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A Mobile based solution for locating campsites and providing camping information in Kenya

Leonard K. Ouma
Faculty of Information Technology (FIT)
Strathmore University

A Mobile Based Solution for Locating Campsites and Providing Camping Information in Kenya

By

Ouma Leonard Kore

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

Names: Ouma Leonard Kore

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Signature

4.5.2017

.....

Date

Approval

The dissertation of Ouma Leonard Kore was reviewed and approved by the following:

Prof. Ismail Ateya Lukanda, D.Sc

Faculty of Information Technology

Strathmore University

Dr. Everlyn Makhanu

Senior Lecturer, Strathmore Business School

Prof. Ruth Kiraka

Dean, School of Graduate Studies

ABSTRACT

The tourism industry in Kenya and many African countries has been a key contributor to the national economy surpassing other key sectors such as mining, construction and agriculture. Camping is one of the major tourism activities in Kenya that domestic and international tourists engage in. This sector has been overshadowed and neglected by other tourism activities such as beaches and wildlife yet it is a major contributor to the economy. The major cause of this neglect is lack of a reliable platform where campers can easily access camping information and locate their preferred camping sites.

A mobile solution iCamp Kenya was implemented to provide campers with a platform to locate camps in Kenya and get reliable camping information such as accommodation prices, highly rated camps, useful camping tips while planning a trip, transport options, directions to the camp and contact information. Quantitative research methods such as questionnaires were used to test the implemented system and collect primary data. The sample size for this population was 136 Vagabond Travels club members.

The findings of the research show that users found the application was fully functional and easy to use. They were able to find their desired camps easily and were satisfied with the useful information that assisted them in planning their camping trip. Users also made a few recommendations that improved the features application. The potential for success and growth for the research project is very high due to the rapid growth of mobile phone usage in Kenya, the ever-growing tourism industry in Kenya supported by domestic and international tourists and finally the encouraging adoption of mobile platforms by majority of the business owners in the tourism sector.

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LIST OF ABBREVIATIONS/ ACRONYMS

AEC	-	African Economic Outlook
CCK	-	Communications Commission of Kenya
EAC	-	East African Community
EU	-	European Union
GDP	-	Gross Domestic Product
GIS	-	Geographical Information System
GPS	-	Global Positioning System
GPX	-	Global Positioning System Exchange format
iOS	-	IDevice Operating System
ITB	-	International Tourism Board
J2ME	-	Java 2 Platform Micro Edition
KNBS	-	Kenya National Bureau of Statistics
LBS	-	Location Based Services
MBLS	-	Mobile Based Location Services
MOT	-	Ministry of Tourism
OS	-	Operating System
PEV	-	Post Election Violence
PHP	-	Hypertext Preprocessor
WTTC	-	World Tourism and Travel Council

Chapter 1: INTRODUCTION

1.1 Background

The telecommunication and mobile industry in Kenya has experienced tremendous growth. Mobile operators have exponentially expanded their services to many citizens and we have experienced a drastic reduction of mobile data services costs as well as migration to newer and more powerful technologies such as 3G, 4G and LTE in the foreseeable future. Simultaneously, Internet-enabled devices and smart phones are dropping in price at a very quick pace, making them affordable to a large part of the population. The mobile phone is the most popular means of accessing the Internet in East Africa. Internet penetration in Kenya currently stands at 25.9%. The total number of subscribers in Kenya has also grown to over 30.3 million users up from the previous 29.7 million recorded in the previous quarter (CCK, 2013).

Tourism plays a major role in the national economy of Kenya. According to the KNBS (2012) there has been a steady growth in tourism earnings since 2008 from Kshs 62.7 billion to Kshs 97.9 billion in 2011. Equally the tourist visitor arrivals have increased from approximately 1.2 million in 2008 to approximately 1.8 million in 2011. However, despite these gains, the initiatives to improve the uptake of other tourism products such as camping have not been exploited by mobile based technology.

Statistics released by Kenya's Ministry of Tourism indicate that 549,083 tourists visited Kenya in the first half of the year of 2011, this beats the previous year's arrivals by over 13 percent. Besides international arrivals, domestic tourism has also become a significant form of tourism in Kenya where it is found that it can cushion off the tourism industry during low periods of international tourist arrivals. With the aggressive promotion of the domestic sector by local and foreign entrepreneurs who have established camping sites, culture festivals, hiking, bike riding, and road trips among other social events for domestic tourists, the local tourism business is expected to increase significantly as middle class Kenyans disposable income gradually increases. The government working closely with the Ministry also works to encourage all Kenyans to engage in domestic tourism to promote the sector (MOT, 2011).

According to Eiland (2004) the major contributors to the national economy in Kenya are mining, agriculture, construction and manufacturing sectors. Over the years, these sectors have experienced a slow growth in revenues among many African countries resulting in shift of focus to the tourism industry. Looking at Kenya a lot of focus has been placed on national parks and wildlife and the coastal region beaches while neglecting of other tourism sectors and activities such as camping, culture festivals, theatres and arts. The focus of the research will be on camping in Kenya where the problem lays in the lack of

adequate information and suitable means of easily locating camping sites and activities by tourists in Kenya hence a slow uptake.

International and domestic tourists seeking to travel and explore Kenya generally look for lodges, hotels, motels, resorts, cottages, camps (tents) and private home stay houses to board while they travel to different places around Kenya. Getting the best locations at the best prices proves to be challenging for the ordinary citizen as he or she mainly relies on social media sites; referrals from friends or colleagues who have recently visited the camp sites; local e-commerce and advertising sites.

1.2 Problem Statement

In Kenya, the major contributors to the Gross Domestic Product are agriculture, mining, manufacturing and construction sectors. Due to the declining revenues of these sectors many African states are now focusing on tourism to boost their economies however emphasis in Kenya has mainly focused on beach and wildlife tourism with exclusion of other key areas such as cultural sites and camping activities. The problem lays in the lack of adequate information and suitable means of easily locating camping sites and activities by tourists in Kenya (E.Irandu, 2004).

Empirical studies of user preferences in mobile location-based services (Chen and Lin, 2011) show that location based tourist applications have been successfully developed to provide information and navigation services on a map and nearby location checking services. It is not however clear whether such applications exist for locating camping sites in Kenya as what lacks is a localized application which will suit Kenyan campers' unique needs. Furthermore, these applications are not suited for the Kenyan market as they lack complementary information needed by a local Kenyan camper such as how to get to the camp and available means of transport, what to carry or wear to the trip, the local culture to be encountered and local fees to be paid at these remote campsites or parks. Another problem is they lack feedback functionality where campers give reviews on their experiences after they have visited a camp which aids other campers in making an informed choice.

1.3 Research Objectives

i. To identify the current platforms being used to find camping sites.

ii. To review location based architectures and related literature.

iii. To design and develop the mobile application iCamp Kenya.

iv. To test the effectiveness of the mobile application in locating campsites and providing information to campers.

1.4 Research Questions

i. Which are the current platforms being used to find camping sites?

ii. Which location based architectures are currently being used and how do they work?

iii. How to design and develop the mobile application iCamp Kenya?

iv. How effective is the mobile application in locating campsites and providing information to campers?

1.5 Justification

The need to boost tourism in Kenya by focusing on other tourism sectors will play a key role in increasing future earnings in the GDP of the country, this will also result in promoting local tourism as camping activities are relatively cheaper than other forms of tourism hence many domestic tourists can participate in it. In Kenya, there are many camping sites which are unknown to both domestic and international tourists. The research will aim at easing the location of these camping sites and providing information on these camps so as ease campers journey and increase exposure of camping in Kenya. Over the years, location based mobile solutions have been developed, the solution provides a more localized application best suited for the Kenyan camping ecosystem.

1.6 Scope

The research investigates the current platforms being used to find camping sites in Kenya by both local and international tourists. The research also focuses on mobile location based architectures, how they work and how best to incorporate these architectures with the mobile application developed during the project. It will also find out which camping information is important to campers before planning their trip and embarking on the journey to the camp. A mobile solution shall be developed and tested on the J2ME

platform to ease the difficulties faced by campers when finding campsites and provide the most necessary camping information in a more convenient way to them.

1.7 Limitations

The major limitations of the research were due to the very high number and remote nature of camping sites in Kenya, the research could not cover a high number of camping sites but focused on camping sites in the major counties in Kenya. This was due to the limited financial resources and time available to conduct this research. The research covered the key and most known camping areas in the Kenya such as Maasai Mara, Nakuru, Samburu and Naivasha to ensure even distribution of most of the counties so as to include a majority of the users.

The iCamp Kenya mobile application was initially developed on the J2ME platform for all java enabled phones. Other mobile users on other platforms were not able to access the mobile application due to incompatibility of operating systems environment. In the future, the application will be developed on other platforms such as iOS, Windows and Android so as to cater for other users.

1.8 Summary

The research project will aim to study the camping ecosystem from a business and technological point of view, identify key gaps and aim to develop a solution that solves camper's information needs while providing an easy to use, convenient solution for potential users.

Chapter 2: LITERATURE REVIEW

2.1 Introduction

In Kenya, tourism plays a major role in the earnings of the country. Currently, Tourism accounts for 10 percent of the Gross Domestic Product (GDP), making it the third largest contributor to Kenya's GDP after agriculture and manufacturing. This means that tourism is Kenya's third largest foreign exchange earner after tea and horticulture. Tourism has been identified as one of the key drivers in achieving the goals of the Vision 2030 (KNBS, 2013).

The literature review gives an overview of the tourism industry in Kenya, the current trends affecting tourism in Kenya that is the technological, economic and social trends that favor the proposed research project. The literature review also focuses on the camping ecosystem in Kenya and how it works. Domestic tourism plays a major role in the economy of the country. The government of Kenya encourages Kenyans of all walks of life to become active participants in domestic tourism as a way of boosting the sector. According to the Ministry of Tourism, international visitors to the country have constantly increased over the last 10 years with exception during the PEV in 2007. As of 2010 tourist's numbers in Kenya lie at over 1.2 million visitors of which it is estimated that over 200,000 of this are domestic tourists. This figure is projected to grow to 2 million by the end of the 2013 season (MOT, 2009).

The local tourism sector is dominated by culture festivals and the arts, wildlife in national parks and game reserves, beaches at the coastal regions and mobile tented facilities or camps and lodges near water bodies and game reserves. The research focuses on camping sites. A recent study by the East African Community on tented camps in the region outline how camping sites are classified between 1 star and 5 stars with different parameters such as camp location, site environment, number of staff among others being key indicators of what star level a campsite will be. Most Kenyan camping sites lie within the 2 star and 3 star levels. An example of a classification is site and environment regulations where a 1 star and 2 star campsites receive 20 points, a 3 star receives 30 points, and a 4 star receives 40 points and a 5 star 50 points if they satisfy environmental requirements. The more important indicators such as campsite capacity and health safety features will be featured in the iCamp Kenya application (EAC, 2009).

The mobile application has a high chance of success due to the high number of local tourists that seek this camping information especially during peak seasons such as Christmas, Easter and other public holidays or when generally planning for a vacation. Users will also use the application to get the latest information on social events taking place in the country such as safari rallies and athletes marathons.

2.1.1 Tourism Trends in Kenya

These trends affect tourism in Kenya and the East African region. They are factors that have influenced the Kenyan tourism industry in both a positive and negative way. They are grouped as political, economic, social and technological. We shall mainly focus on technological, economic and social trends in Kenya.

2.1.1.1 Technological Trends

According to Sarova (2012), the technological trends affecting tourism in Kenya are:

i. **Aggressive consumer adoption of the mobile platform as a booking vehicle for travel:** According to the Tourism trends report, the rapid growth of web - enabled mobile devices is changing how many tourism players do business. The local tourism industry can take advantage of this trend. The number of mobile users researching travel is expected to grow 51% in 2012. 34% of all US Smartphone users' research from their mobile device. 23% of all international travelers use mobile check-in for flights. By the year 2013 22% of mobile users will also book from their smart device.

ii. **Product innovation in the tourism and travel sector will emerge for the first time since entry of OTA`s in the late 90s:** The normal life cycle of a tourist is normally dreaming, researching, booking, experiencing and sharing their experiences afterwards. The potential for innovation especially for this research project is immense especially in the early stages of dreaming; researching (looking or searching for a camping site) and sharing their experiences (review of campsites visited).

iii. **The travel category is rapidly changing with mobile:** The mobile platform has influenced all industries including the tourism industry. Particularly when tourists are planning for their trips and during their journey there is still a lot of opportunities to make the tourist or camper in our case better informed allowing them to find nearest attraction sites, restaurants of their preference and provide special location based features that can only be delivered via mobile.

2.1.1.2 Economic Trends

i. **Inflation rate:** the inflation rate in Kenya has been steady over the past few months; recent reports as per January 2013 indicate that the inflation rate has been dropping over the past 12 months from approximately 19% to 12% in December 2012. The inflation rate currently stands at 4.14%, this affects cost of living and has a negative effect on disposable income levels for locals. This will

eventually influence local tourism and in the long run affect numbers visiting camping sites in Kenya (KNBS, 2013). **Figure 2.1** shows the inflation rate in Kenya from 2011 to 2013.

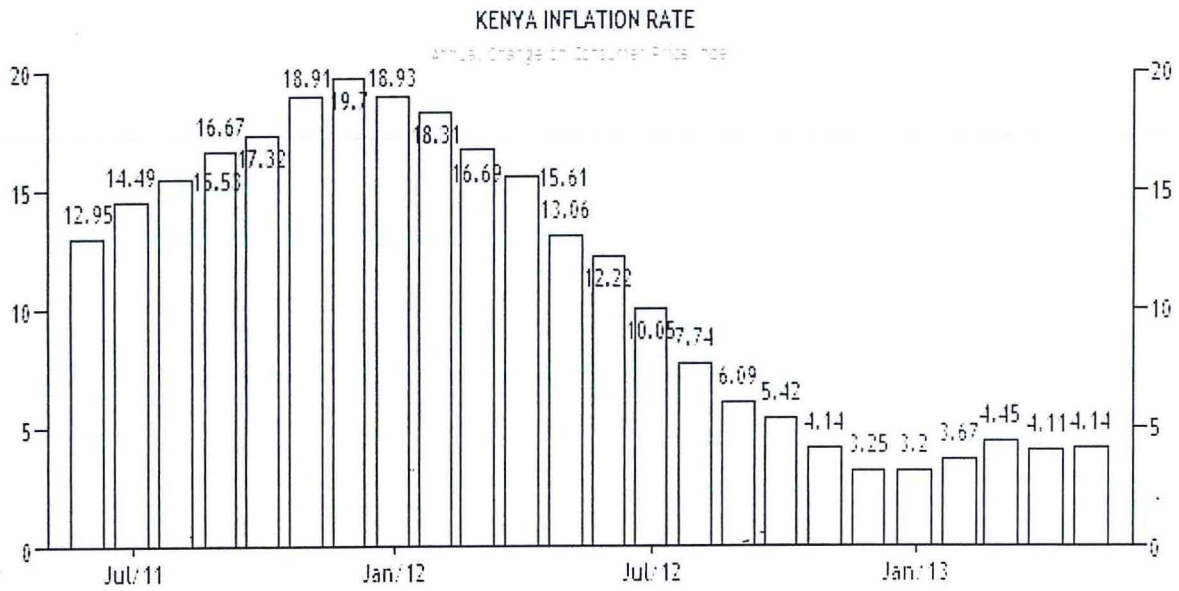

Figure 2.1: Kenya Inflation Rate (KNBS, 2013)

ii. **Projected growth of Kenyan economy:** a credible, stable and positive macroeconomic environment is expected to persist as the monetary and fiscal policies were expected to reduce inflation and keep the interest rates low. Given this conditions the Kenyan economy is expected to grow by about over 5.5% in 2012 and higher in 2013. This will create optimum conditions for growth for both local and international tourism. This is a very positive indicator of the research project undertaken as it shows opportunities for success (AEC, 2012). **Figure 2.2** shows the real GDP growth of Kenya over the past years.

