical school, NYS was mentioned as one of the vocational schools attended.

4.2.3. Marital status

In order to understand the level of commitment to the business marital status was one of the demographic information collected, the study tool categorized marital status into: Single, Married, Divorced and widowed, the study result indicated that

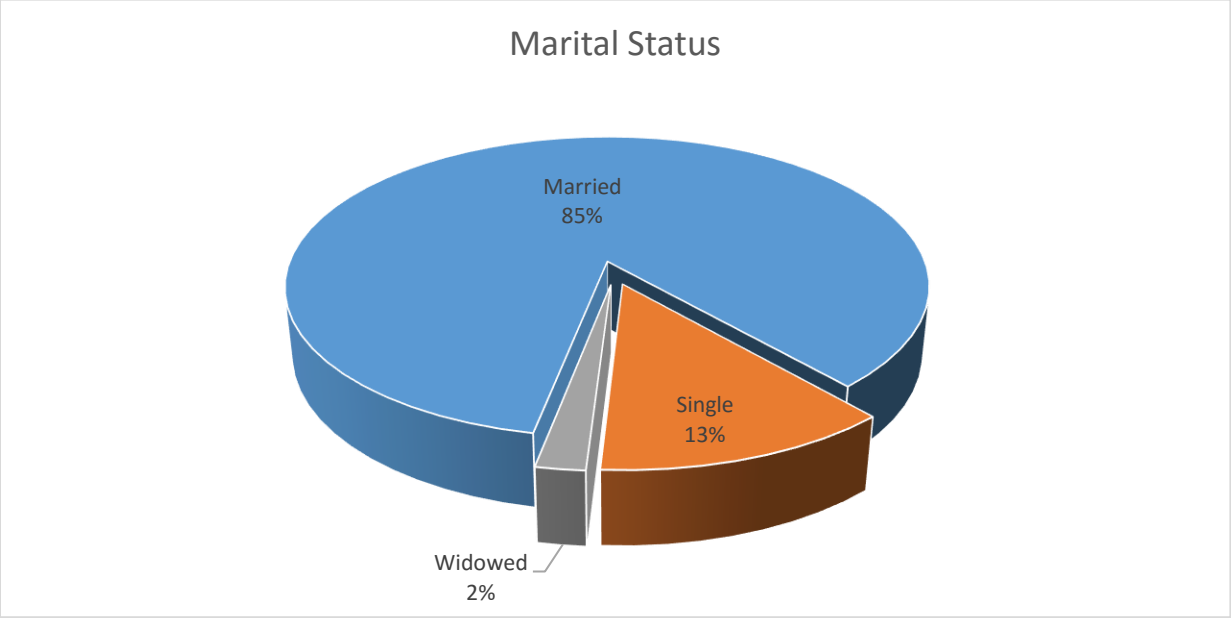

Figure 4. Marital status

Eighty-five percent of the respondents were married, this finding is in-line with other studies that boda-boda is a source employment for many families in Kenya. Many families depend on use of boda-boda as a source of income for the families, hence this is an area that requires a lot of attention to sustain dependent families.

4.3.Riders information, social and economic status

In this section researcher inquired information concerning specific issues on riders and their economic gain from boda-boda operation as a means of public transport. Researcher intended to understand the extent to which riders value this business and anything towards improving daily revenue of smooth operationalization will be treated.

We confirmed with respondents to be sure they are riders by asking a question on "*are you a boda-boda rider?*" all the respondents responded with "yes" response as this was one of the criteria for inclusion in the study.

We also asked to understand the motivational factor to become boda-boda rider and it was all agreed that the main motivating factor is. **Source of income** as responded by all the 48 respondents included in the study

4.3.1. Possession of valid riding license and valid Insurance cover

Being this was self-administered questionnaire none of the responded indicated not having valid riding license with one respondent failing to answer this question, this might be one of the drawbacks of self-administered questionnaires since some might fear telling the truth. Out of the 48 responded 44 responded to question on possession of valid insurance cover with 4 opting not to respond to that question. For those who responded to this question list below table as insurance companies providing them with insurance cover.

Table 2. Insurance companies

Insurance Companies	**Number**	**Percent**
AIC Lions	2	4.88
CIC insurance	2	4.88
Equity	3	7.32
Explico	1	2.44
KCB bank	5	12.2
Madison insurance	24	58.54
Monarch	4	9.76
Total	41	100

4.3.2. Motorcycle ownership

The researcher sought to understand the ownership status of the motorcycles as this could affect the implementation of any system and its sustainability. This question was well responded to it had 100% response rate. Sixty-two percent of the respondents were the real owners of the motorcycles they use to operate boda-boda business while 37% of the respondents rented

motorcycles and they had to pay between Shs 200 and Shs 300 the rental fee depends between the owner and the rider there is no rule governing or regulating this rate. With a high percentage rate of ownership of the motorcycle by riders, proves to be a good indication for system implementation and long term sustainability, the summary is as shown in the chart below.

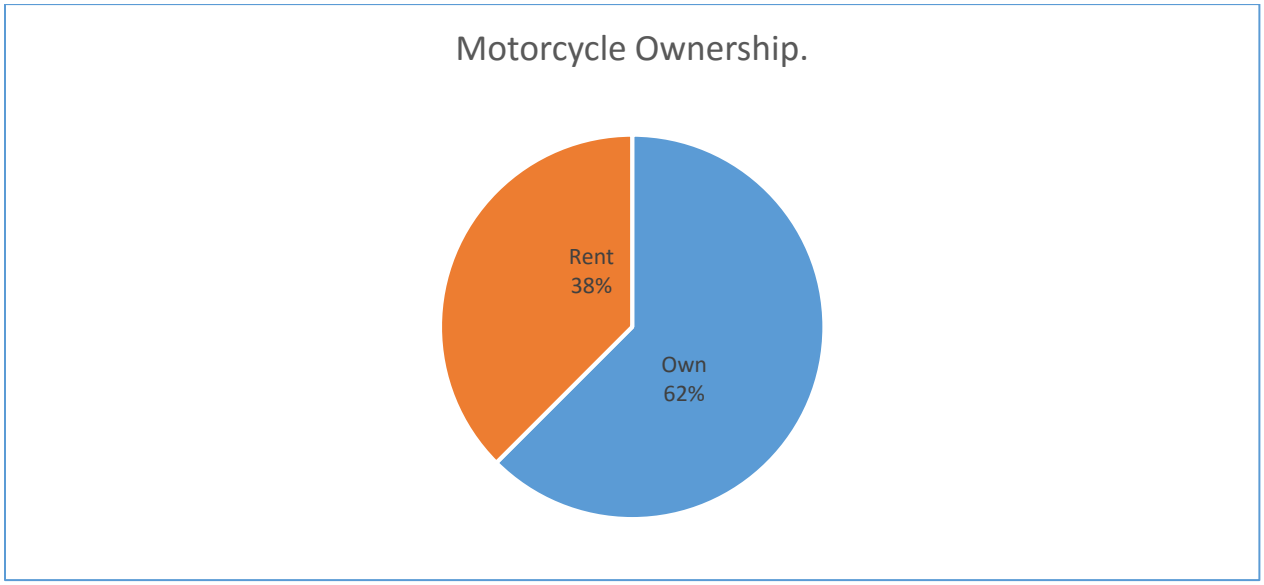

Figure 5. Motorcycle ownership

4.3.3. Duration in operation as boba-boda rider

To authenticate responses from riders, it was of essence for the researcher to understand duration of which each respondent has been in service, this would help in categorizing challenges either as long term on individual one sport issue. The respondents' operation time span was between 6 moths to 7 years with mean operation time being 2 years.

As boda-boda operator the research sought to understand the average operation time in a day, the study indicates that operation time in each day ranges from 5 hours to 16 hours in a day with an average time of 12 hours. To shade more light a cross tabulation of ownership and time spend operation boda-boda was done.

Table 3. Average time spent operating boda-boda per day (hours)

Ownership of Motorcycle used	5 (hrs)	10 (hrs)	12 (hrs)	13 (hrs)	14 (hrs)	15 (hrs)	16 (hrs)	Total
Own	2	2	10	3	9	2	0	28
Rent	0	0	5	2	4	2	5	18
Total	**2**	**2**	**15**	**5**	**13**	**4**	**5**	**46**

Majority of riders who were seen to be operating for long hours were those who rented motorcycles. This was augmented with a focused group discussion when participants responded "we *work for long hours because the owner of the motorcycle must be given his daily money and I must also get something with bad working conditions its forcing us to work for long hours*"

In relation to the amount of time spent operating boda-boda majority of riders gets between 1000-1500 shillings and use between 100-500 Kenya shillings for fuel.