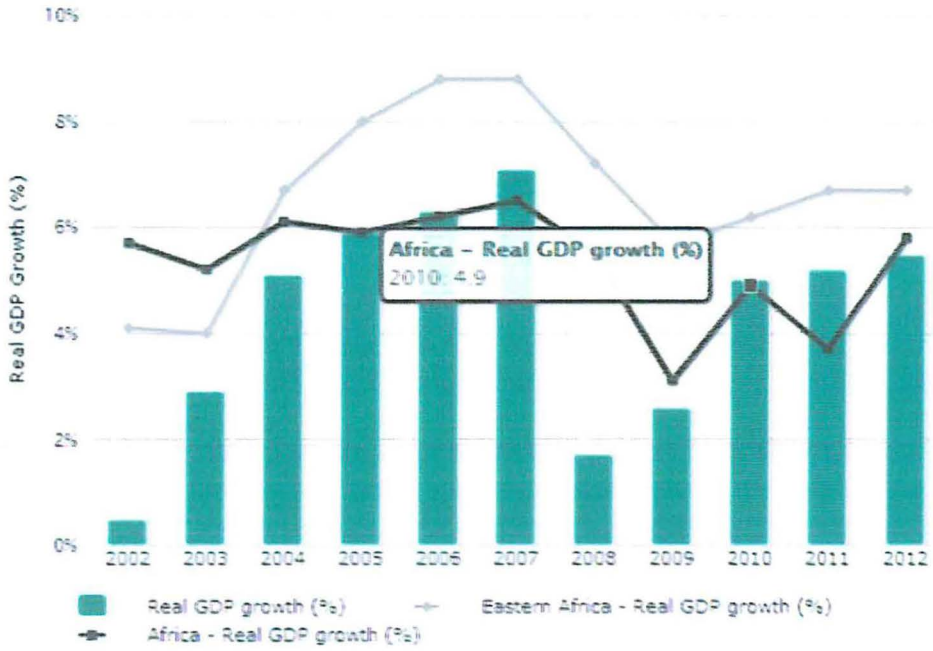

Figure 2.2: Growth of Kenyan Economy (AEC, 2012)

iii. **Expansion of Chinese and Indian tourism sectors and comparison with Kenyan market:** Interesting enough China and India are becoming the hubs with most tourists visiting other countries. The Chinese are recognized shoppers and many countries are working hard to attract them to their countries through tourism. India on the other hand has a very vibrant tourism economy and the World Travel & Tourism Council predicts India as a potential lead in tourism business starting from the year 2009 to the year 2018. Despite these positive outlooks accommodation is a big problem in India with a shortage of rooms due to a low ratio of hotels to the number of domestic and international tourists, this leads to tourists resorting to other means such as camping, lodging, cottages and resorts. Many who visit India are mostly interested by the 5000 years of history, geographical features and cultural events while on the other hand Indian tourists who visit Kenya are mostly interested in the Kenyan coast i.e. marine life and the protected coral reefs. Despite this preferences Kenya on the other hand unlike India has an abundance of camping sites, lodges, cottages and resorts. These accommodation avenues provide both local and international tourists a multitude of options when planning their trips. The research project will capitalize on this advantage and aim to provide campers will easy location of many camping grounds in Kenya (WTTC, 2011).

iv. **Resilience of tourism worldwide:** According to Blanke and Chiesa (2013), the tourism economy in the world has managed to remain resilient over the past few years despite the unpredictable global economic outlook, which has been characterized by fragile global economic growth, macroeconomic tensions, and high unemployment in many of the 3rd world and developing countries. One of the key pillars to maintain this resilience is investment in the ICT infrastructure.

2.1.1.3 Social Trends

i. **Travelling in Kenya is becoming social:** People are using mobile technology and social networks such as twitter and Facebook to get feedback on other users experience so that they can make good travelling decisions. Users of this social platforms who have previously visited camping sites can narrate their experiences to new tourists and from there are able to make a decision. The proposed application will incorporate a feedback mechanism to help campers make easier decisions (Sarova, 2012).

ii. **The power and omnipresence of reviews:** While platforms such as TripAdvisor has for over a decade could help other travelers have the best trips, it has been recently observed that many travelers look online to get reviews for desired destinations. Consumer reviews are known to be important to travelers in the planning process (Sarova, 2012).

2.2 Camping Ecosystem in Kenya

According to the EAC (2009) Criteria for classification of Tented Camps in East Africa, a tented camp is defined as a commercial establishment of permanent, semi - permanent or mobile tented facilities usually located close to or within popular areas such as beaches, rivers, lakes, protected areas, national parks and game reserves or forests. In Kenya camping is a major leisure activity for both domestic and international tourists. Camping sites in Kenya are widespread and are in all provinces. Camping in Kenya can be classified in the following ways:

i. **Camping Safaris:** favored by international tourists where campsite is typically located in a game reserve. Campers move their campsite from one location to another in the game reserve as they tour and follow wild animals in the reserve.

ii. **Private campsites**: most of these campsites are owned by private investors or companies and tend to have good camping facilities, adjoining restaurants and offer a wide variety of alternative activities apart from camping.

iii. **Park campsites:** these are in national parks and game reserves and are fixed at one location. They have only the basic facilities from a long drop toilet and showers to no facilities at all. They are mainly self-sufficient requiring the camper to bring all the needed items for the stay.

The classification of camping sites is based on the 1 to 5-star level based on the following parameters: location, site and environment, dining facilities, recreational facilities, client accommodation, bathroom supplies, room features and facilities, communication services and size of lobby lounge (EAC, 2009). **Table 2.1** shows a few categories of the classification of tented camping sites.

Table 2.1: Standards for Classification of Tented Campsites (EAC, 2009)

Section	1 Star	2 Star	3 Star	4 Star	5 Star
Location	Should be variable for a tented camp. (10)	Same as for 1 star. (10)	Same as for 1 star but should be within or near the main attraction of the area and offer easy accessibility, safety, comfort and tranquility. (20)	Same as for 3 star. (20)	Same as for 3 star. (20)
Campsite and Environment	The establishment should be in harmony with the natural environment and in conformity with the building and development regulations applicable to the locality. The site should be safe from main water foods and strong winds. (20)	Same as for 1 star. (20)	Same as for 1 star but the location should have added advantage in terms of scenery and/ or fauna and flora. (30)	Same as for 3 star but with an impressive site offering greater vantage in terms of scenery and/or fauna and fora. (40)	Same as for 4 star but with greater appeal and vantage in of scenery and/or fauna and fora. (50)
Minimum Size of Public rooms	Minimum size of lobby/lounge/public areas, bar and covered terraces should be as per the	Same as for 1 star. (30)	Same as for 1 star but minimum size should not be less than an aggregate of	Same as for 3 star but minimum size should not be less than an	Same as for 4 star. (50)

	building code but in any case, not less than ½ sq. M per guest bed. (30)		1 sq. M per guest bed. (40)	aggregate of 1 sq. M per guest bed. (40)	

The most popular campsites in Kenya are in Maasai Mara, Naivasha and Nakuru with CrayFish camping site in Naivasha, Kembu camp in Njoro, Rapids Camp in Sagana are the leading campsites in Kenya by popularity. The camp is popular with domestic and international tourists because of the following reasons: a wide range of activities such as boat riding, hiking and mountain biking, other amenities such as a modern restaurant with an excellent cuisine, open beer gardens, a wide range of accommodation facilities supporting different customer budgets and easily available information on what the camp has to offer through social media, business website and referrals. In Kenya, the success of a campsite is determined by the number of visitors both domestic and international who frequent the camping site, to achieve this camping sites must find ways to advertise its services to the masses so as to attract as many customers as possible. Many potential campers are not willing to risk travelling long distances to a remote campsite without assurance that they will have a good time. For this reason, many platforms offer crowdsourcing mechanisms where other campers can read experiences of other campers who visited a camp (Kenya Talii, 2012), (Kenya Travel Ideas, 2012).

2.2.1 Camping Ecosystem in Europe

In Europe, camping is an important sector in the tourism market. In 2008, over 15% of all tourist's nights spent in collective accommodation establishments were spent on camping sites, this translates to approximately over 300 million nights. European Union residents made more than 23 million holiday camping trips of which nearly two thirds were spent in their own member state (Christophe, 2010). See **Figure 2.3** for details.

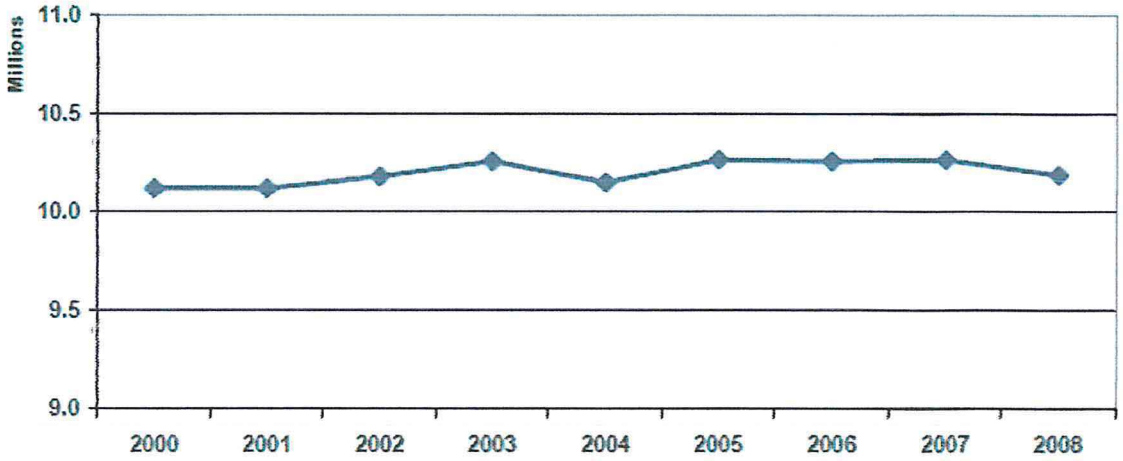

Figure 2.3: Camping Accommodation Capacity in EU 2000 to 2008 (Christophe, 2010)

2.3 Tourism Demand for Smartphone Technology as a Travel Guide

Fáilte Ireland Applied Research Scheme and I.T. Sligo, (2012) describe the travel and tourism industry in the world as a rapidly evolving sector. Over the past years the use of smartphone technology, social media platforms and mobile applications ("apps") has experienced tremendous growth where these platforms are expected to outdo traditional computer Internet use by 2014. According to ITB (2011), statistics show that up to 40% of international travelers own a smartphone with Internet, e-mail and other functions; 57% have a conventional mobile phone; over 40% of smartphone owners use their devices to get destination information; 34% of business travelers and 26% of leisure travelers use them to make booking changes during their trip. As many as 37% of international leisure travelers say they use mobile social networks.

2.3.1 Most Used Type of Travel Guides

The same study also reveals that in Ireland, many travelers say that they use some form of travel guide. The most used type of travel guide surprisingly was still traditional guide books with a 37% score, the second highest response category (14%) was a tour information office while the third highest at 14% was travel mobile applications. It was presumed that the travel mobile applications figure would be higher but taking into consideration how new these are to the tour guide industry, the future is bright for mobile applications. The rest used other means such as Internet research, maps and tour operators. See **Figure 2.4** for the most used types of travel guides.

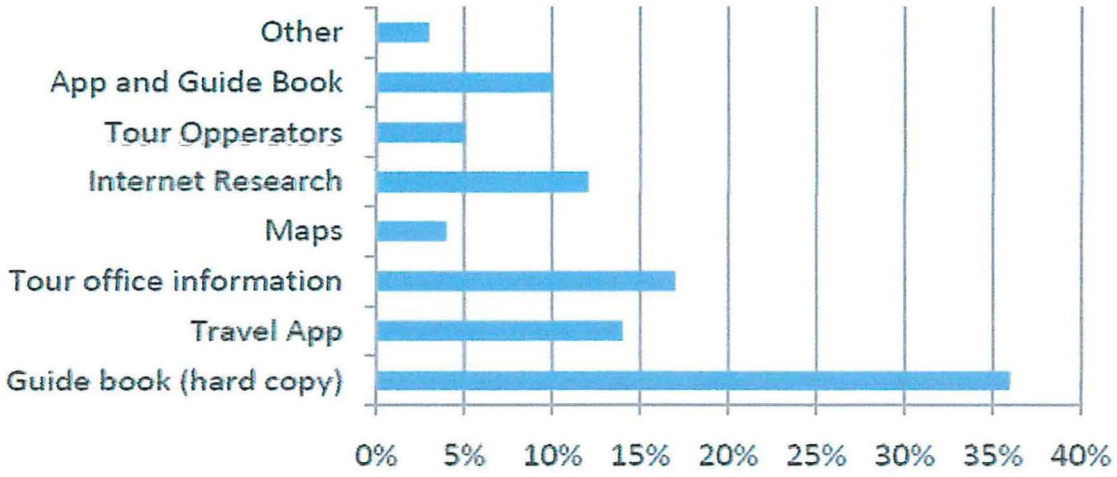

Figure 2.4: Most Used Types of Travel Guides (Fáilte Ireland & I.T. Sligo, 2012)

2.3.2 Top 15 Reasons for Smartphone Use while Travelling

Fáilte Ireland and I.T. Sligo, (2012) also show that when smartphone users were asked which were their top 5 reasons for using their device while on vacation, the responses varied. Among the most common smartphone uses while travelling include information on tourism services, destination information, maps or directions, weather, social media and sharing, taking photos, voice and data Internet and listening to music. The variation in responses can be attributed to demographic differences such as age and gender, variation between domestic and international visitors. Respondent's answers may also be affected by technological barriers such as access to Internet. Social media was had the highest response rate as users relied on platforms such as Facebook to get travel information. Google Maps, text and email use were also frequently used to help travelers stay in touch with family and work engagements while away on vacation. **Figure 2.5** shows the top 15 reasons travelers use smartphones while travelling.

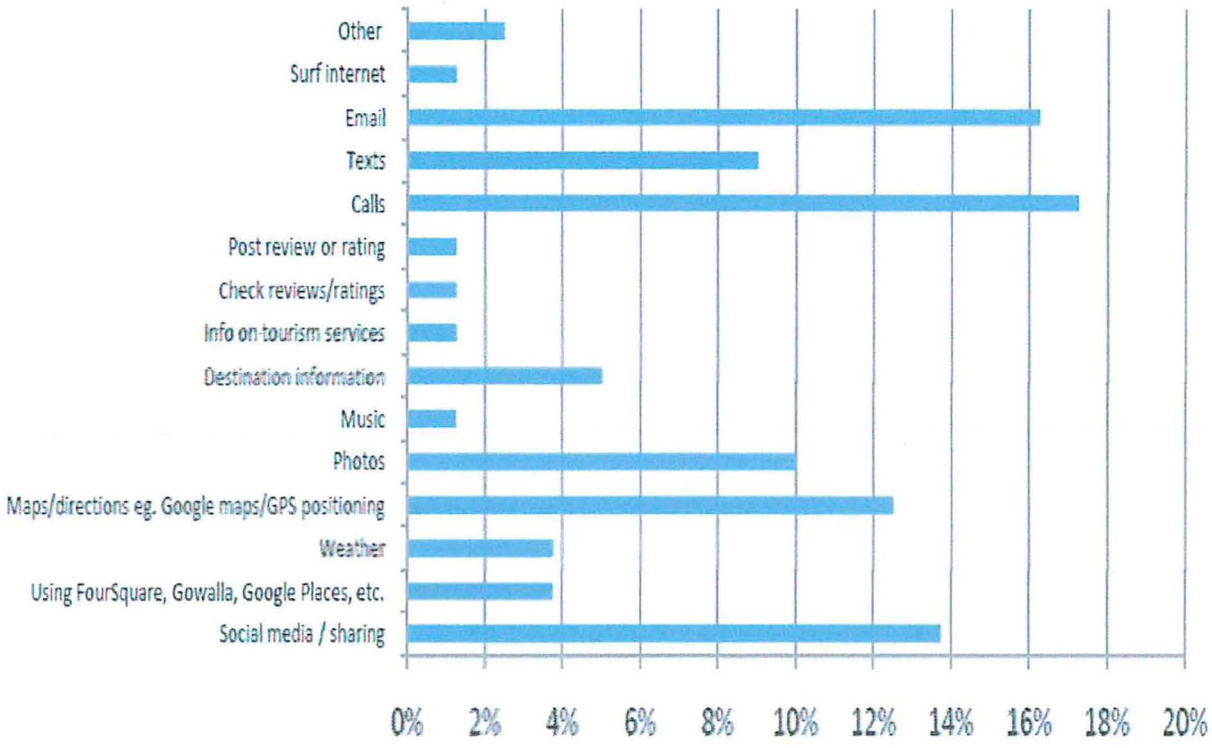

Figure 2.5: Top 15 Reasons for Smartphone Use while Travelling (Fáilte Ireland & I.T. Sligo, 2012)

2.3.3 Types of Travel Applications Used by Tourists

Furthermore, when respondents were asked which mobile applications they frequently used, those most commonly cited include Google Maps, Lonely Planet Ireland, Dublin Pocket Guide, Trip Advisor, Triposo, Tripit, foursquare and several others. The most used mobile application is Trip Advisor and Google Maps. Furthermore, the research noted that smartphone and mobile application users tend to be younger, their percentages will increase as the younger demographics groups age, therefore it may be helpful and more beneficial for future research to target younger visitors in order to better identify future trends in this sector (Fáilte Ireland & I.T. Sligo, 2012). **Figure 2.6** shows the most used travel mobile applications in Ireland.

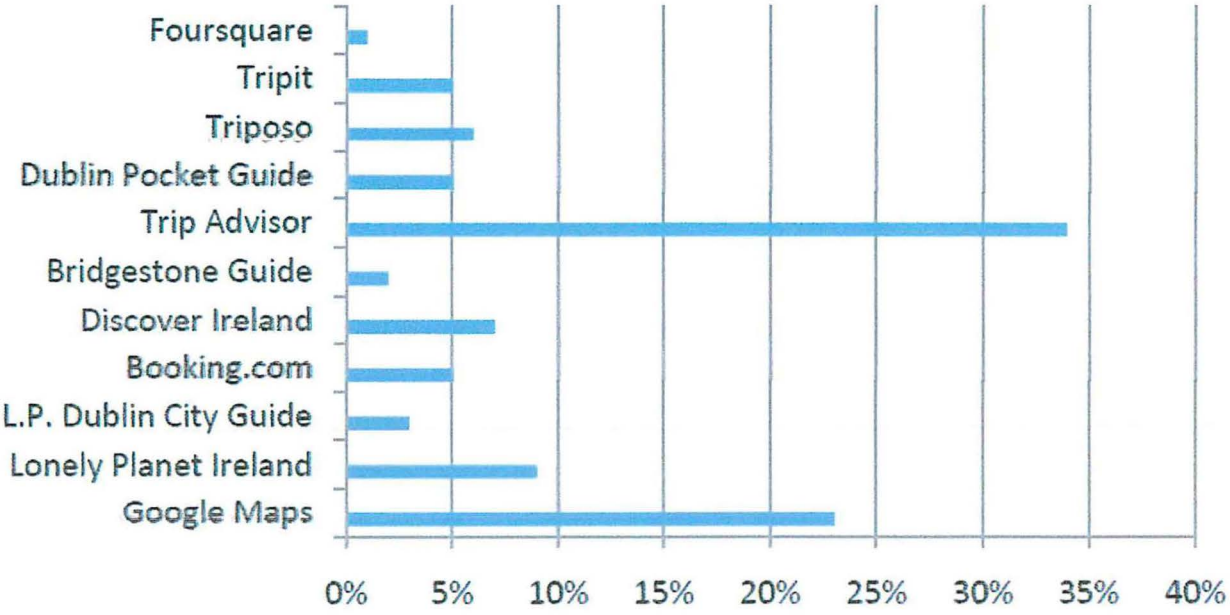

Figure 2.6: Which Travel Applications Respondents Use (Fáilte Ireland & I.T. Sligo, 2012)

2.4 Mobile Based Location Services

Mobile phone usage has increased significantly over the past 5 years. As the mobile device usage grows so do the features and characteristics; examples are ubiquity, interaction, location tracking and personalization. With the growth of mobile broad band data services, Internet service providers are better positioned to provide new data value added services such as mobile location based service (MLBS) to clients. This is believed to be a profitable opportunity to the mobile carriers and Internet service providers (Chen & Lin, 2011).

According to Kühn (2004), a Location Based Service (LBS) is a service for mobile users (terminals) where the awareness of the current, past or future location forms a major part of the service. The service contents may include real-time and geographic-based information to support user's dynamic spatial decision making. Mackaness, Kealy and Williamson (2004) describe the service contents as aspects that show real-time and geographic-based information to support user's dynamic spatial decision making. Junglas and Watson (2008) simply state that a Location Based Service is any service provided to users that takes into consideration any geographical location of a subject. There are two types of Location Based Services, open and closed systems. The closed system does not have the capability to transmit data while the open system can transmit data (Chen & Lin, 2004).

According to Chen and Kuo (2006) LBS Location Based Services can be grouped in different types of categories i.e. entertainment, information, security and tracking, commerce and information.

i. **Entertainment Services:** typically composed of applications and applications that fulfill entertainment needs of users' example MLBS friend finder which helps users to find their nearest friends location without use of traditional voice or text. Another example is gaming where if users successfully solve puzzles, riddles and quizzes they arrive at specific locations.

ii. **Information Services:** LBS tourist applications give users information such as local weather report and nearby location checking e.g. Find and Seek, Night guide provide localized information based on the user's location.

iii. **Navigation Services:** services include traffic information, navigation and map services. Traffic information aid users of applications to receive traffic updates as they travel. Navigation services guide help users to reach their intended destinations easily. Map services enable users to locate desired specific locations on electronic maps. The proposed application uses this navigation mechanism i.e. Google Maps.

iv. **Commerce Services:** helps users to obtain prices, buy goods and services easily in nearby stores and use mobile billing where users receive price lists and catalogues, advertisements and can make payments through SMS.

v. **Security and Tracking Services:** ensure users personal safety and include the following: emergency rescue services provide alert services where health authorities can be easily and quickly alerted, roadside assistance used to provide SOS type of functionality for broken down vehicles requiring assistance in remote locations and tracking elders, children, pets, property to avoid them getting lost.

A diagrammatic representation of the 5 categories of MLBS is shown in **Figure 2.7.**

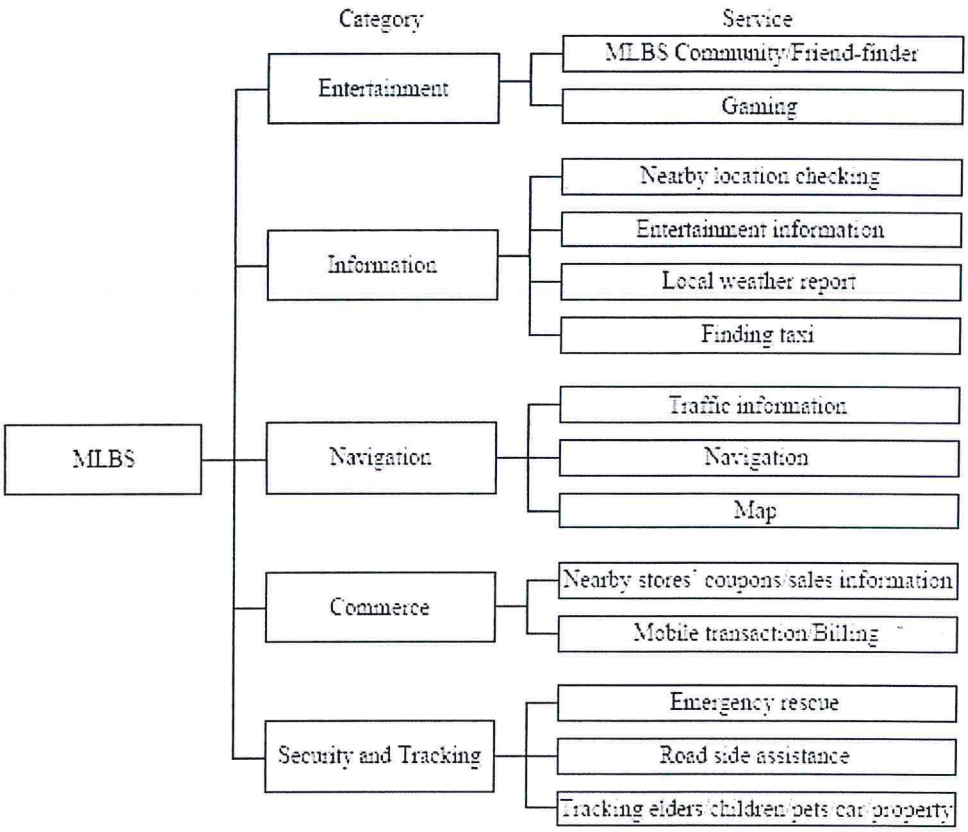

Figure 2.7: Categories of Mobile Location Based Services (Chen and Kuo, 2006)

2.4.1 MLBS Provision Situations in Different Countries

Based on the categories of MLBS categories discussed above, a classification of how Mobile Location Based Services (MLBS) are provided in different countries in the world. Sample regions of the world assessed include Taiwan, Europe, Japan and United States of America. In Europe, the main MLBS services provided include the following: MLBS community, MLBS game, Nearby Location checking, entertainment information, local weather report, finding a taxi, traffic information, navigation map, car tracking, fleet management and roadside assistance (Cheng, Lai & Huang, 2005).

In Japan, the main MLBS services provided include the following: nearby location checking, local weather report, finding a taxi, navigation, nearby stores' coupons, tracking children, and emergency rescue. United States of America uses the following: nearby location checking, local weather report, navigation, and emergency rescue. Different countries exploit different MLBS services for their businesses or social use. In Kenya, we would expect information services such as nearby location checking and navigation services such as traffic information, map services and navigation services (Chen & Lin, 2011), (Chen &

Kuo, 2006), (Tsai, 2006). **Figure 2.8** shows the current situation of MLBS service provision of select countries.

Category	Services	Europe	Japan	U.S.	Taiwan
Entertainment	MLBS community	•	•	•	•
	MLBS game	•			
Information	Nearby location checking	•	•	•	•
	Entertainment information	•			
	Local weather report	•	•	•	
	Finding a taxi	•	•		
Navigation	Traffic information	•			•
	Navigation	•	•	•	•
	Map	•			•
Commerce	Nearby stores' coupons		•		•
	Mobile transaction	•			
Security Tracking	Emergency rescue		•	•	•
	Roadside assistance	•			
	Tracking elders/children/pets/cars/property	•	•		•

Figure 2.8: Current Service Providing Situations in Different Countries (Chen and Lin, 2011)

2.5 Mobile Based Location Services Architectures

According to Schiller and Voisard (2004) the general concept surrounding Location Based Services (LBSs) architecture is based on services that integrate a mobile device's location or position with other relevant information so as to give added value to users of the application. This architecture is composed of the following components: Positioning (Location aware technologies), Global Information Systems (GISs), the Internet and Mobile services. The four components are all integrated with each other as shown in the **Figure 2.9.**

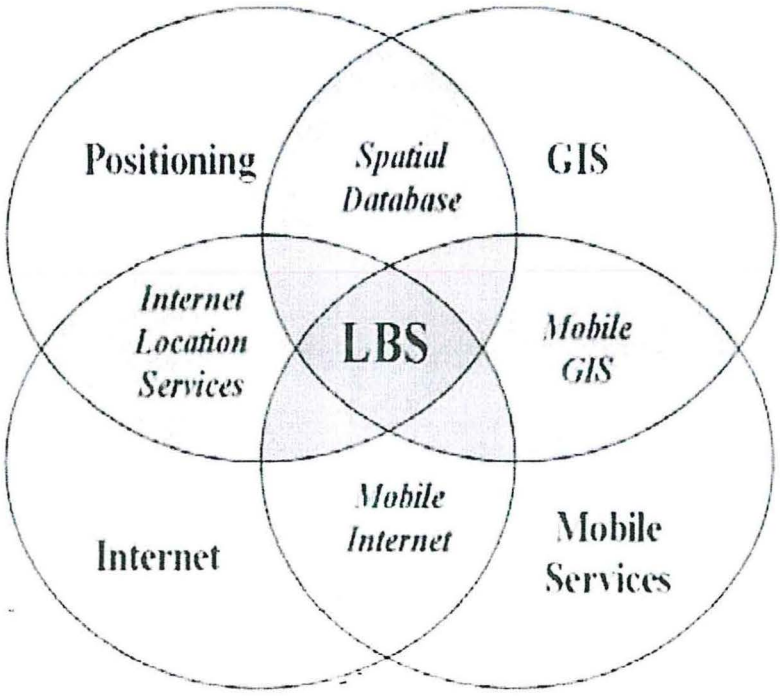

Figure 2.9: Convergence of Technologies to Create LBS (Schiller and Voisard, 2004)

The various applications of LBSs must be able to integrate data related to any of the following services that is: address location functionalities, map location functionalities or information mapping, searching, geographical position, routing and multimedia content. The developed application incorporates map location functionalities to assist campers or users of the application to easily locate camping sites on Google Maps.