Table 4. Amount earned per day

Amount earned per day (Ksh)	Number	Percent
100-500	4	8.33
500-1000	12	25
1000-1500	20	41.67
1500-2000	11	22.92
2000 and above	1	2.08
Total	48	100

Waiting time was another key factor considered, this is the approximated time riders take in their respective stage's waiting for customers to offer services. Majority of respondents reported to take approximately 30 minutes on average other reported to take more than 2 hours

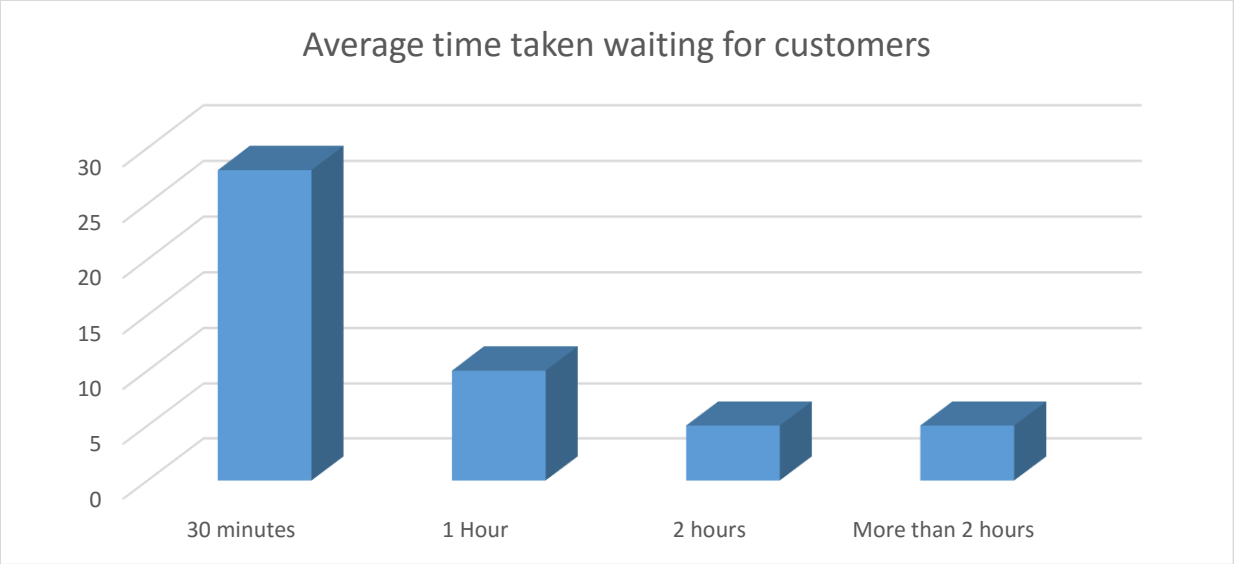

Figure 6. Average time taken waiting for customers

4.4.Identified challenges

From the data collected five major issues were raised, the leading problem being Robbery 33.3% as stand alone or in combination with other challengers, careless riding was also adversely mentioned as a major challenge, the other challenges were uncontrolled growth, management deficit, police harassment, long working hours and lack of identification for riders.

Table 5. Summary of challenges

Major challenges	**Number**	**Percent**
Uncontrolled Growth, Robbery	1	2.08
Careless Riding	2	4.17
Careless Riding, Uncontrolled Growth	1	2.08
Careless Riding, Robbery, Management Deficit	1	2.08
Careless Riding, Robbery, Uncontrolled Growth	2	4.17
Careless Riding, Uncontrolled Growth, Management Deficit	1	2.08
Management Deficit	1	2.08
Management Deficit, Robbery, Police Harassment	1	2.08
Management Deficit, Robbery	8	16.67
Robbery	16	33.33

Robbery, Arrest, Careless Riding	1	2.08
Robbery, Uncontrollable Growth	1	2.08
Robbery, Careless Riding	1	2.08
Robbery, Uncontrolled Growth	1	2.08
Uncontrolled Growth, Robbery	10	20.83
Total	48	100

4.5.Mitigation of identified challenges

Individual respondents were asked to list major challenges faced as boda-boda rider and the following were noted:

a. ***Long working hours:*** riders note with a lot of concern that this business requires working for many hours, this many hours working time does not translate into direct income. A lot of time is wasted at different strategic picking points (stage) waiting for customers, even though they work for up to 16 hours in a day the average amount earned per day does not change much it usually ranges from 1000-1500 Kenya shillings. Long working hours may be reduced by implementation of ICT technology to organize schedules rather than waiting for unknown opportunities from passersby, there is need to have scheduling system for riders to monitor and be able to operate within pick hours and reduce their operations during off pick hours, this is coast benefit analysis that would help them to engage in other activities during off pick hours.
b. ***Uncontrolled growth & lack of government policy enforcement:*** many riders noted with a lot of concern that this industry received a lot of newcomers on a daily basis, it's currently unknown how many riders operate this business in a particular area leading to many issues like robbery, careless riding, loss of life. Providing analytical perspective of the issue requires creation of a database that can hold details of riders, providing a mechanism of following them up after registration. This issue can be best reduced through use of ICT by creating a database of all riders in particular areas. This would help both the customers and rider to know legitimate riders.

It is from this that we developed a system that could help keep records of all riders, monitor their movements, monitor peak and off peak hours to reduce operating hours and help customers to call riders at their door steps.

Table 6. Challenges, gaps and ICT solution

	Challenge	**Gap**	**ICT Solution**
1.	Robbery by both posing as riders and customers	Lack of rider's and customer's identification	Create an electronic database that riders and customers must register before service, and track movement of riders at the interval
2.	Unregulated growth	Lack of rider's information, no document	Create database of riders
3.	Careless riding	Lack of mechanisms to identify rider's locations	Monitoring of riders through the use of GPS
4.	Management deficit	Lack of coordination	System for registering and monitoring riders
5.	Long working hours	Lack of analytical way to understand customer peak and off-peak hours	Develop database for customer's movement registry to provide data for analysis

4.6.System analysis and design

4.6.1. Current System

Boda-boda groups currently have no technologically supported system that can help them in management of their operations in Nairobi Kenya, the related systems are used majorly in car taxi business examples of such systems are Uber in Africa and Heart-limo mainly used in the UK for management of taxi business these systems are used to order services, trace location and

make payments. Such system has not been implemented in management of boda-boda especially in the study area while this is seen to be the most lucrative form of employment to both youths in urban and rural areas of Kenya.

4.6.2. Proposed system

It is from the literature review and preliminary study gaps identified informed the development of the prototype. One of the goals of this research project was to study and analyze challenges facing boda-boda as a means of public transport, the other objective was to develop a prototype that could solve the identified problem, implement the prototype and test its efficiency in addressing the challenge. The preferred system development methodology is Rapid Application development(RAD).

4.6.3. General component of the prototype

4.6.3.1.Rapid Application Development

RAD is an incremental software development process model that emphasizes an extremely short development cycle. The RAD model is a high speed adaptation of the linear sequential model in which the rapid development is achieved by using component-based construction.

This methodology involves

- Gathering system requirement
- Prototyping and user iterative testing
- Reuse of user components

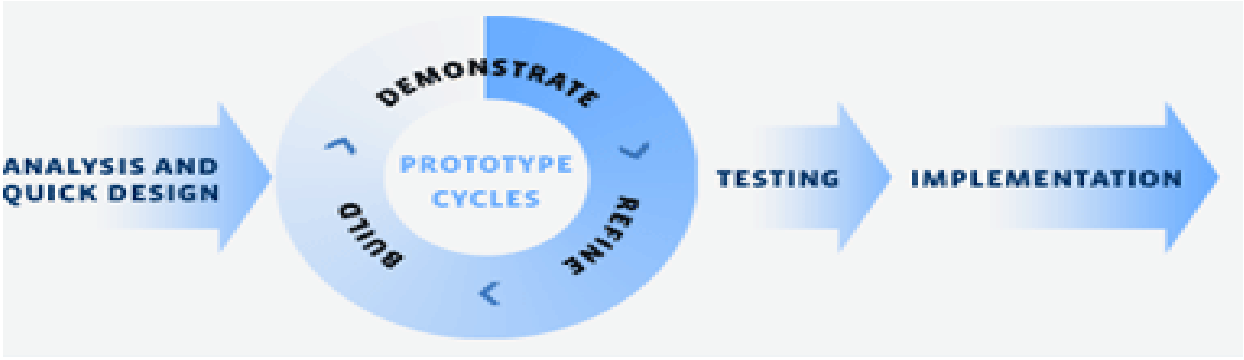

Figure 7. RAD Stages

4.6.3.2.**Stages of Rapid Application Development**

RAD cycle composed of four stages

- Requirement planning – this involves requirement planning and prototype design
- User design- this is where prototype and models are built iteratively with users.
- Rapid construction- after the development of models, this is where real system development is involved, it requires iterative consultation with the real users.
- Transition- this is the last stage in this methodology, it where full scale-up of the system is done, user ownership and training for future users and maintenance personnel.