According to Liu (2002) the general concept behind many location based services architecture is composed of the following components:

i. **Mobile positioning system and Wireless network:** delivers the service to users. Their function is to use wireless networks to connect positioning systems and the LBS application.
ii. **LBS application itself:** consists of an application server and a spatial database.
iii. **LBS middleware:** facilitates the development and deployment of LBS applications in heterogeneous network environments.
iv. **Application server:** acts as the processing center for a LBS platform that handles user interface functions and communicates with the spatial database.

2.5.1 Client - Server Architecture used in Camp where application

Many LBS applications such as Camp Where employ a client server architecture that is abstracted in three main components that is the client, the server and the wireless communication to connect both the client and server components (Big Nerd Ranch, 2013). The client side is responsible for sending users requests which has the geographical location of the mobile device to the server. The server side is responsible for provision of services to the user based on the geographical location of the mobile device. The client side of the architecture can provide data to the application through data collection in the field while server can also provide the same provision through insertion of information in the database and then provide services to all clients based on the data repository (Liu, 2002). **Figure 2.10** shows the LBS architecture.

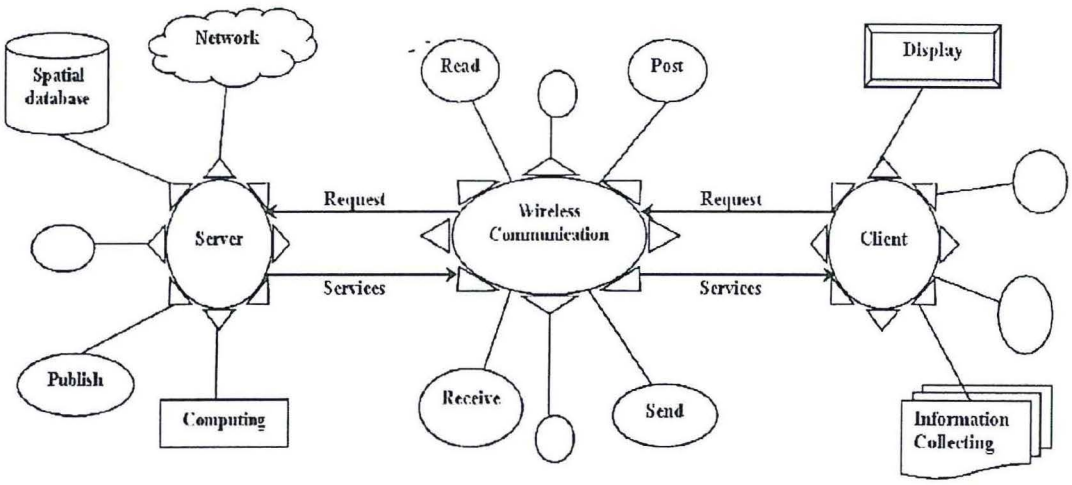

Figure 2.10: LBS Architecture (Liu, 2002)

Liu (2002) describes the server, wireless communication and client architecture as further composed into an aggregation of functions. These are:

i. **Wireless functions:** used primarily for receiving, sending, real-time, post, read, encryption and Information Security. The main method in use today is the commercial cellular telephone system. Compared to server side and client side architectures different types of wireless functions are complementary and easily merged to a high degree.

ii. **Server functions:** composed of the database (spatial database), network, multimedia and business logic. At the server side the main problem encountered by developers is network compatibility.

Supporting programs that run on the server side need to be compatible with multiple operating systems, web browsers and protocols that are constantly changing in the Internet.

iii. **Client functions:** primarily composed of display, information collection, wireless connection, save and multimedia. Hardware compatibility which has been the core problem for application developers to realize reusability is now available. When one considers power consumption, computation ability, size, hardware interface, and screen issues, there is not a universal solution to meet all the requirements of all users.

2.5.2 LBS Middleware Architecture

Using standards that are emerging in this domain such as interoperability standards, LBS middleware should bridge protocols and network technology with wireless and Internet technology. LBS middleware is deployed in 2 ways either within the network operator's network or hosted by an application service provider. The middleware integrates the network infrastructure, including location servers, subscriber portal services, customer care, customer activation services, billing systems, accounting systems, and operational systems (OGC, 2005). **Figure 2.11** shows an end to end LBS middleware architecture.

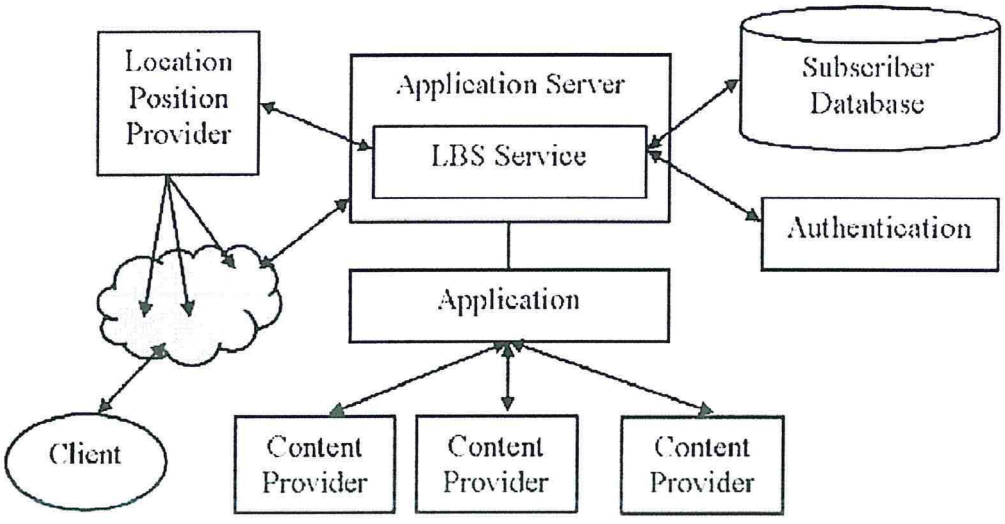

Figure 2.11: LBS Middleware (OGC, 2005)

2.5.3 LBS Integration with GISs

Location Based Services architecture mainly deals in geographical data. Clarke (2001) demonstrate technologies currently available for use in wireless GIS systems and its capabilities by reviewing portable devices that can run mobile cartography and GIS applications. There are several aspects of a GIS that have to be considered when trying to create enhanced LBSs with GIS features such as geographic data collection, management, analysis and presentation (Longley, Goodchild, Maguire & Rhind, 2001). The great advantage with LBSs is in providing GIS functionality and location based information across fixed and mobile Internet-based networks, to be used by anyone, anywhere, at any time and on any device.

2.5.3.1 Mobile GIS Architectures in Camp Where Application

According to Brinkhoff (2005), the mobile GIS and LBS have special demands on the presentation of maps and the interaction with spatial objects, which result from the varying position and orientation of the user and from typical applications performed on mobile devices. The main architectures of a mobile GIS system are:

i. **Stand - alone architecture:** simplest architecture where application stores geo-data, out-of-the box mobile GIS to interpret and display that data and the actual application. Main problem faced by this architecture is lack of communication between components. **Figure 2.12** shows the stand-alone client architecture.

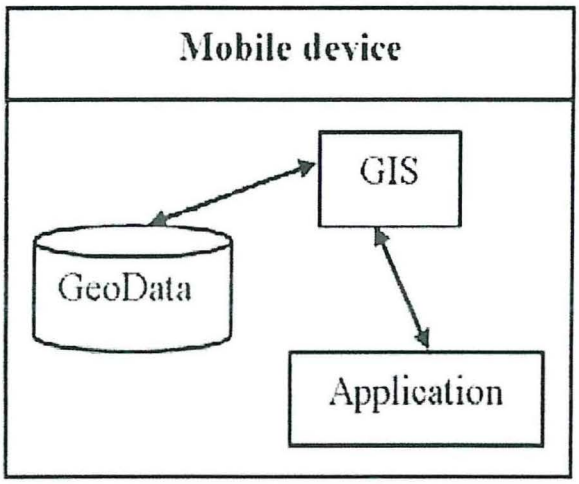

Figure 2.12: Stand - Alone Client Architecture (Brinkhoff, 2005)

ii. **Client – Server architecture:** addresses problems faced by stand-alone architecture as the geo-data is moved to a separate computer and served to the client by GIS server software. The benefits of this architecture are that the hardware which is an enterprise server is powerful and has limitless resources able to serve many requests from multiple applications. Just like the stand-alone architecture the main drawback is when a connection to the server cannot be established. Figure 2.13 shows a stand - alone architecture.

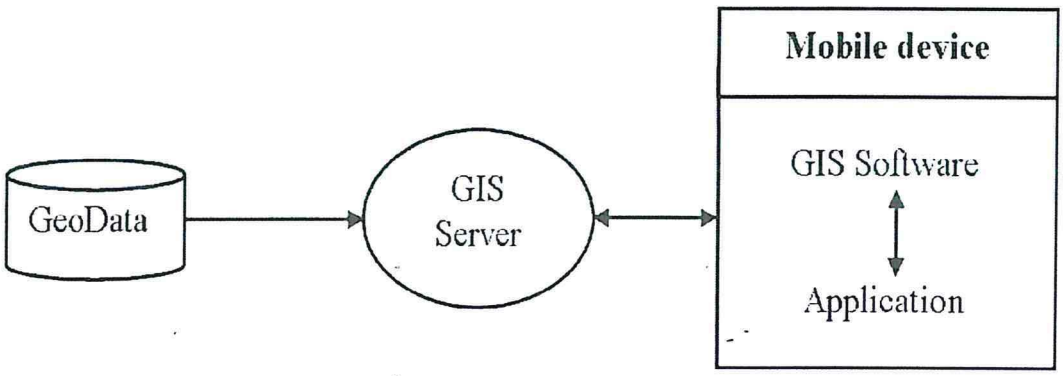

Figure 2.13: Client - Server Architecture (Brinkhoff, 2005)

iii. **Distributed Client - Server architecture:** addresses connectivity problems of the client-server architecture by incorporating persistence and resource management in the form of locally cached data.

2.6 Review of Camping Applications

2.6.1 Camp Where

Camp Where is a mobile application that assists campers to locate and reserve public campgrounds all over the US and Canada. The application helps users get the amenities they want, locate camps on maps, get directions and get a reservation telephone contact. The application provides users with a database of 11,500 camps in USA and Canada. The camps are composed of camps accessible by cars, all the Canadian National Parks and Provincial parks, the National Forests, Corps of Engineers, the State Parks, city camps, the State Forests and State Recreation Areas. It is also important to note that the application does not include privately owned campgrounds (Big Nerd Ranch, 2013). **Figure 2.14** shows screenshots of Camp Where application.

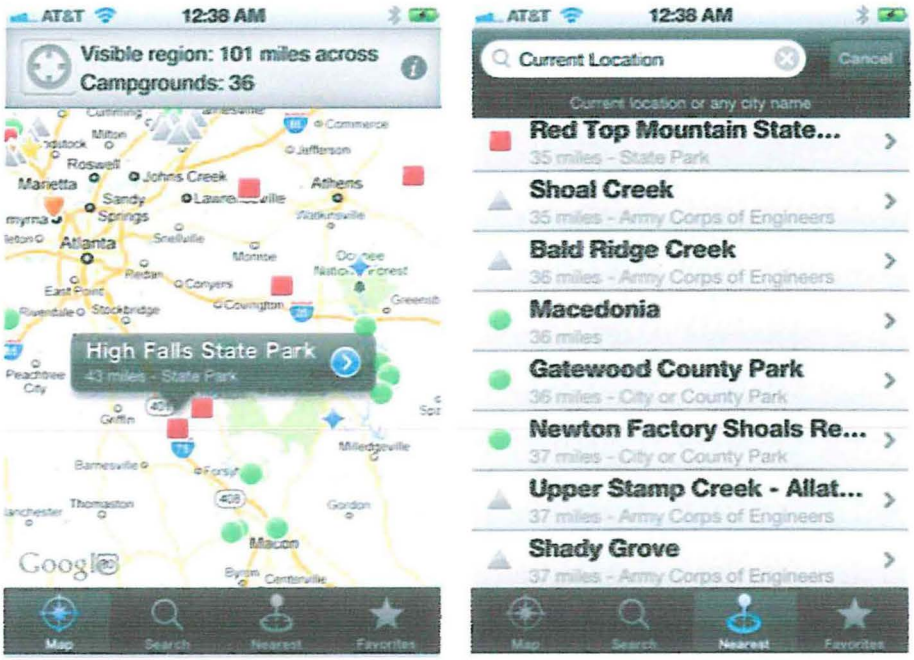

Figure 2.14: Camp Where Screenshots (Big Nerd Ranch, 2013)

2.6.2 iCamp USA: The Ultimate Camping App

iCamp USA is a very similar app to the developed iCamp Kenya but is more of a utility application. It focuses more on helping the camper to ease his camping experience from the moment he arrives at the campsite to the moment he departs. iCamp Kenya helps the camper to first reach the camping site. It has a more general feel as it helps the camper find the best campsite from camp listing, organize for transport and then later report on his/her experience at the end of his trip. iCamp USA is simply a camping utility that enables friends to organize hiking and camping trips (Apple Inc., 2012). The application has the following features:

i. An SOS functionality to help in case of emergencies during the trip.

ii. Setting up a trip itinerary.

iii. Emailing all the details of the trip including the cost and shopping requirements to all the parties involved.

iv. A checklist option to help stay on top of things.

Users who have an iPhone enjoy additional features such as:

i. See the points on a map.

ii. A GPS utility that allows you to import GPX files for a hike.

iii. Fishing utility to help keep track of your favorite fishing spots.

Figure 2.15 shows the start and end date of a trip, a trip itinerary and view on Maps screen.

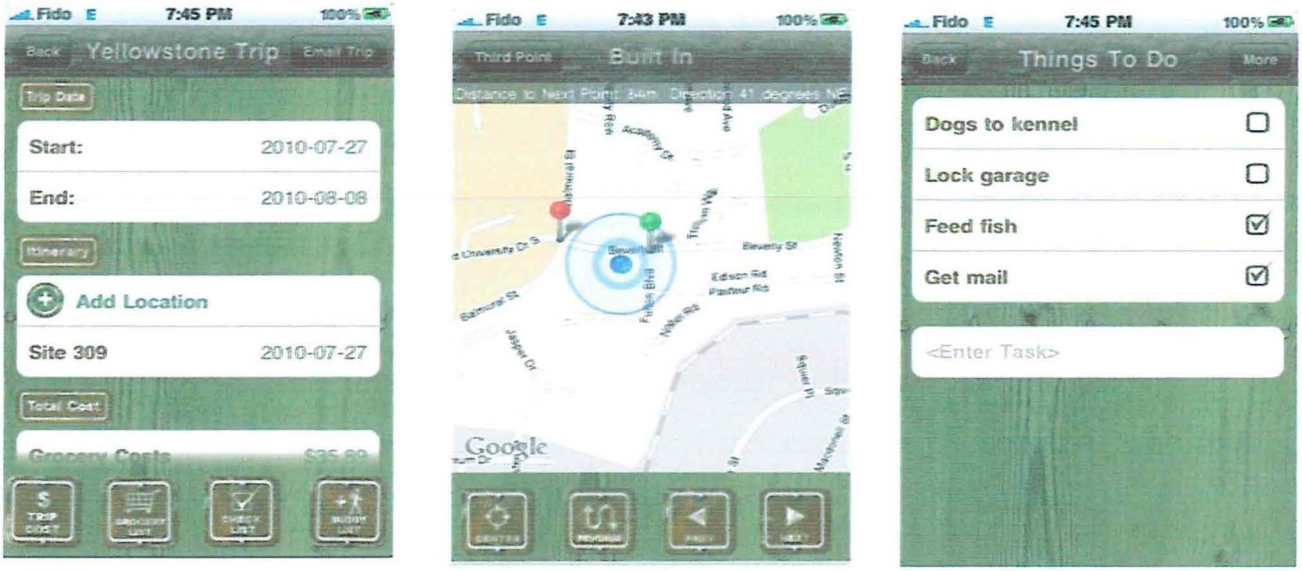

Figure 2.15: iCamp USA Screenshots (Apple Inc., 2012)

2.6.3 Alan Rogers Camping

Based in Europe, Alan Rogers Camping application helps campers to search over 3000 campsites, get full directions to the campsites, view reviews of the camps, check camp opening dates, enjoy galleries of photos of the camping site. The application has classified camps in terms of dog-friendly campsites, naturist campsites, spa or wellbeing campsites, fishing campsites and campsites for kids (Rogers, 2012).

2.6.4 What Knot To Do

What Knot to do is a famous camping utility application that helps campers to know how to tie over 70 knots while camping. Tying knots while camping is a major camping activity that a new camper is expected to learn whether for fun activities or for actual use when camping. While the application does not locate campsites the What Knot to do application represents the large number of camping applications that

help campers enjoy their stay at camps by providing games and other fun activities to enjoy (Columbia, 2013).

2.6.5 Summary of Reviewed Applications

Most camping applications in online application stores e.g. iCamp USA are primarily utility applications with a focus in helping campers enhance their camping experience after they have already arrived at the camping site. They help campers to ease their stay by providing them with games to play, how to cook manuals, how to tie knots, navigation features while at the camp and generally provide users with tips on how to survive while camping. This means that very few applications such as Camp Where actually help campers to locate desired camps and plan for their trips which is the problem domain in Kenya. The geographical region covered by most camping applications is USA, Canada and Europe regions. This provides opportunities for growth in the untapped African regions. Another aspect common in many of the reviewed applications is that they lack a crowdsourcing or feedback functionality to collect reviews from campers.

2.7 Summary and Contribution

The growth of the mobile telephony industry coupled with decline in cost of accessing Internet services and affordable smartphones has provided immense opportunities for the tourism sector in Kenya. The promising technological and social trends in the tourism sector has shown positive impact brought about by mobile applications in improving business transactions, travel bookings, location based services and information provision to users. The mobile location based architectures reviewed helped the proposed application to adopt a similar model of architecture based on 3 levels that is the client side i.e. the iCamp Kenya mobile application which interacts with the application controller which communicates with the application database. It was discovered that the most of the reviewed camping applications helped campers ease their stay at the camp by providing fun games to play, SOS functionalities and other utility functionalities indicating that the problem domain in many of the countries abroad is providing users of the applications with activities to do while already at the camp. On the other hand, the problem domain in Kenya how to find a camping site and how to reach there. The proposed application will primarily focus on helping campers find the best camping sites in Kenya and provide complementary information to help them to reach the camp.

Chapter 3: RESEARCH METHODOLOGY AND DESIGN

3.1 Research Design

Carriger (2000) defines a research design as the strategy, the plan, and the structure for conducting a research project. The study has used descriptive survey design to analyze the user experience while interacting with iCamp. Questionnaires and interviews were used to collect data on whether iCamp gave the users the information they needed. Data was also collected from customers to find out their perception and attitude towards the mobile camping application.

3.2 User Testing

Questionnaires were used to collect the data. The mobile application was tested by a sample of users composed of the Vagabond Travels club members. The testing of the application was based on key principles such as usability, appearance or look and feel of the application, performance and functionality. Users interacted with the mobile application and provided the research with feedback on how the application worked. The feedback collected from the users focused on the following key areas:

i. **Functionalities of the application:** the major functionalities of the application were tested by the users, this include the locate on maps feature which tested whether users could easily locate desired camping sites and view them on Google Maps in the application; ability to post comments and review others comments; whether users were able to rate other campsites and other campers to view the highly rated camping sites in a favorite list and the search functionality which enables users to search for camping sites using key words.

ii. **Usability of the application:** this testing was performed to assess whether users could easily use the application without difficulty. It assesses whether users can post comments without difficulty; navigability that is movement from one screen to the other; receive understandable error prompts if a mistake is made and can interact with the system freely without any difficulty.

iii. **Look and feel of the application:** from the splash screen through the main menu and the subsequent screens. This involves assessing whether the color themes, font types and design layout auger well with each other elements of the application such as buttons, text boxes and menus. Look and feel refers to the level consistency felt throughout the application.

iv. **Overall performance of the application:** This indicates a general performance of all the key testing aspects such as functionalities, usability and the overall look and feel of the application. It

gives the researcher an opportunity to understand the overall level of satisfaction by the user when using the application.

v. **Validation testing:** performed on text fields, text areas and any other input infields of the application to ensure that they accept only the permitted types of data.

3.2.1 Target Population

The population of this research was composed of Vagabond Travels club members. Vagabond Travels is a Strathmore University alumni group that organizes travelling adventures all around Kenya. Vagabonds Travels is composed of both present and past students of universities and colleges in Kenya. They travel around Kenya visiting camping sites and other tourist destinations hence they would be ideal for this study due to the nature of their camping and hiking activities. Vagabond Travel club members were chosen for this study to get views and experiences from respondents who represent 2 different types of users of the application i.e. those who are planning future trips to a camping site and those who have already visited a camping site.

The target population for this study was 208 Vagabond Travels club members composed of a mixture of individuals with varying characteristics such a large percentage own smartphones and frequently travel the country that is are domestic tourists. The age of the population is between 18 years and 40 years.

3.2.2 Sampling Procedures and Techniques

Trochim (2006) defines sampling as the process of selecting or choosing units example people from a population of interest to generalize the results obtained back to the original population from which they were chosen. Purposive sampling was used in the study. Purposive sampling is selecting a sample based on the knowledge or information the researcher has about a chosen population that is the population is non-randomly selected based on a particular characteristic (Frey, Lawrence, Botan & Kreps, 2000). The target population where the sample will be extracted is Vagabond Travel club in Kenya which is currently composed of 208 club members. Purposive sampling was used due to their nature of activities which is travelling around the country visiting camping sites and other tourist destinations. They also have access to Android smartphones.

3.2.3 Sample Size Calculation

The sample sizes will be a function of the target population that is relevant to the study. The confidence interval which is our margin of error or degree of uncertainty is used to estimate our sample size. According to Krejcie and Morgan (1970) the sample size formula calculated as shown in **Equation 3.1.**

Equation 3.1: Sample Size Calculation (Krejcie & Morgan, 1970)

$$s = X^2 NP(1-P) \div d^2(N-1) + X^2 P(1-P)$$

Where:

s= Required sample size.

X^2 = Table value of chi-square for 1 degree of freedom at the 95% confidence level.

N = Total population size.

P= Population proportion.

d = Degree of accuracy expressed as a proportion.

Calculation of sample:

X^2 = **3.841**: This figure was arrived at by first, determining the confidence level, (95%) which represents the amount of uncertainty that the researcher can tolerate. The table value of chi-square for 1 degree of freedom at that confidence level is 3.841.

N= **208:** This figure was obtained from the Vagabond Travels Club. It represents the total number of club members.

P = **0.5**: This figure was assumed, since it results in a maximum sample size.

d= **5% or 0.05:** This figure represents the margin of error that the researcher can tolerate.

Therefore, our sample size will be:

$s = 3.841^2*208*0.5(1-0.5) \div 0.05^2(244-1) + 3.841^2*0.5(1-0.5)$

$s = 136$

The calculated sample size is 136.

3.2.4 Data Collection Methods

The primary data collection instrument used in this research is the research questionnaires. The primary focus of these data collection methods was for user testing of the developed application. A questionnaire is used to extract information from number of people. The questionnaire consists of series of questions framed together in logical manner. The research used questionnaires to collect data from campers on their user experience of the developed application. Both open-ended and close-ended questions were used in the questionnaires. The questions were carefully drafted to achieve the objectives and provide satisfactory information for answering the research.

3.2.5 Data Analysis

After collection of the data from the respondents of the study the structured questionnaires were analyzed using Statistical package for Social sciences (SPSS) 12.0 and Microsoft Excel.

3.2.6 Ethical Issues

The following ethical issues emerged during this research:

i. The researcher obtained permission to carry out the research from the Vagabond Travels club administrators.
ii. The information provided by the participants was confidential and was treated with care.

3.3 System Design and Analysis

The system design and analysis is used to represent the mobile application in a logical form. It was comprised of the following diagrams and representations:

i.The System Architecture
ii.User Interface Flow Diagram
iii.Use Case Diagram
iv.System Sequence Diagrams
v.Entity Relationship Diagram
vi.Context Diagram

vii.Level 0 Data Flow Diagram

3.3.1 System Architecture

Based on the reviewed architectures of past applications, the developed application was based on a client server architecture where the mobile application composed of 2 primary components. These are the client and server components. The client side is composed of the iCamp Kenya application interacting with GIS and GPS software modules present in the mobile device. The camper interacts with the application and requests for services such as location of camps on maps or information. Through an internet connection the application retrieves data from the application server, the database server and web server. The application server communicates user requests on which camping site is chosen with the iCamp Kenya database (compared with GIS server in the Client – Server architecture by Brinkhoff, (2005)) to obtain the camping sites coordinates. The database server is accessed by the backend website system administrator to edit, update and add the system data used in the application. **Figure 3.1** shows the system architecture of iCamp Kenya application.

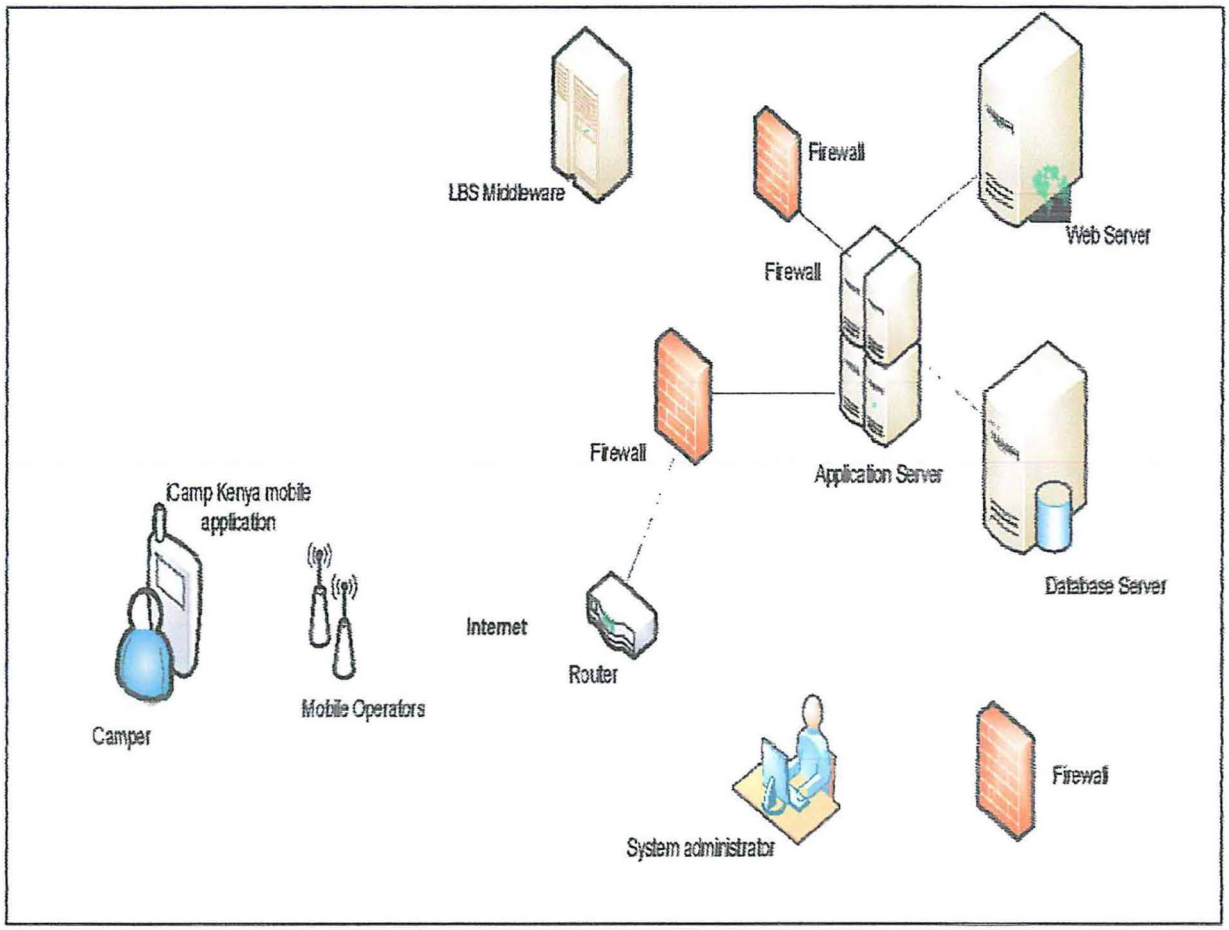

Figure 3.1: iCamp Kenya System Architecture

3.3.2 User Interface Flow Diagram

The user interface flow diagram shows the flow of screens or information when the user interacts with the application. When the user first runs the application, the first screen is the main menu which has several buttons representing shortcuts of the main functionalities of the application. These are the Camp Sites button, the Search button, the Other attractions button, the Favorites button, the Travel button and the information button. The camp sites button is the main functionality that users will be interested in. When a user accesses the camp site button they view a regions screen representing a list of key areas of the country. When a user selects a region, he will access another screen showing a list of campsites found in that region. After selecting the user will access the profile of the camp which shows the camp information, view on map features, get directions, rate camps and view comments buttons.