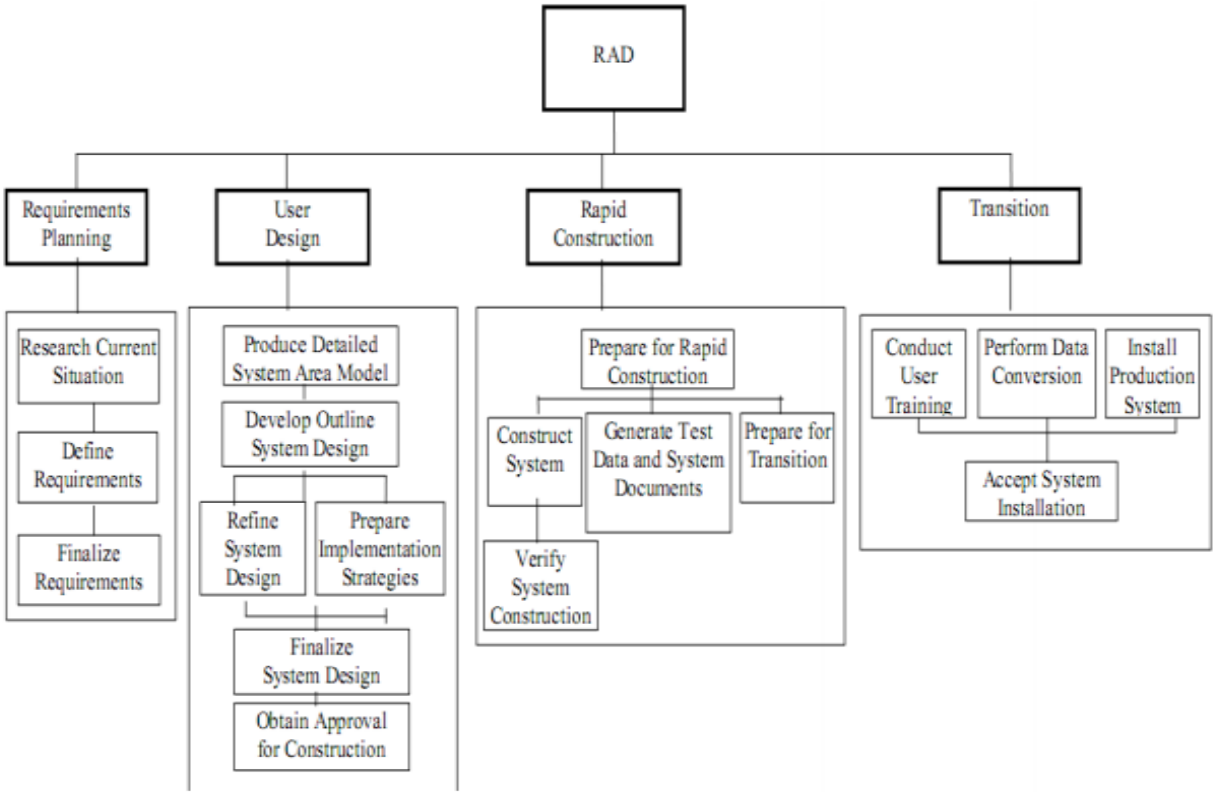

Figure 8. RAD framework

4.6.4. Prototype description

Boda-boda industry does not have current system that could be used, either for booking, registering, or monitoring daily operations of riders and their customers.

Developed system introduces a way of registering boda-boda riders, providing form of identification to all riders, provide mechanism of monitoring all riders on real time basis with the help of GPS locations coordinated, provide mechanisms of booking rides from the conform of customers doors step, this system can also be integrated to other systems e.g. Road safety authority to cube issues of accidents, integrated with police crime department to track movement of riders as boda-boda has introduced efficient way of people escaping after committing robbery.

4.6.4.1.System overview

The prototype is named Msafiri, it is designed to capture, store, track and provide quick summaries of boda-boda riders movement.

Boda-boda registration: in order to maintain integrity of the riders, registration of riders will be done by the administrator after thorough validation of documents provided by the requesting rider for registration, this will contain identification documents such as national id number, motorcycle registration number, riding license number and operational location.

Rider monitoring: this system used GPS coordinated that are sent to server database after every five minutes providing real time location where specific rider is at all point. Coordinates will either be obtained through GSM or GSM for those with phones without GPS functionality and via GPS for those with phones that have GPS functionality.

Analysis: analysis of rides and locations will be accessible on the browser side of the application and for any case of loss or stagnant movement for more than 2 hours, the admin will check with the rider maintaining constant awareness of all rider's information

Evaluation: evaluation from both the rider and the customer is submitted to the server after every ride providing backup information about the system and the entire ride process.

Booking for rides: this is one of the major component of this system, each customer requesting for ride must register to the system, registration of customers involves personal identification details e.g. phone number, full name, email, and password. This is used in case of loss or malpractice during service provision period. On successful registration customers are able to see all available riders near to them on google map, pick the drop off location either by searching on google map or by typing the actual location name, this are submitted to the database.

***Confirmation notifications**:* both the customer and the rider gets notifications, riders gets notification on bookings done by customers that they may accept or reject depending on thier availability and assessment of the areas. Customer also gets notification on acceptances of bookings made or rejections, prompting for another booking.

Reports: this includes riders, customers and ride reports

4.6.5. Data flow Diagram

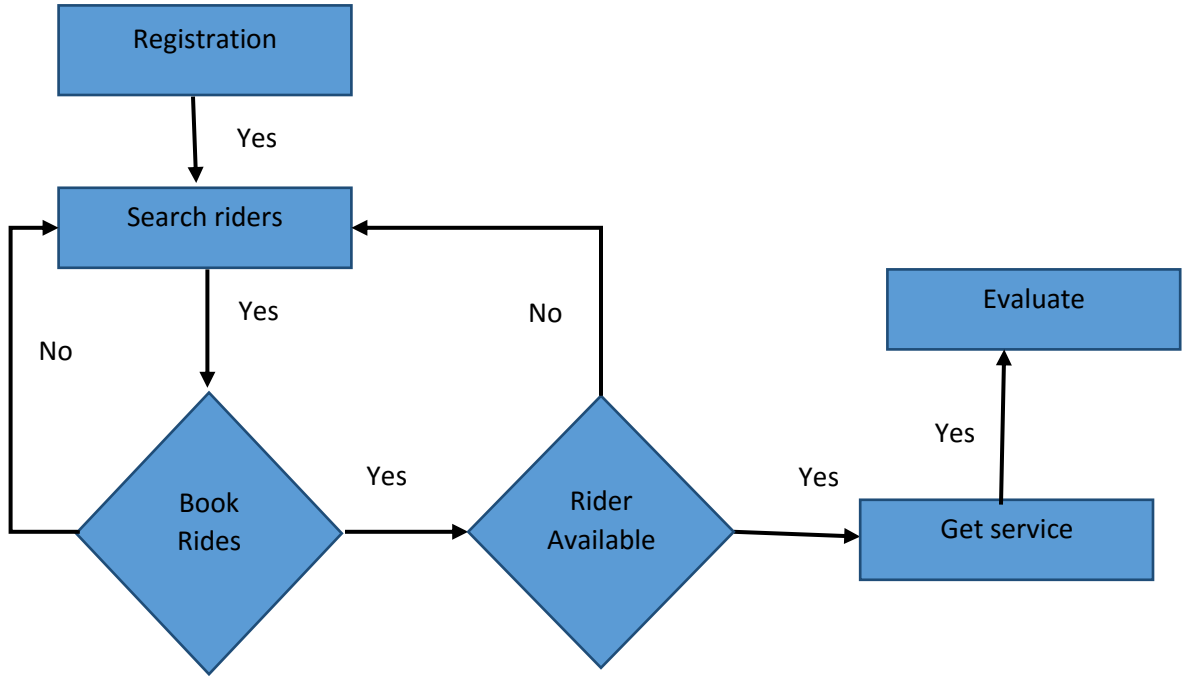

Figure 9. Dataflow diagram

DFD shows the process flow from when the riders are registered, customers booking riders, services rendered and evaluation done

4.6.6. Implementation

Development of the prototype involved user specifications obtained from the study in relation to the real-life situation and environment where the system will be used.

Implementation includes:

Use of android application to develop both rider and customer application

Use of MySQL for development of database for store

Use of PHP application to ease communication to databases

Use of HTML for administration side user interface development for registration of riders and development of reports.

4.6.7. System interface

Developed system has login interface for both user and the riders this is after successful registration to the system.