The search option provides users with a text box where they enter the camp name or key words to enable them to search for the camp site. The next screen will be the search results where users can view the sought-after camp site and view more details. The favorites list provides users with a list of highly rated camping sites as per user ratings in the application. The favorites list only shows the top 10 highly rated camps and keeps on changing as more users' rate different camps.

The information screen provides user with various types of information such as camping tips and information for visitors. The explore Kenya button gives users a list of the best tourist destinations in the country. The transport option provides users with either travel by air or travel and tours choices where users can access the preferred means of travel. The other attractions button provides campers with a list of other events or activities taking place in the country e.g. rhino charge or culture festivals. **Figure 3.2** shows the user interface flow diagram of the application.

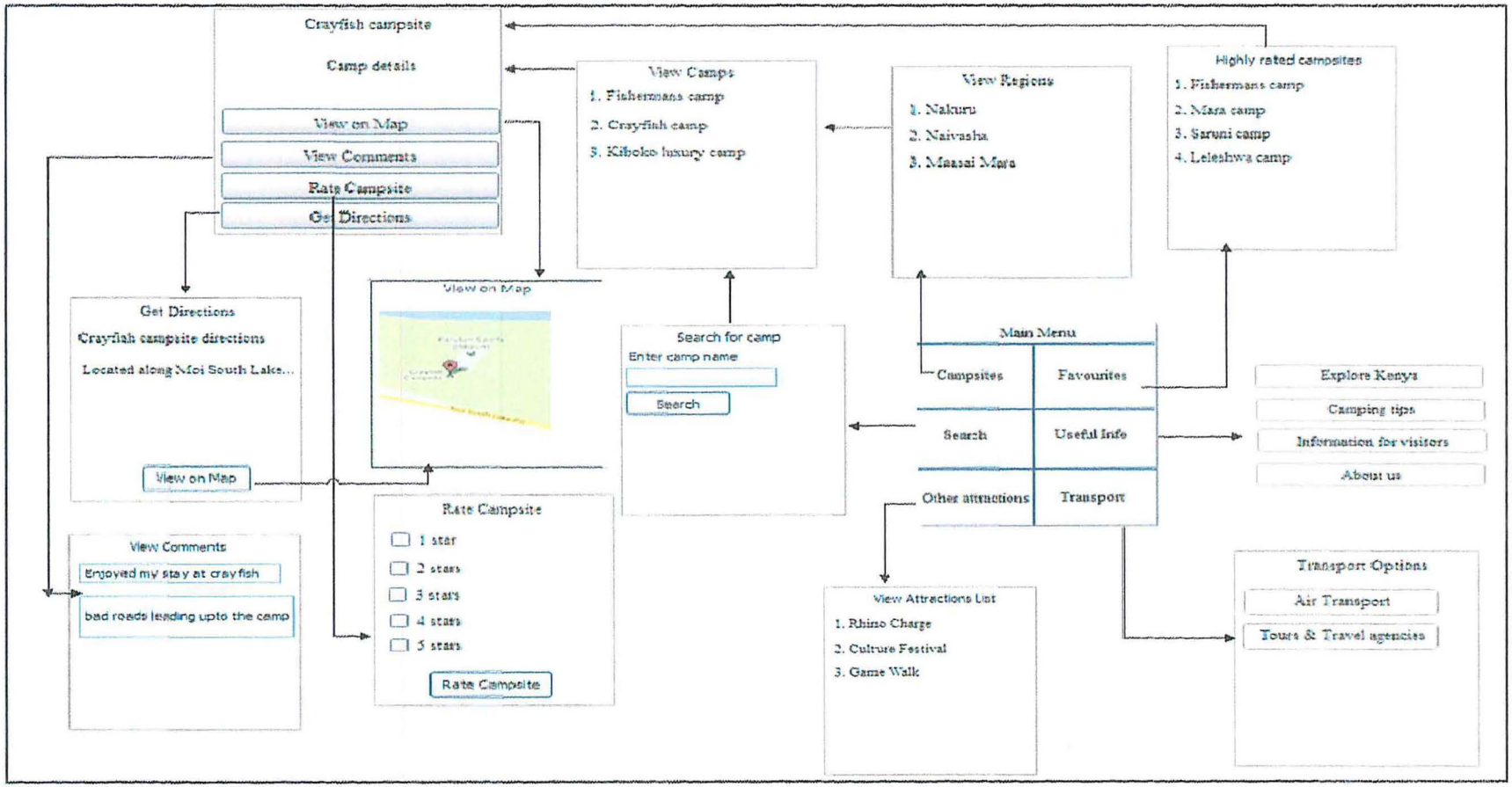

Figure 3.2: User Interface Flow Diagram

3.3.3 Use Case Diagram

This is a behavior diagram that shows the functionality provided by a system in terms of actors, their goals as represented by use cases and any dependencies on those use cases. The main actors of the system are the campers and the system administrator. The main processes in the iCamp Kenya application are:

i. View camp details: Primary actor is the camper who views camp information.
ii. Search campsite: Primary actor is the camper who searches for camping site using keywords.
iii. Rate campsite: Primary actor is the camper who rates the camp on a scale of 1 to 5 stars.
iv. View travel options: The camper is the primary actor who selects the preferred mode of travel.
v. Modify camp details: The system administrator is the primary actor in this process and can add new camps, edit and delete existing camps from the system.

Table 3.1 shows the use case description of the application and **Figure 3.3** shows the use case diagram.

Table 3.1: Use Case Description

Use Case	**Description**
Use Case UC1: View camp details	i.Primary actor: Camper ii.Stakeholders: a. Owners of the campsites b. Campers iii.Preconditions: a. Users must have selected a desired region b. Users must have selected a desired camp site iv.Main success scenarios: a. Users can access camp information b. Users gain access to other features and details such as view a campsite on map, review other camps and post comments based on experiences, get directions to a campsite and rate other campsites v.Frequency of occurrence: process occurs very often

Use Case UC2: Rate campsite	i. Primary actor: Camper ii. Stakeholders: a. Owners of the campsites b. Campers iii. Preconditions: a. Users must have selected a desired region b. Users must have selected a desired camp site c. Users must have accessed the camp profile information iv. Main success scenarios: a. Users receive rating successful notification implying that their ratings have been recorded by the application. b. Favorites list is updated according to the ratings that a particular camp has received v. Frequency of occurrence: process occurs very often
Use Case UC3: Modify camp details	i. Primary actor: System administrator ii. Stakeholders: a. Owners of the campsites b. Campers iii. Preconditions: There are no preconditions. iv. Main success scenarios: a. Details of camp site are edited b. User views new camp details v. Frequency of occurrence: process occurs rarely

Figure 3.3: Use Case Diagram

3.3.4 System Sequence Diagram

The system sequence diagram shows how users interact and receive feedback and messages to and from the system. It also shows how other activities in the system communicate i.e. from the applications interface and the database where information is added and retrieved. The diagram also shows how users receive feedback messages from the system. These major entities of the system sequence diagram are:

i. **The Mobile application user or camper:** the camper searches for the campsite desired using the name of the camp or the keywords. The response from the system will be the camps. The camper also views the camp details and will get camp information from the iCamp Kenya application. Other interactions between the camper and the iCamp Kenya application are the view reviews and view ratings where users get system returns on camp reviews and ratings of a camp site according to user requests.

ii. **iCamp Kenya mobile application:** the camper interacts with the system i.e. the iCamp Kenya mobile application.

Figure 3.4 shows the major entities that communicate with each other in the system sequence diagram.

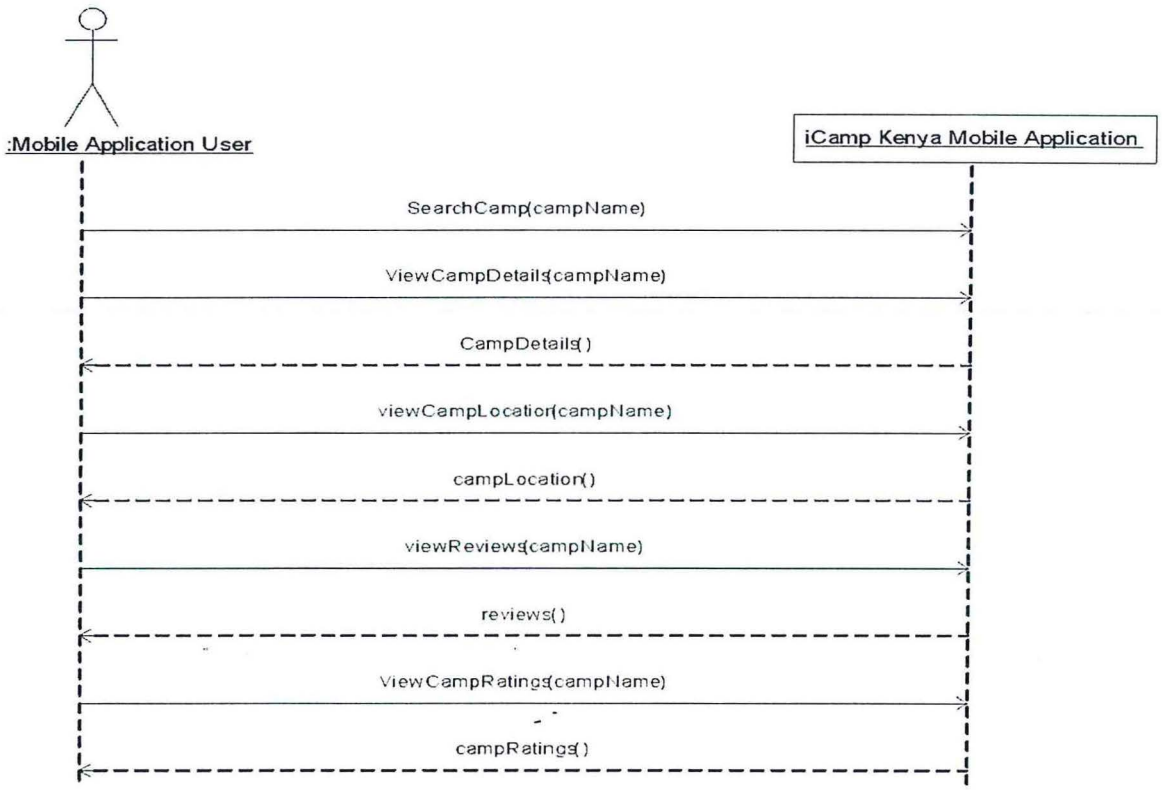

Figure 3.4: System Sequence Diagram

3.3.5 Entity Relationship Diagram

Figure 3.5 shows the entity relationship diagram which identifies the relationships among all the entities in the iCamp Kenya application system. **Table 3.2** describes the Entity Relation Diagram.

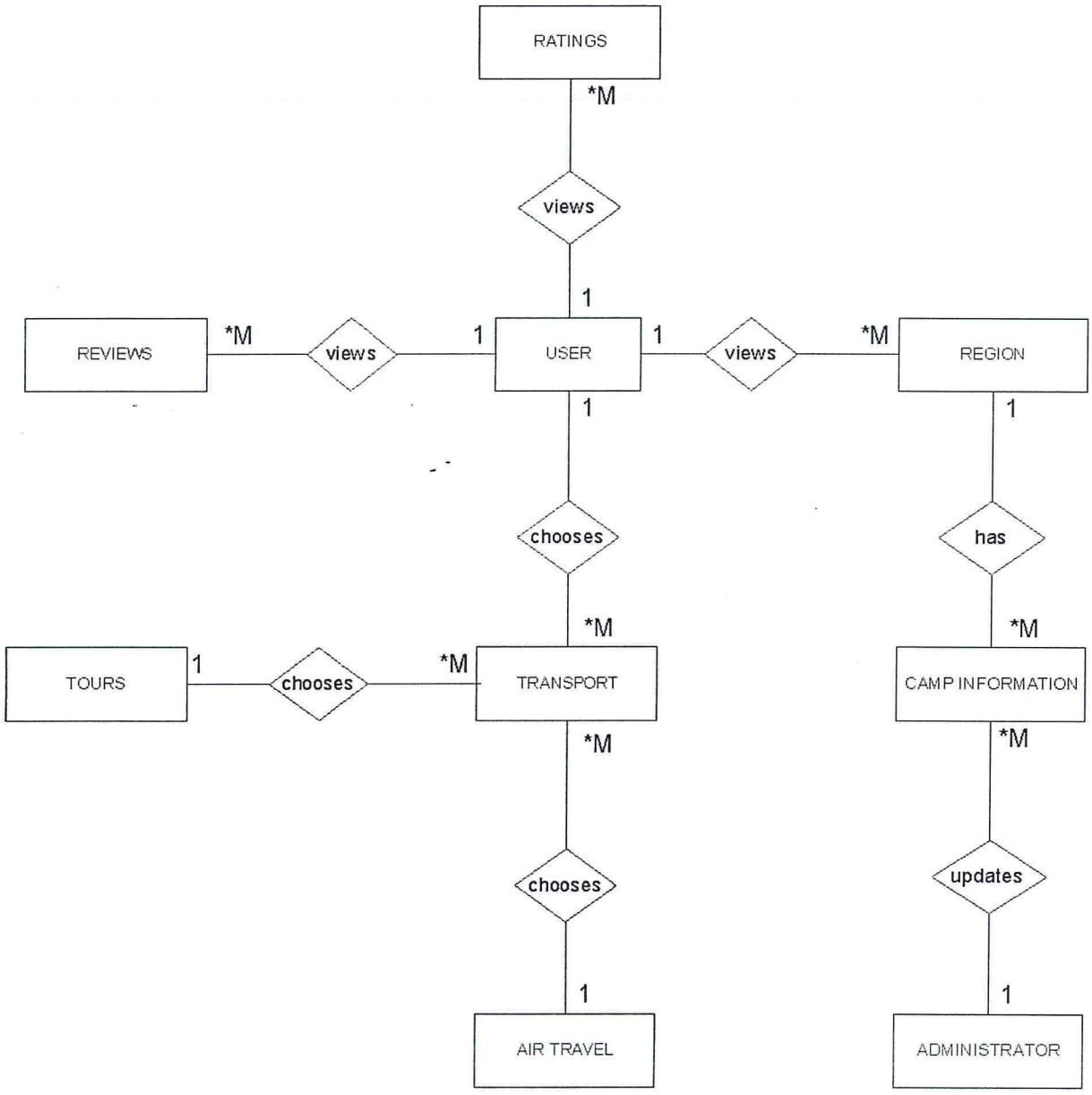

Figure 3.5: Entity Relationship Diagram (ERD)

Table 3.2: Description of Entity Relationship Diagram

Entity Name	Entity Description	Entity Fields
Administrator	This entity stores information about the administrator.	adminID , username, password
Camp Information	This entity stores information about camps.	campID, regionID, campName, description, campRatings, campLongitude, campLatitude, campContacts,
Region	This entity stores information about the region of a camp.	regionID, regionName
Camp Ratings	This entity stores information about ratings of a camp.	ratingsID, campRating, campID
Transport	This entity stores the transport options.	transportID, transportType
Air Travel	This entity stores the air travel options.	airtravelID, airtravelName, airtravelContacts
Tours	This entity stores the tours and travel companies.	toursID, toursName, toursContacts
Reviews	This entity stores the camp reviews	reviewID, campID, comments

3.3.6 Context Diagram

A system context diagram is used to represent actors outside a system that interact with the mobile application. They are composed of entities and relationships; entities represent the main system (shown in a box) and the multiple external entities representing external actors.