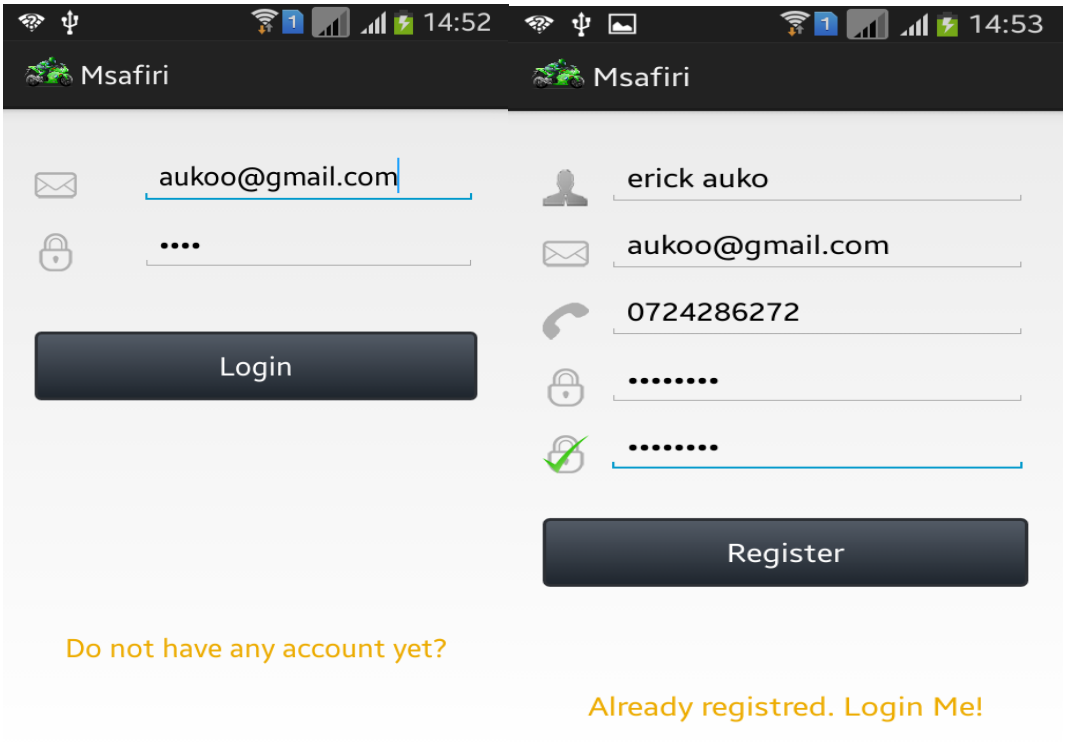

Figure 10. System login and registration interface

Once the user is logged in will be able to request for riders

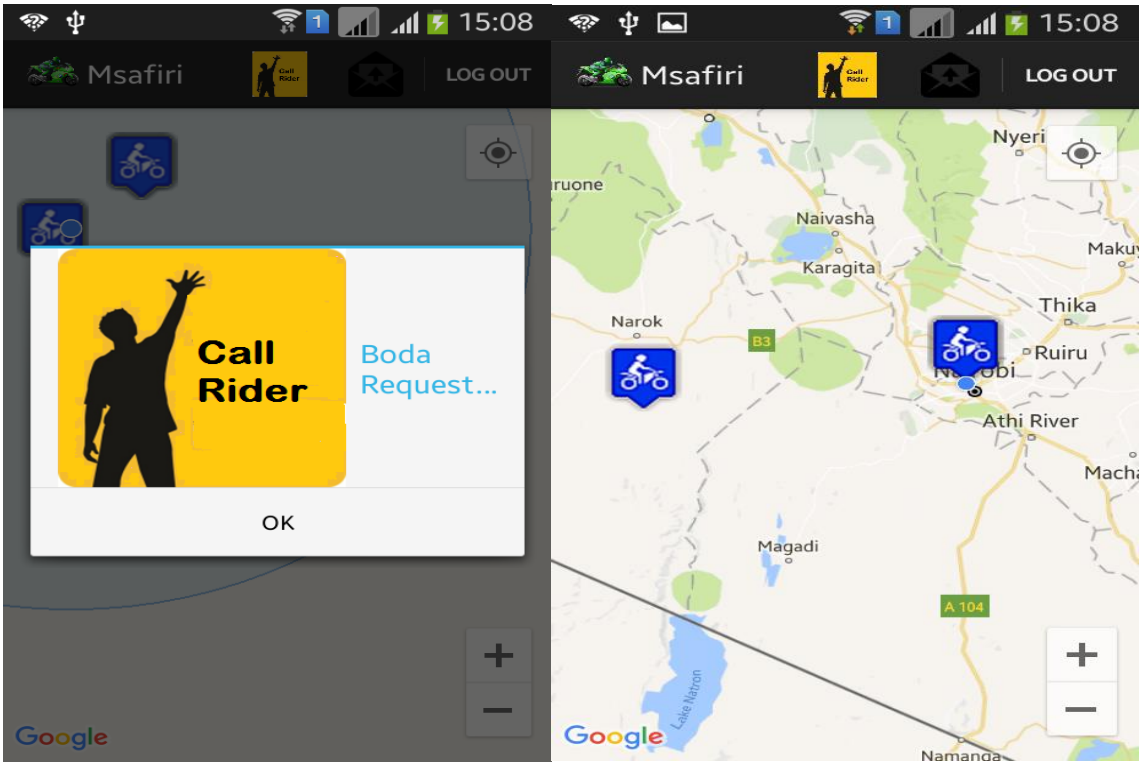

Figure 11. System Customer request and Rider mapping

While rider's login they have the option of viewing requests and be able to respond to requests

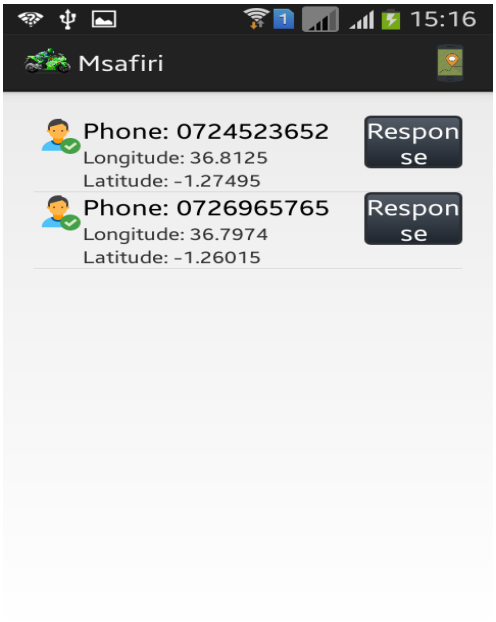

Figure 12. List of Ride requests

CHAPTER FIVE

Results and Discussion

5.1.Introduction

This chapter consists of results and discussions of data analysis obtained from boda boda riders after two weeks of system implementation. Methods used for data collection included interviews and focused group discussion.

5.2. General Information

ICT has proved to be one of the key deriving catalysts to the current economy, with increase in number of mobile phone users, many sectors have fully embarked on use of mobile phone to help in streamlining different sectors, this is clearly evident in the financial sector especially in Kenya with the use of M-pesa, where mobile money transfers has produced recommended income to many communities, proving to be one of the most economical and efficient way to transact money between people within and outside the country.

A survey on the use of ICT in improving boda-boda business as a means of public transport was conducted after successful implementation of the developed prototype. 10 boda-boda riders were registered to the prototype with the aim of improving their daily operations through the use of ICT. The prototype had special functionality of registering rider's destinations at all points during their daily movements to the database, providing linkage mechanisms between riders and customers. Information stickers were posted along road sides within Dagoretti North constituency to inform the general public on the system and services it provides. The stickers also contained basic operational instructions on how to find, launch, register and use the prototype.

In evaluating the prototype, it was necessary to assess user's ability to use the prototype efficiently without requesting for assistances. Majority of the participants indicated agreement with the statement of being able to use the system without seeking help. This is possibly because majority of the respondents confirmed having used other generic mobile application before (72%). In addition, assessment on ease of use in connecting and responding to customers had majority of respondent's agreement as well as preferred system of use.

5.3.Prototype usability testing

Usability testing is a method by which users of a product are asked to perform certain tasks in an effort to measure the product's ease-of-use, task time, and the user's perception of the experience. Usability test was conducted to understand user's perception towards the developed prototype and their level of satisfaction regarding the system. A large proportion of users strongly recommended the use of the developed prototype, a large proportion was also satisfied with the developed system in both cases having proportion of 80% and 70% respectively for all riders who responded to this question.

Question on recommendation was put to riders *"do you recommend the use of this prototype in running boda-boda operations as a means of public transport"?* This question showed strong agreements with the system from riders with 80% of the riders recommending the use of this system in running daily boda-boda operations as shown in table 7 below

Table 7. Riders prototype user recommendation

Do you recommend the use of this prototype in running of boda-boda operations as a means of public transport?	
Response	Percent
Strongly recommend	40%
Recommend	40%
Don't recommend	20%
Strongly do not recommend	0%

Even though the majority of users strongly agrees with the prototype usability, a number of the respondents did not recommend the use with their main issue being *"the prototype runs on android hence those with basic phone may be left out"* while on the same context they agree with the use of the system and were willing to purchase a compatible phone in order to use the developed prototype.

5.3.1. Connecting riders with customers

Connecting riders with customers was one of the key components the prototype was aimed at accomplishing, from the preliminary study conducted respondents reported riders waiting time at particular stages to be between 1-2hours, there was lack of a system to connect customers with riders hence the developed prototype provided mechanisms of which customers could search for riders and book rides. 100% of respondents reported satisfaction with the prototype that, with the use of this system, it was unnecessary to wait at a particular designated point hence customers were able to contact them at their local points.

Rides are not bound to wait at particular points, with connection possibility riders can now be able to analyze peak and off-peak hours with the aim of attending to other activities, increasing the level of income to riders and promoting prioritization of activities. Riders were asked how efficient is it to use the prototype in connection with Customers, 84% recommended the prototype for connection even though they also recommended high advertisement rates for many customers to be aware of the system, from conversation with Riders one reported "*the system is good and it helps a lot in connecting us with potential customers, as of now the turnout is still not good since many are not aware of the system*". Many Riders and customers also reported confidence during rider since there is way of identification before the service, reducing the number of robberies to both parties.

5.3.1.1.Registered users

The system got good reception to the markets, withina spann of 2 weeks the system had registered over 50 customers. This was a clear indication that this system is usable and customers

Customer Name	Customer Email	Customer Mobile Number	Booking Date	Location Lat:	Location Long
Maurice Otieno	aukoo@gmail.com	0724286272	2016-09-08	-1.269376	36.808556
Bendict Wamboi	aukoo@gmail.com	0727976495	2016-09-13	-1.293337	36.751507
Kenneth Wamalwa	ken@gmail.com	0725825362	2016-09-10	-1.269376	36.808556
Kennedy Mutisia	wken@gmail.com	0782453675	2016-09-12	-1.345268	36.673782
Evarest Ogendo	ogendoevarest@gmail.com	0782453675	2016-09-12	-1.356274	36.782764
Benson Wambua	bnjuguna@gmail.com	0787896182	2016-09-12	-1.342563	36.882729
Christopher Mogambi	chris@gmail.com	0780898617	2016-09-13	-1.234568	35.873737
George Onyango	njoroge@gmail.com	0723657482	2016-09-12	-1.342553	36.673664
Peterson Kamande	p.mwalili@gmail.com	0724365742	2016-09-12	-1.453663	36.782825

appreciate its effectiveness

Figure 13. Administrator portal for mapping riders

5.3.2. Riders tracking

According to this research study the term monitoring refers to the process of keeping track of riders' current position, the system implemented GPS location locator that relay riders' location through updating riders' central database linked with google map API, the position can then be accessed by both the administrator through the web application and customers through android application, the location identified contained the name of the rider and the Bike Number. Riders tracking component of the system were well appreciated as many riders were confident with their operation eliminating the fear of being mugged. On the preliminary study robbery was one of the majorly scored challenge, many riders supported the issue of tracking/monitoring as one functionality a boda boda management system should have. Tracking functionality was highly accepted and received greater acceptance by both Riders and their customers. On assess functionality component this is one of the functionality both the riders and customers agreed with promoting acceptance of the system to the general public. The picture below indicates the current position of the riders as captured from the administrative system.

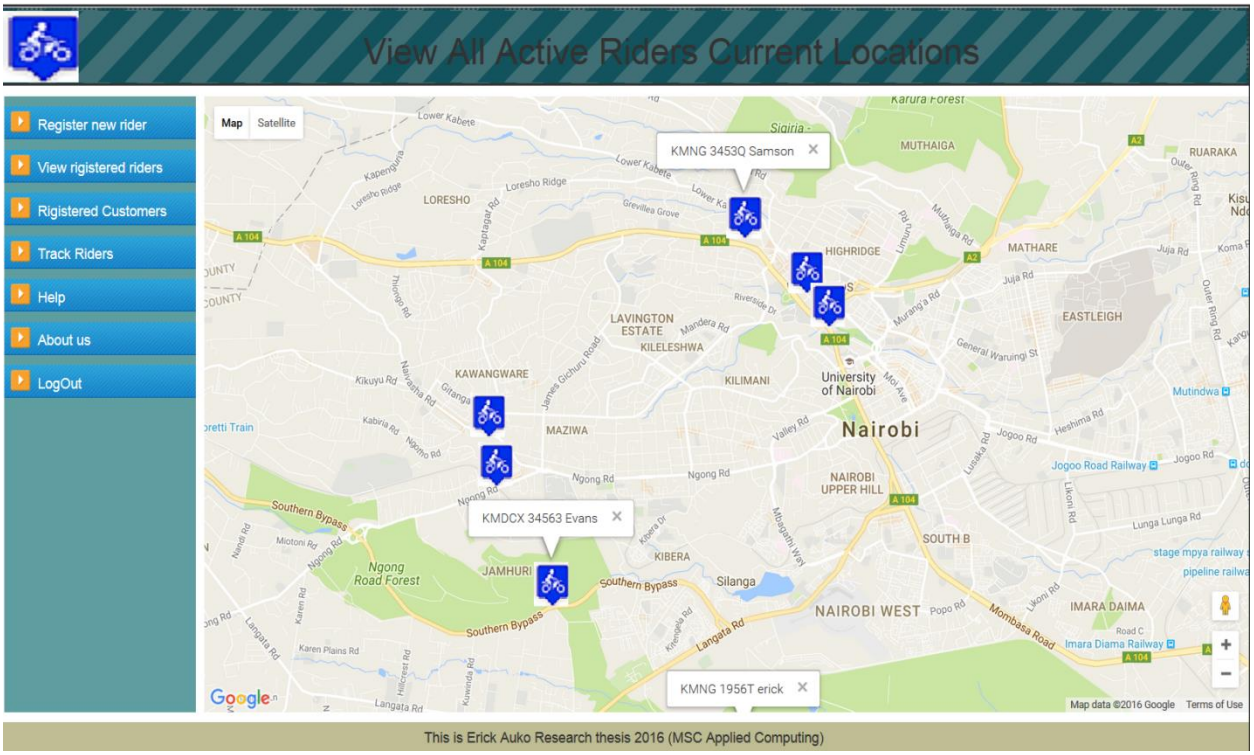

Figure 14. Administrator portal for mapping riders

5.4.Prototype Efficiency and Usefulness

Any system is recognized as useful only if it performs tasks it was intended, a system is also recognized as efficient if it can perform specified task within the minimum time possible, the developed prototype was subjected to efficiency and usefulness test by asking boda boda riders who have used it their opinion regarding efficiency and usefulness of the prototype. A total of 10 boda boda riders were asked to rate usefulness of the developed prototype on their own opinion if they agree or disagree on the usefulness of the developed prototype.

Table 8. Respondents summary on System usefulness

Is this system useful in management of boda boda business	
Category	**Percent**
Strongly agree	60%
Agree	40%

Disagree	0%
Strongly disagree	0%

One hundred percent of riders agreed that the system is useful in their boda boda operation this was reflected with the large number of customers who had registered to the system.

Study respondents were also asked which component of the application was more useful, the components were categorized into: booking rides, monitoring/locating riders and customers, registering customers.

Customers were majorly happy with the rides booking component as they could always book from their doorsteps this made it easy for them not to be moved to some designated places to find riders, it also assured them of the security since all riders could be easily identified and traced in the event of any abnormality during the ride.

On the other hand, riders were much satisfied and happy with booking component as they do not require to stand at some strategic points for them to get customers, they were also happy with the registration component since this regulated the number of riders. Any rider coming to the business must have had required paperwork by the government, hence this has reduced cases of new unqualified riders to this business in return boosting daily income.

5.5.Conclusion

The developed system showed greater improvement on the management of boda-boda operations, it provided a reliable and easy platform for connecting customers and riders, enhances security and assurance through GPS tracking mechanisms. Riders involved in testing the application registered 100% efficiency and user satisfaction of the system in management of boda-boda operations. It's therefore recommended to implement this system in large scale to ensure smooth operationalization of boda-boda as a means of public transport in Kenya and other countries with similar characteristics. Even though system testing showed tremendous management capability it was of essence to test it for a longer period of time to understand all its aspects both from the customer, riders and any other interested body.

CHAPTER SIX

Conclusion and Recommendation

6.1.Conclusion

To the best of our knowledge, no study had been conducted on use of ICT in empowering boda boda operations as a means of public transport in Kenya. The preliminary study conducted and literature reviewed indicated that there is information gap when it comes to use of boda boda as means of public transport in Kenya. There is no system either from the government of private sector that could provide information on the use of boda boda as means of transport in Kenya. The developed prototype system is user driven and takes into account all the necessary measures to protect the users of the system, both the riders and customers during the service provision period. This is an interactive system that provides prompt to the system used to indicate what to be filled in all the system entry fields.