The main entities of the mobile application include:

i. **The Campers:** can be regarded as the primary entity in this application as he will be interacting with the system on a frequent basis.

ii. **The System administrator:** the system administrator primarily manages the applications data; this includes adding, editing and deleting information.

Figure 3.6 shows the relationships between the entities representing flow of information.

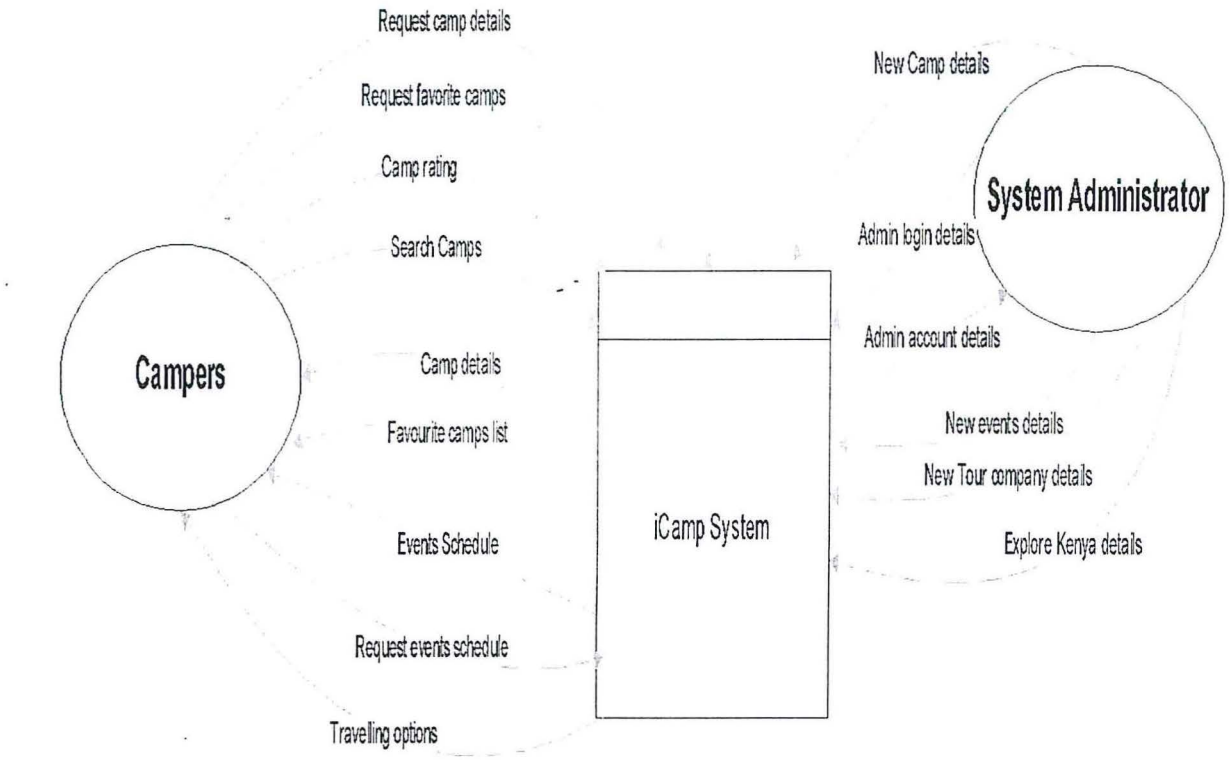

Figure 3.6: Context Diagram

3.3.7 Level 0 Data Flow Diagram

The level 0 data flow diagram shows the interaction between the external entities of the system and the processes of the system. It shows the flow of data or information through an information system. The data flow diagram shows the inputs and outputs of the system with the data store storing the files for each process.

These external entities of the system include:

i. **The camper:** the camper views the camp details and will get the camp information from the iCamp Kenya application. The campers will also review other camps, view camp ratings and view tourist attractions.

ii. **The system administrator:** the system administrator primarily manages the applications data; this includes adding, editing and deleting information. The administrator modifies camp information, monitors ratings and modifies tourist attraction details.

The processes that external entities interact with include the following:

i. **View camp information:** provides camp details such as description of the camp, accommodation prices, contact information and reviews to the campers.

ii. **View tourist attractions:** enables campers to view the best tourist attraction.

iii. **Review campsites:** enables campers to rate campsites based on their experiences visiting the camp on a scale of 1 to 5 stars.

iv. **Modify travel information:** provides campers with travel options such as air travel and tours and travel agencies.

Figure 3.7 shows the level 0 data flow diagram.

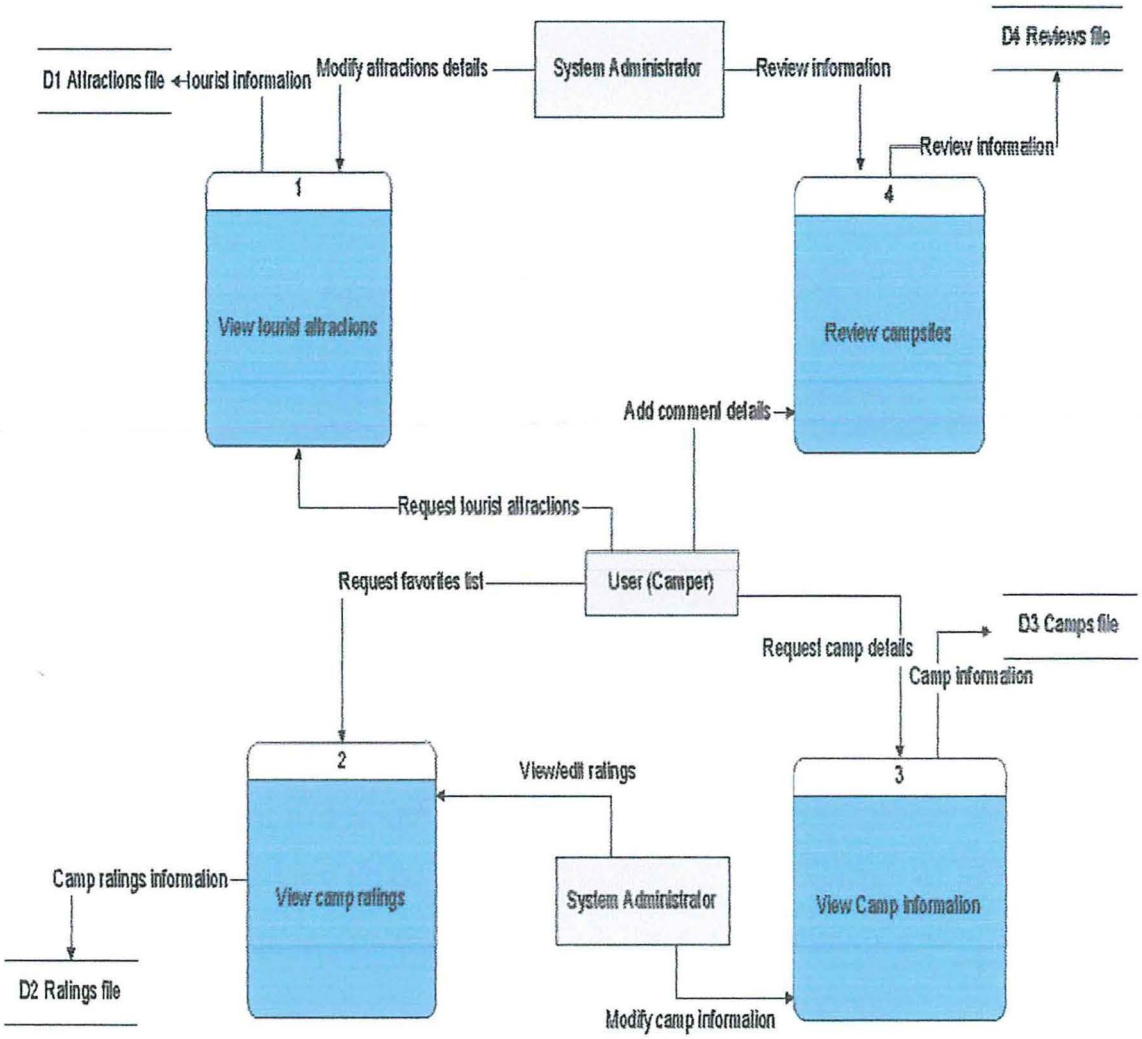

Figure 3.7: Level 0 Data Flow Diagram

Chapter 4: SYSTEM IMPLEMENTATION AND TESTING

4.1 Introduction

This section shows the how the mobile application was implemented and testing of the system. The results of the system testing were tabulated and presented in this section. This system is composed of the following components:

i. The mobile application iCamp Kenya application that users will interact with when accessing camping information. This application was developed on the J2ME platform.
ii. The backend website application to be used by the system administrator in making changes to the application. This was developed using PHP programming language.
iii. The database for data storage.

4.2 Mobile Application - iCamp Kenya

The mobile application is the front_end application that campers will interact with to access the needed information for their camping trip and help them easily locate their desired camping sites. The application was developed on the J2ME platform which is compatible for java enabled phones. See (Appendix D) for details on the development environment. The application was divided into several modules which made up the application:

i. **View camping information**: enables users of the application to view camping sites information such as a short description of the camp, activities on offer, accommodation prices, and contacts of the campsite.
ii. **View on map feature**: enables campers to view camping sites on Google maps.
iii. **View and post comments:** enables users of the application to post comments of a camp they have visited and also to view comments of other camps.
iv. **Search functionality:** users can be able to search for camps using key words in case they cannot recall the right name of the camp or do not know the location of the camp.
v. **Ratings and favorite's functionality:** users of the application can rate a camp on a scale of 1 to 5 stars based on their experience of the camp, these ratings generate a top 10 favorite list ranking of the highest rated camps.
vi. **View transport information:** this functionality gives users 2 types of travel options these are by air or road. Users can then select the preferred option and view trusted companies providing transport services.

vii. **View important information and events:** provides users with useful information such as camping tips for first time campers, information tips for international visitors and other important information such as dangerous hotspots when travelling.

4.2.1 Modules of the iCamp Kenya Mobile Application

4.2.1.1 The Home or Main Menu Functionality

The splash screen is the first screen that a user views when the mobile application is being launched. The home screen shows the shortcuts of the major functionalities of the application that is a Camp Sites button where users can access the primary camping functionalities such as view campsites information, view their location on maps, review other camps and finally rate other camps; the Search button is used for searching for camping sites using key words; the Information button provides users of the application with important information such as camping tips and information for foreigners visiting the country; the Favorites button is used to view the highly rated campsites while the Other Attractions button is used destinations to showcase other tourist destinations in Kenya that might be of interest to the camper. **Figure 4.1** shows the main menu and splash screens.

Figure 4.1: Main Menu and Splash Screen

4.2.1.2 *View Campsites Functionality*

Users first select the preferred region e.g. Maasai Mara or Naivasha regions. Under each region there will be a selection of campsites of which users select a preferred camping site and view the Camp information screen. On the camp profile page users of the application can view a short and precise description of the camp, the contact information such as telephone or email and accommodation prices to be incurred. Users will also have access to the following features; Get directions where users are given directions on how to reach the camp; View on map button where users can view the camp chosen on Google maps; the View comments button enabling them to post and review other user's comments about their experiences when they visited the camping site and Rate Camp button which enables users to rate a camp on a scale of 1 to 5 stars. Users can rate a campsite based on their own experiences or metrics similar to the EAC standards of classification of tented camping sites previously discussed in the literature review. **Figure 4.2** shows the view regions, camps and camp profile screens of the application.