This prototype system provides good information for both riders, customers in relation to where the service provider and services seekers are if they had never come in contact with each other. The system provides real time present locations, hence making prompt decision for both parties. The developed prototype provides an archive of data for both the rider and customer and could provide better information evidence for government regulations, the information stored can also help in areas where either of the parties defile one another during the service provision period, the police could use this information to trace defilement time and service provision time.

6.2.Reflecting on the Research objective

Objective 1: Find out challenges facing boda boda as means of public transport and single out challenges that can be solved using ICT

A preliminary study was conducted to understand the context and challenges facing boda-boda transport industry, from this study Robbery, Uncontrolled growth and Management deficit were some of the major challenges faced by boda boda riders, this was also supported by the literature reviewed from other studies. From our study, it has emerged utilization of a mobile application tool has great impact on the management of boda boda operations this comes hand in hand from

customers and ride connections, monitoring of riders and keeping a database of all riders hence controlling unregulated growth in the number of riders joining the business. This arises from the qualitative data collected from riders and customers. However, there is a potential need for customers and riders to be educated on the use and benefit of using such applications in running a business.

Objective 2: Develop prototype to contribute in solving singled out problem

This objective was addressed as explained in chapter four, android application was developed with web admin portal, riders were registered to the system after satisfactorily providing valid required documents by Kenyan authorities allowing them to ride on Kenyan roads, the system also stores customer's details at time of rides this provided a form of identification to both riders and customers during and after service provision.

Objective 3. Test the developed prototype

The developed prototype was tested in real life situation and results obtained from the implementation shared as discussed in chapter five.

6.3.Limitation of the study

The following are the limitation of this research project

- The study used purposive sampling technique which might be biased hence may not reflect the same picture if the study was to be implemented in different locations.
- This is a volatile industry, many of the riders do not accept participation in the industry with the fear of being identified being they do not have recommended attire and documentation for operation.
- No any other research has been done on the use of ICT in boda boda hence a preliminary research was to be conducted, this extended the study period from the intended time frame.
- System testing done for two weeks hence we could not realize the full potential of this system, it requires sufficient time to operationalize for its long-term benefits to be achieved.

6.4.Recommendation for future work

The developed system only runs on android phone and required internet connection throughout hence this was a major drawback as some of the users had basic phone and could not be able to use the prototype, they recommended having a system that could both used basic and advance phone.

The prototype used internet connection, hence some users thought this could reduce their earnings in a long time since they have to use money in purchasing bundles, the prototype could use only SMS which is a one-time expense then could be much more affordable to the large group.

Fear of technological embarrassment was one of the challenges, encounter hence there was need to have much training on the benefits of the system that could emphases long-term benefit to users.

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APPENDIXES

Appendix 1. User questionnaire

Use of ICT in Empowering Boda Boda Industry Questionnaire

All questions contained in this questionnaire are part of the survey on boda-boda rider's perception on use of ICT in empowering Boba-boda industry. This survey aims to capture knowledge attitude and practice of bodaboda operators. This survey should only take 15-20 minutes of your time.

Instruction: Please respond by putting cross or tick in from of the chosen response and explain briefly where required.

<table>
<tr><td colspan="5">1. Demographic information</td></tr>
<tr><td rowspan="2">a. Age</td><td><18Yrs ☐</td><td>18-25Yrs ☐</td><td>26-30Yrs ☐</td><td>31-35 ☐</td></tr>
<tr><td>36-40Yrs ☐</td><td>41-45Yrs ☐</td><td>46-50Yrs ☐</td><td>>50Yrs ☐</td></tr>
<tr><td>b. Gender</td><td colspan="4">☐ Male
☐ Female</td></tr>
<tr><td rowspan="2">c. Highest level of education?</td><td>Primary ☐</td><td>Completed Secondary ☐</td><td>Some secondary ☐</td><td>Vocational/ technical school ☐</td></tr>
<tr><td>College ☐</td><td>Some collage ☐</td><td>University ☐</td><td></td></tr>
<tr><td colspan="2">d. Marital status</td><td colspan="3">☐ Married ☐ Single
☐ Divorced/separated ☐ Widowed</td></tr>
<tr><td colspan="5">2. Rider information, social and economic status</td></tr>
<tr><td colspan="5">a. Are you boda boda rider? ☐ Yes
☐ No</td></tr>
</table>

b. What was your motivating factor to become boda boda operator?	☐ Source of income ☐ Peer influence ☐ Leisure ☐ Asked by Parents ☐ Other _____
c. Have you even gone to any riding school?	☐ Yes ☐ No
If yes in C above, Name the school: _____	
d. Do you have riding license?	☐ Yes ☐ No
e. Do you have motorcycle valid insurance cover today?	☐ Yes ☐ No
If yes in E above, which insurance company insures this motorcycle _____	
f. Do you own or rent this Motorcycle	☐ Own ☐ Rent
g. Is boda boda riding your main source of income?	☐ Yes ☐ No
h. For how long have you been in this business (*record answer in months*)?	*Months*
i. On average how much time do you spend in a day operating boba boda as form of business? (*record time in hours*)	*Hrs*
j. Do you have specific location you operate from?	☐ Yes ☐ No
k. Do you group your selves inform of organization/association or any kind of grouping?	☐ Yes ☐ No

If yes in K above, what is the name of your group: _____	
l. Is the association registered with Kenyan government department?	☐ Yes ☐ No
m. On average, how much time do you spend waiting for customers at your station/location?	☐ 30 minutes ☐ One hour ☐ 2 hours ☐ More than 2 hours
n. On average, how much money do you earn from this business on daily basis?	☐ < shs 100 ☐ Shs 100-500 ☐ Shs 500-1000 ☐ Shs 1000-1500 ☐ Shs 1500-2000 ☐ >Shs 2000
o. On average, how much money do you spend on fuel every day for this business?	☐ < shs 100 ☐ Shs 100-500 ☐ Shs 500-1000 ☐ Shs 1000-1500 ☐ Shs 1500-2000 ☐ >Shs 2000
p. How do you often get customers?	☐ Passersby ☐ Phone calls ☐ Use mobile application

	☐ Referrals
q. What are the major challenges you face as boda boda rider?	☐ Careless riding ☐ Management decifit ☐ Uncontroled growth ☐ Robery
r. Any other major challenges	
s. Have you ever thought of how you can mitigate the mention problem above?	☐ Yes ☐ No
What was your proposed solution? _____	
3. Phone ownership and usability	
a. Do you own mobile phone?	☐ Yes ☐ No
b. Which make of mobile phone do you own?	☐ Basic phone ☐ Feature phone ☐ Smart phone
c. Do you use your mobile phone in any way to help you in your boda boda business?	☐ Yes ☐ No
d. If yes, what do you use your mobile phone for in your boda boda business?	☐ Calling customers ☐ SMS customers ☐ Use application to connect with customers
e. Have you ever used your mobile phone application either for plying games or running user customized applications?	☐ Yes ☐ No

f. Would you recommend the use of mobile phone application in enhancing your business operation?	☐ Yes ☐ No

Any other comment

_____

_____

_____

_____

_____

Thanks for your time

Appendix 2: Usability Testing Questionnaire

All questions contained in this questionnaire are part of the Usability test for the system. This questionnaire aims to capture perception and attitude of the user towards the system. Filling this questionnaire should only take 5-10 minutes of your time.

Instruction: Please read carefully and respond by putting cross or tick in from of the chosen response

No	Question		1	2	3	4	5	6	7	NA
1	Overall, I am satisfied with how easy it is to use this system		◯	◯	◯	◯	◯	◯	◯	◯
2	It was simple to use this system		◯	◯	◯	◯	◯	◯	◯	◯
3	I was able to complete tasks and scenarios quickly using this system		◯	◯	◯	◯	◯	◯	◯	◯
4	I felt comfortable using this system		◯	◯	◯	◯	◯	◯	◯	◯
5	I believe I could become productive quickly using this system		◯	◯	◯	◯	◯	◯	◯	◯
6	It was easy to lean to use this system		◯	◯	◯	◯	◯	◯	◯	◯
7	The system gave error message that clearly told me how to fix problems		◯	◯	◯	◯	◯	◯	◯	◯
8	Whenever I made mistake using the system I could recover easily and quickly		◯	◯	◯	◯	◯	◯	◯	◯
9	The information (such as onscreen messages) provided with this system were very clear		◯	◯	◯	◯	◯	◯	◯	◯
10	It was easy to find the information I needed		◯	◯	◯	◯	◯	◯	◯	◯
11	The information was effective in helping to complete the tasks and scenarios		◯	◯	◯	◯	◯	◯	◯	◯
12	The organization of information on system was		◯	◯	◯	◯	◯	◯	◯	◯

	very clear									
13	The interface of this system was very pleasant		○	○	○	○	○	○	○	○
14	I liked using the interface of this system		○	○	○	○	○	○	○	○
15	This system has all the functionalities and capabilities I expected it to have		○	○	○	○	○	○	○	○
16	Overall, in am satisfied with this system		○	○	○	○	○	○	○	○

Appendix 3. System Sample Code

```
//Main activity class
package com.erick.boda;

import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStream;
import java.io.InputStreamReader;
import java.io.UnsupportedEncodingException;
import java.util.HashMap;
import org.apache.http.HttpResponse;
import org.apache.http.client.ClientProtocolException;
import org.apache.http.client.HttpClient;
import org.apache.http.client.methods.HttpPost;
import org.apache.http.entity.StringEntity;
import org.apache.http.impl.client.DefaultHttpClient;
import org.apache.http.message.BasicHeader;
import org.apache.http.params.HttpConnectionParams;
import org.apache.http.protocol.HTTP;
import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;
import android.app.Activity;
import android.app.AlertDialog;
import android.content.DialogInterface;
import android.content.Intent;
import android.os.Bundle;
import android.util.Log;
```

```
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;
import com.google.android.gms.maps.CameraUpdate;
import com.google.android.gms.maps.CameraUpdateFactory;
import com.google.android.gms.maps.GoogleMap;
import com.google.android.gms.maps.MapFragment;
import com.google.android.gms.maps.model.BitmapDescriptorFactory;
import com.google.android.gms.maps.model.LatLng;
import com.google.android.gms.maps.model.Marker;
import com.google.android.gms.maps.model.MarkerOptions;

public class MainActivity extends Activity
// Google Map
GoogleMap googleMap;
Marker UserMarket, TaxiMarker;
private double Lat, Lon;
private String UserEmail;
private String UserPhone;
private static final String URL = "http://10.128.228.78/boda/UpdateGPS.php";
private static final String URLREQUEST = "http://10.128.228.78/boda/SendRequest.php";
  //// GLOBAL VARIABLES ////
private int intRole = 0;
// Session Manager Class
SessionManager session;
/////  GETTER AND SETTER OF MY VARIABLES//////////
public void setLat(double Lat){
this.Lat = Lat;
```

```
 }
public void setLon(double Lon){
this.Lon = Lon;
}
public double getLat(){
return this.Lat;
   }
public double getLon(){
return this.Lon;
 }
@Override
protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_main);
// Session Manager
session = new SessionManager(getApplicationContext());
//  Toast.makeText(getApplicationContext(), "User Login Status: " + session.isLoggedIn(),
Toast.LENGTH_LONG).show();
if(session.isLoggedIn() == false){
Intent goLogin = new Intent(this, LoginActivity.class);
startActivity(goLogin);
overridePendingTransition(R.anim.slide_in_left, R.anim.slide_out_left);
}else{
try {
GPSTracker gps = new GPSTracker(this);
if(gps.canGetLocation()){
/////////// GET INFORMATION OF USER WHO IS LOGED //////////////
HashMap<String, String> User = session.getUserDetails();
String UserName = User.get("name");
```

```
String Role = User.get("role");
this.intRole = Integer.parseInt(Role);
this.UserEmail = User.get("email");
this.UserPhone = User.get("phone");
this.Lat = gps.getLatitude(); // returns latitude
this.Lon = gps.getLongitude(); // returns longitude
/////////INITIALIZE THE MAP
googleMap = ((MapFragment) getFragmentManager().findFragmentById(R.id.map)).getMap();
LatLng CURRENT_LOCATION = new LatLng(this.Lat,this.Lon);
//Get current position on map
CameraUpdate update = CameraUpdateFactory.newLatLngZoom(CURRENT_LOCATION, 15);
googleMap.animateCamera(update);
///////////////// PRINT TO DEBUG //////////////////
Log.e("My name is:",User.toString());
///////// DEPENDING WHAT IS THE ROLE IT CHANGE THE MARKERT IMG
////////// ROLE 1   --  USER
if(this.intRole == 1){
googleMap.setMyLocationEnabled(true);
UpdateGPS(this.UserEmail, this.UserPhone);

////////// ROLE 2   --  Boda rider
}else if(this.intRole == 2){
this.TaxiMarker = this.googleMap.addMarker(new MarkerOptions()
                                                    .position(CURRENT_LOCATION)
                                                    .title(UserName)
.icon(BitmapDescriptorFactory.fromResource(R.drawable.taxi)));
                                                UpdateGPS(this.UserEmail, this.UserPhone);
   ////////// ROLE 3   --  ADMINISTRATOR
}else {
```

```
googleMap.setMyLocationEnabled(true);
UpdateGPS(this.UserEmail, this.UserPhone);}
} else{
gps.showSettingsAlert();
}
} catch (Exception e) {
e.printStackTrace();
}
} // end if else condition
}
@Override
protected void onResume() {
super.onResume();
}
////////// THIS CREATE THE HEADER METHOD ////////////////////
    @Override
public boolean onCreateOptionsMenu(Menu menu) {
if(this.intRole!= 2){
MenuInflater mif = getMenuInflater();
mif.inflate(R.menu.main_activity_actions, menu);
return super.onCreateOptionsMenu(menu);
}else{
MenuInflater mif = getMenuInflater();
mif.inflate(R.menu.main_activity_actions_taxi, menu);
return super.onCreateOptionsMenu(menu);
}   }
@Override
public boolean onOptionsItemSelected(MenuItem item) {
```

```
// Handle presses on the action bar items
switch (item.getItemId()) {
case R.id.getTaxi:
//////// SEND MESSAGE TO REQUEST ///////////
RequestTaxi(this.UserEmail, this.UserPhone, this.Lat, this.Lon);
return true;
case R.id.getRequest:
Intent gRequest= new Intent(this, Userlist.class);
//gRequest.putExtra("Email", UserEmail);
gRequest.putExtra("Phone", this.UserPhone);
startActivity(gRequest);
overridePendingTransition(R.anim.slide_out_left, R.anim.slide_in_left);
return true;
case R.id.customers_waiting:
//////// SEND MESSAGE TO REQUEST///////////
session = new SessionManager(getApplicationContext());
Intent goRequest= new Intent(this, RiderequestActivity.class);
startActivity(goRequest);
overridePendingTransition(R.anim.slide_out_left, R.anim.slide_in_left);
return true;
case R.id.LogOut:
// Session Manager
session.logoutUser();
Intent goLogin = new Intent(this, LoginActivity.class);
startActivity(goLogin);
overridePendingTransition(R.anim.slide_in_left, R.anim.slide_out_left);
return true;
default:
```

```
return super.onOptionsItemSelected(item);
                                    }
                                }
///////////////// THIS FUNCTIONS IS TO UPDATE THE GPS LOCATION ////////////////////////////
protected void UpdateGPS(final String Email, final String Phone){
GPSTracker gps = new GPSTracker(this);
final double lat = gps.getLatitude();
final double lon = gps.getLongitude();
Thread t = new Thread() {
public void run() {
while(true){
try{
HttpClient client = new DefaultHttpClient();

HttpConnectionParams.setConnectionTimeout(client.getParams(), 10000); //Timeout Limit
HttpResponse response;
JSONObject json = new JSONObject();
try {
HttpPost post = new HttpPost(URL);
json.put("Lat",lat);
json.put("Lon", lon);
json.put("UserEmail", Email);
json.put("UserPhone", Phone);
StringEntity se = new StringEntity( json.toString() );
se.setContentType(new BasicHeader(HTTP.CONTENT_TYPE, "application/json"));
post.setEntity(se);
response = client.execute(post);
Log.e("Data to update",json.toString());
/*Checking response */
```

```
if(response!=null){
InputStream in = response.getEntity().getContent(); //Get the data in the entity
// Convert data InputStream into String
final String result = slurp(in);
try {
runOnUiThread(new Runnable() {
@Override
public void run() {

JSONObject reader = null;
try {
reader = new JSONObject(result);
JSONObject StatusRequest  = reader.getJSONObject("Result");
     //  int Status = Integer.parseInt(StatusRequest.getString("Status"));
JSONArray Drivers = StatusRequest.getJSONArray("Drivers");
int lenArray = Drivers.length();
for(int i=0; i<lenArray;i++){
JSONObject resultArrayJson  =Drivers.getJSONObject(i);
String UserID = resultArrayJson.getString("UserID");
String Username = resultArrayJson.getString("Username");
String Email = resultArrayJson.getString("Email");
String Phone = resultArrayJson.getString("Phone");
String Latitude = resultArrayJson.getString("Latitude");
String Longitude = resultArrayJson.getString("Longitude");
String ID = resultArrayJson.getString("ID");

////////////////////// NOW IT IS NECESSARY TO PUT THE ON THE MAP //
double Lat = Double.parseDouble(Latitude);
double Lon = Double.parseDouble(Longitude);
```

```
LatLng Location = new LatLng(Lat,Lon);
                        googleMap.addMarker(new MarkerOptions()
.position(Location)
.icon(BitmapDescriptorFactory.fromResource(R.drawable.taxi)));
                                                    } // End for loop
} catch (JSONException e) {
// TODO Auto-generated catch block
e.printStackTrace();
                            }
                    }
            });
Thread.sleep(10000);
} catch (InterruptedException e) {
e.printStackTrace();
}
}
} catch(Exception e) {
e.printStackTrace();
}
} catch(Exception e) {
e.printStackTrace();
}
} // End while loop
}
};
t.start();
}
////////////// FUNCTION TO CREATE THE REQUEST//////////////
public void Request(final String UserEmail,final String UserPhone, final double Lat, final double Lon){
```

```
Thread Request = new Thread() {
public void run() {
HttpClient client = new DefaultHttpClient();
HttpConnectionParams.setConnectionTimeout(client.getParams(), 10000); //Timeout Limit
HttpResponse response;
JSONObject json = new JSONObject();
HttpPost post = new HttpPost(URLREQUEST);
try {
json.put("UserEmail",UserEmail);
json.put("UserPhone",UserPhone);
json.put("Lat",Lat);
json.put("Lon",Lon);
StringEntity se = new StringEntity( json.toString() );
se.setContentType(new BasicHeader(HTTP.CONTENT_TYPE, "application/json"));
post.setEntity(se);
response = client.execute(post);
Log.e("Data to update",json.toString());
if(response!=null){
InputStream in = response.getEntity().getContent(); //Get the data in the entity
// Convert data InputStream into String
final String result = slurp(in);
// Print on LogCat to debugin purpose
JSONObject reader = new JSONObject(result);
JSONObject StatusRequest  = reader.getJSONObject("Result");
final int Status = Integer.parseInt(StatusRequest.getString("Status"));
//int value = Integer.parseInt(reader.getString("Status"));
runOnUiThread(new Runnable() {
@Override
```

```
public void run() {
alertDialog("Boda Requested");
            }
});

} // if response !- null
} catch (JSONException e) {
// TODO Auto-generated catch block
e.printStackTrace();
} catch (UnsupportedEncodingException e) {
// TODO Auto-generated catch block
e.printStackTrace();
} catch (ClientProtocolException e) {
// TODO Auto-generated catch block
e.printStackTrace();
} catch (IOException e) {
// TODO Auto-generated catch block
e.printStackTrace();
}
} /// End run method
}; ///End new thread
Request.start();
}
public static String slurp(final InputStream is) throws IOException
{
BufferedReader reader = new BufferedReader(new InputStreamReader(is));
StringBuilder out = new StringBuilder();
String newLine = System.getProperty("line.separator");
```

```
String line;
while ((line = reader.readLine()) != null) {
        out.append(line);
out.append(newLine);
}
return out.toString();
}
 public void alertDialog(String Message){
new AlertDialog.Builder(MainActivity.this)
.setTitle(Message)
.setPositiveButton(android.R.string.yes, new DialogInterface.OnClickListener() {
public void onClick(DialogInterface dialog, int which) {
// Include function if you need it on this event
}
})
.setIcon(R.drawable.getrider)
.show();
} } // End class MainActivity
```

//ride request List

```
package com.erick.boda;
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStream;
import java.io.InputStreamReader;
import java.util.ArrayList;
import java.util.HashMap;
 import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;
 import android.app.Activity;
import android.app.ProgressDialog;
import android.content.Intent;
import android.os.AsyncTask;
import android.os.Bundle;
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;
import android.view.View;
import android.widget.AdapterView;
import android.widget.ListAdapter;
import android.widget.ListView;
import android.widget.SimpleAdapter;
import android.widget.TextView;
import android.widget.Toast;
import com.erick.boda.GPSTracker;
import com.erick.boda.Utils.JSONParser;
```

```
public class RiderequestActivity extends Activity {
    ListView list;
    TextView UserPhone;
    TextView LocationOfCall_Lat;
    TextView LocationOfCall_Lon;
    SessionManager session;
    ArrayList<HashMap<String, String>> userlist = new ArrayList<HashMap<String, String>>();
    //URL to get JSON Array
    private static String url = "http://10.128.228.78/boda/Riderequest.php";
       //JSON Node Names
    private static final String TAG_OS = "android";
    private static final String TAG_USERPHONE = "UserPhone";
    private static final String TAG_LAT = "LocationOfCall_Lat";
    private static final String TAG_LON = "LocationOfCall_Lon";
    private static final String TAG_LOCATION_NAME = "locationName";
    JSONArray android = null;

    GPSTracker tracker = new GPSTracker(this);

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main_user);
session = new SessionManager(getApplicationContext());
        new JSONParse().execute();
    }
private class JSONParse extends AsyncTask<String, String, JSONObject> {
         private ProgressDialog pDialog;
```

```
        @Override
        protected void onPreExecute() {
            super.onPreExecute();
             UserPhone = (TextView)findViewById(R.id.userphone);
             LocationOfCall_Lat = (TextView)findViewById(R.id.lat);
             LocationOfCall_Lon = (TextView)findViewById(R.id.lon);
             pDialog = new ProgressDialog(RiderequestActivity.this);
             pDialog.setMessage("Getting Data ...");
             pDialog.setIndeterminate(false);
             pDialog.setCancelable(true);
             pDialog.show();

        }

        @Override
        protected JSONObject doInBackground(String... args) {
JSONParser jParser = new JSONParser();
// Getting JSON from URL
            JSONObject json = jParser.getJSONFromUrl(url);
            return json;
        }
         @Override
         protected void onPostExecute(JSONObject json) {
             pDialog.dismiss();
             try {
                  // Getting JSON Array from URL
                  android = json.getJSONArray(TAG_OS);
                  for(int i = 0; i < android.length(); i++){
```

```
                JSONObject c = android.getJSONObject(i);

                // Storing  JSON item in a Variable
                String UserPhone = c.getString(TAG_USERPHONE);
                String LocationOfCall_Lat = c.getString(TAG_LAT);
                String LocationOfCall_Lon = c.getString(TAG_LON);

                // Adding value HashMap key => value

                HashMap<String, String> map = new HashMap<String, String>();

                map.put(TAG_USERPHONE, UserPhone);
                map.put(TAG_LAT, "Lat: "+LocationOfCall_Lat);
                map.put(TAG_LON, "Lon: "+LocationOfCall_Lon);
map.put(TAG_LOCATION_NAME, "Location: Near
"+tracker.reverseGeocode(Double.valueOf(LocationOfCall_Lat), Double.valueOf(LocationOfCall_Lon)));

                userlist.add(map);
               list=(ListView)findViewById(R.id.list);
ListAdapter adapter = new SimpleAdapter(RiderequestActivity.this, userlist,R.layout.list_res,
new String[]  { TAG_USERPHONE,TAG_LOCATION_NAME,TAG_LAT, TAG_LON },
new int[] {R.id.userphone,R.id.location_name,R.id.lat, R.id.lon});
list.setAdapter(adapter);
list.setOnItemClickListener(new AdapterView.OnItemClickListener() {
@Override
   public void onItemClick(AdapterView<?> parent, View view,
                                   int position, long id) {
                           //toast the number and send it for sending sms
```

```
Toast.makeText(RiderequestActivity.this, "You have accepted request for
"+userlist.get(+position).get("UserPhone"), Toast.LENGTH_SHORT).show();
                        Intent i = new Intent(RiderequestActivity.this,SendSms.class);
                        i.putExtra("phone", userlist.get(+position).get("UserPhone"));
                        startActivity(i);
                    }
                });


                }
            } catch (JSONException e) {
                e.printStackTrace();
            }

        }
    }
    @Override
public boolean onCreateOptionsMenu(Menu menu) {
MenuInflater mif = getMenuInflater();
mif.inflate(R.menu.request_activity_actions, menu);
return super.onCreateOptionsMenu(menu);
}
@Override
public boolean onOptionsItemSelected(MenuItem item) {
   // Handle presses on the action bar items
   switch (item.getItemId()) {
case R.id.BackToMap:
Intent goMap = new Intent(this, MainActivity.class);
startActivity(goMap);
overridePendingTransition(R.anim.slide_out_left, R.anim.slide_in_left);
```

```
return true;
case R.id.LogOut:
// Session Manager
session.logoutUser();
Intent goLogin = new Intent(this, LoginActivity.class);
startActivity(goLogin);
overridePendingTransition(R.anim.slide_in_left, R.anim.slide_out_left);
return true;
default:
return super.onOptionsItemSelected(item);
  }
   }
public static String slurp(final InputStream is) throws IOException
{
BufferedReader reader = new BufferedReader(new InputStreamReader(is));
StringBuilder out = new StringBuilder();
 String newLine = System.getProperty("line.separator");
String line;
while ((line = reader.readLine()) != null) {
out.append(line);
out.append(newLine);
}
return out.toString();
                                    }
   } // This is the end of my RequestActivity class
```