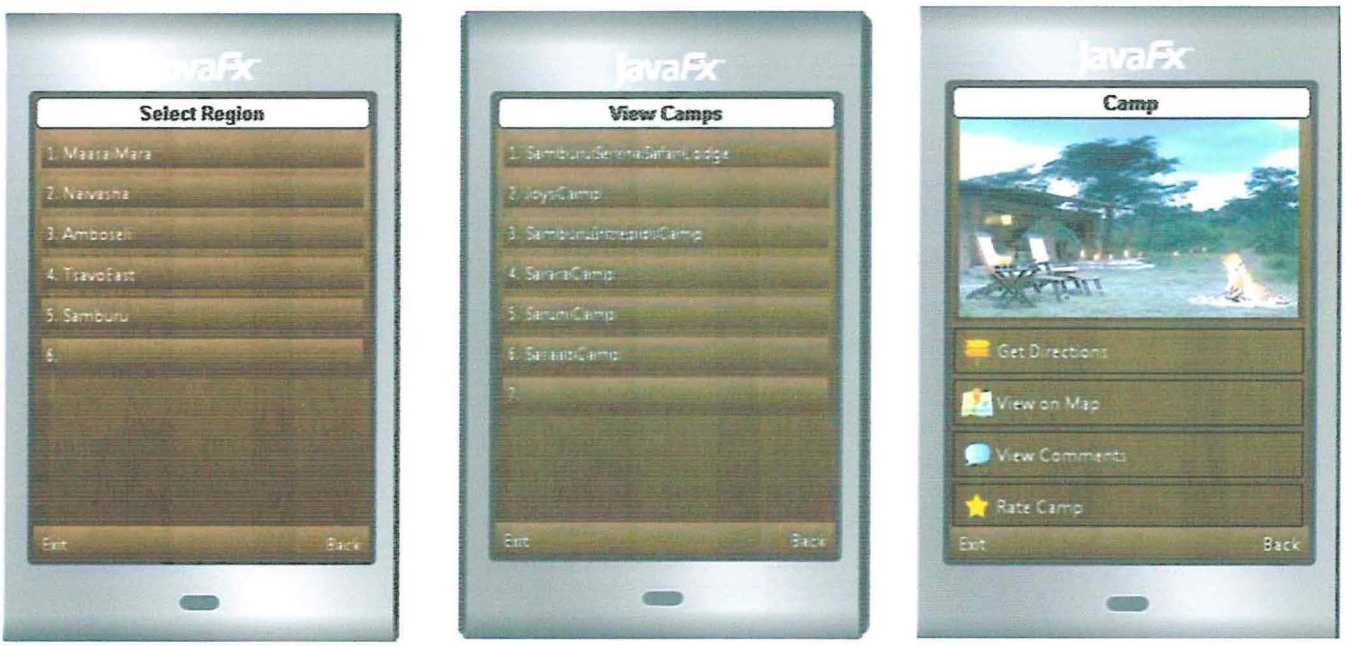

Figure 4.2: View Regions, Camps and Camp Profiles

4.2.1.3 *View on Map and Search Campsites*

The view on map feature helps users to view desired camping sites via Google Maps. The underlying architecture for this functionality is the database storage that contains longitude and latitude coordinates for

each corresponding campsite, when a user accesses the view on map button for a specified camp it queries the database which fetches the coordinates back to the application which uses the GIS and GPS software on the mobile phone to display the exact location of the desired camp. Figure 4.3 shows the map view of Crayfish camping site in Naivasha, on the map a nearby road called Moi South Lake Road and Karuturi stadium are landmarks that assist the user to reach the campsite.

The search campsite functionality is where users can find the favorite campsite by keying in the campsite name. The search function will provide campers with a list of camping sites that have a similar name to the user's request and the user can select from the list. This feature is helpful when a user cannot remember the exact name of the camping site. **Figure 4.3** shows the search campsite and screens view on map.

Figure 4.3: View on Map and Search Campsite

4.2.1.4 Travelling Options and Explore Kenya

The application also provides campers with travelling options i.e. local tours and travel agencies and air travel options. Campers can view a listing of reputable tours and travel agencies that provide transport services to the camping locations. Under the tours and travel profile the user of the application will be provided with important information such as mobile phone, email and website contacts. A company logo is also provided to the user for easier identification and reference. The local air travel screen gives

users an option where they can view a list of reliable small plane airlines that travel to camping areas such as Maasai Mara and other remote areas which are difficult to reach by road. The travelling options module provide the mobile application with an all-inclusive or holistic feel meaning users or campers get all the information inclusive of transport details needed to plan their camping trip without having to search the other platforms for key ingredients needed to make their trip a success.

The Explore Kenya destinations provide users of the application with an overview of the best landmarks in the Kenya. This feature targets mainly the international visitors who have no knowledge of important tourism destinations in the country. **Figure 4.4** shows the travelling options and explore Kenya screenshots.

Figure 4.4: Travelling and Explore Kenya

4.3 Backend Website - iCamp Kenya

The backend of the application helps the system administrator of the application to make any changes to the application such as add or remove campsites depending on the market, add or remove tours destinations and travelling options. The backend website also assists the system administrator to manage the applications data. Section 4.3.1 shows some of the modules and their corresponding screenshots in the backend application.

4.3.1 Modules of the Backend Application

4.3.1.1 Edit Campsites Module

The edit campsites module enables the system administrator to manage the camp information. This information includes camp names, the description, prices, contact information, location coordinates, sample pictures of the camp and the corresponding regions. The administrator can also add new campsites and delete others that may have stopped operating in the view campsites. This module provides the administrator with a simple interface to manage all the campsites information. **Figure 4.5** shows the edit campsites module.

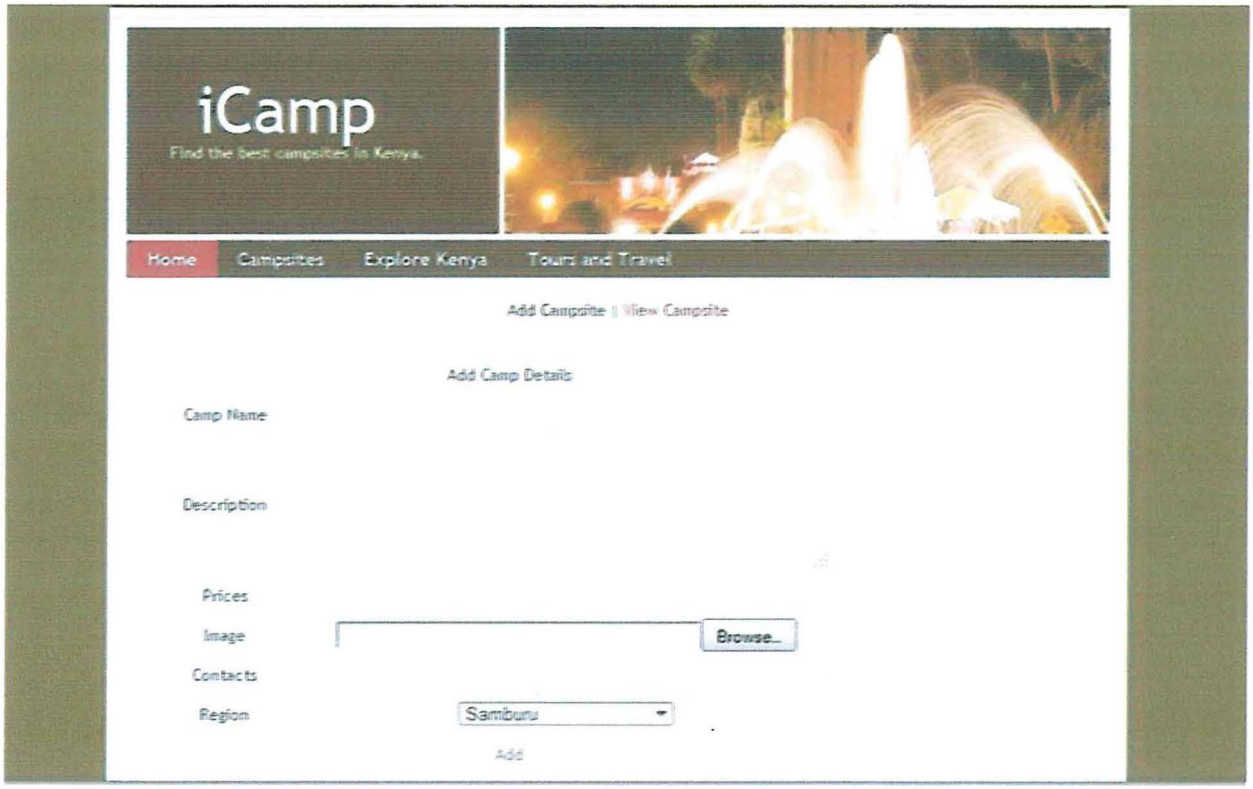

Figure 4.5: Edit and Add Campsites

4.3.1.2 Edit Tours and Travel Module

The edit tours and travel module enables the system administrator to manage the travel information that is presented to users in the iCamp Kenya application. In this module, the administrator can edit existing travel information for both local tours companies and airlines by editing information such as name of the company, company contacts and change the logo of the company in the event of a change in company

ownership. The administrator can also add new tours and travel companies. The edit tours and travel module also provides the administrator with another tab in which he can delete existing travel companies in the application to update users of companies that are in existence. **Figure 4.6** shows the edit tours and travel companies' screenshot.

Figure 4.6: Add and View Tours Companies

4.3.1.3 Edit Explore Kenya Destinations Module

This module helps the administrator to manage the tourist attraction destinations of the application. The administrator can edit the location, preferences and pictures of the tourist destination on this page and add new tourist attraction sites for the application. The administrator can also delete existing destinations if they fall out of favor with users or with the public. This module needs to be reviewed on a quarterly basis

so as to update destinations and provide users of the application with the best and most interesting places in Kenya. **Figure 4.7** shows the explore Kenya destinations screenshot.

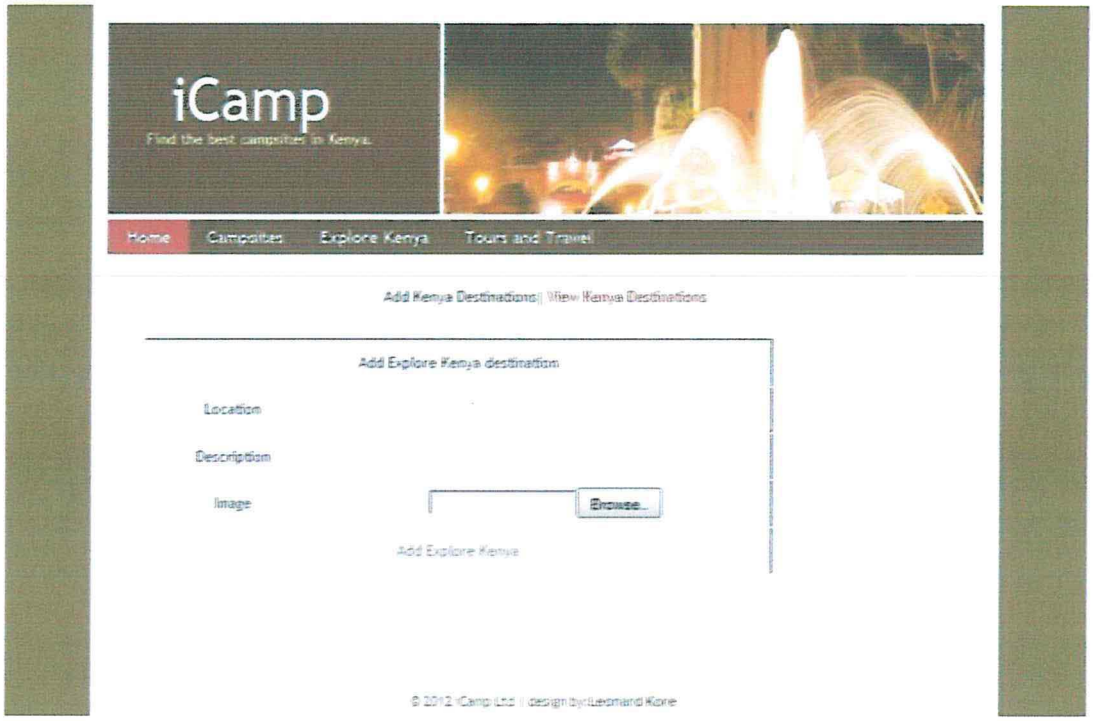

Figure 4.7: Edit Explore Kenya Destinations

4.4 Findings

Questionnaires were used in this research to collect data on the use of the developed mobile application iCamp Kenya and to find other usage patterns of the users.

4.4.1 Age Bracket

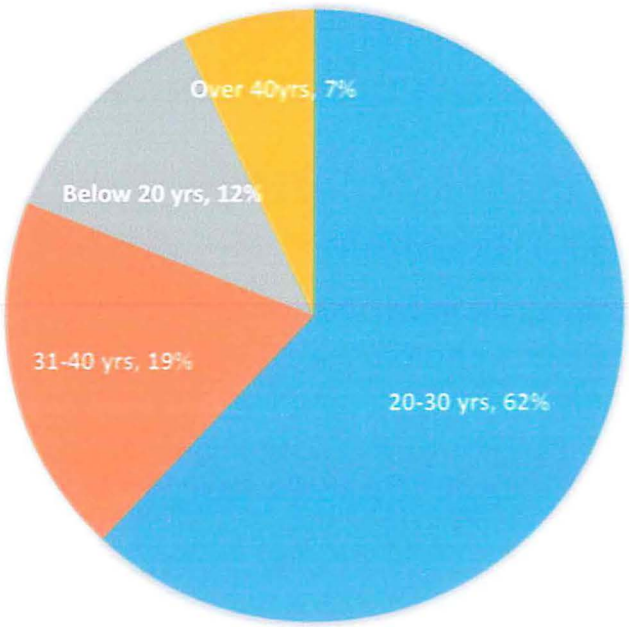

Figure 4.8: Age Range

62% of the participants in the research were aged between 20 and 30 years old this represented the highest age bracket. 19% of the participants were aged between 31 and 40 years old. The remaining participants were split between those aged below 20 years old representing 12% and those aged over 40 years old representing 7% of the participants. **Figure 4.8** shows the age results.

4.4.2 Occupation of Respondents

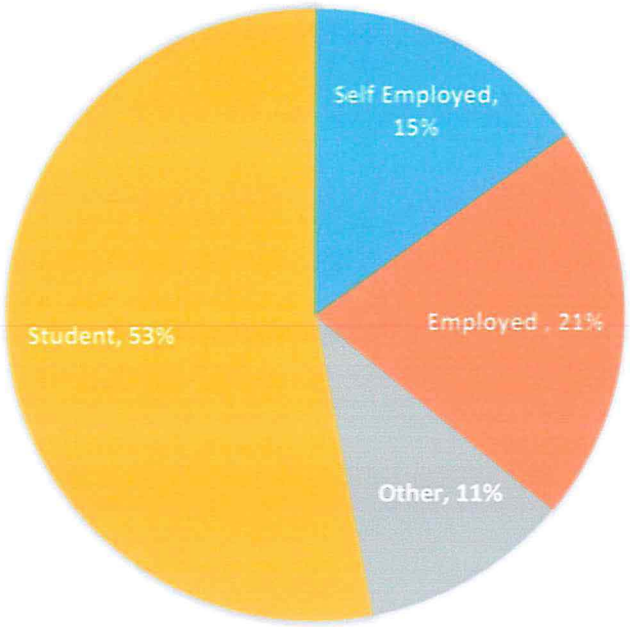

Figure 4.9: Occupation of Respondents

Figure 4.9 shows the occupation of respondents. 53% of the respondents were students. 21% of the respondents were employed and 15% represented the number of self-employed respondents. The others category scored only 11% of the users.

4.4.3 Challenges Faced when Searching for Campsite

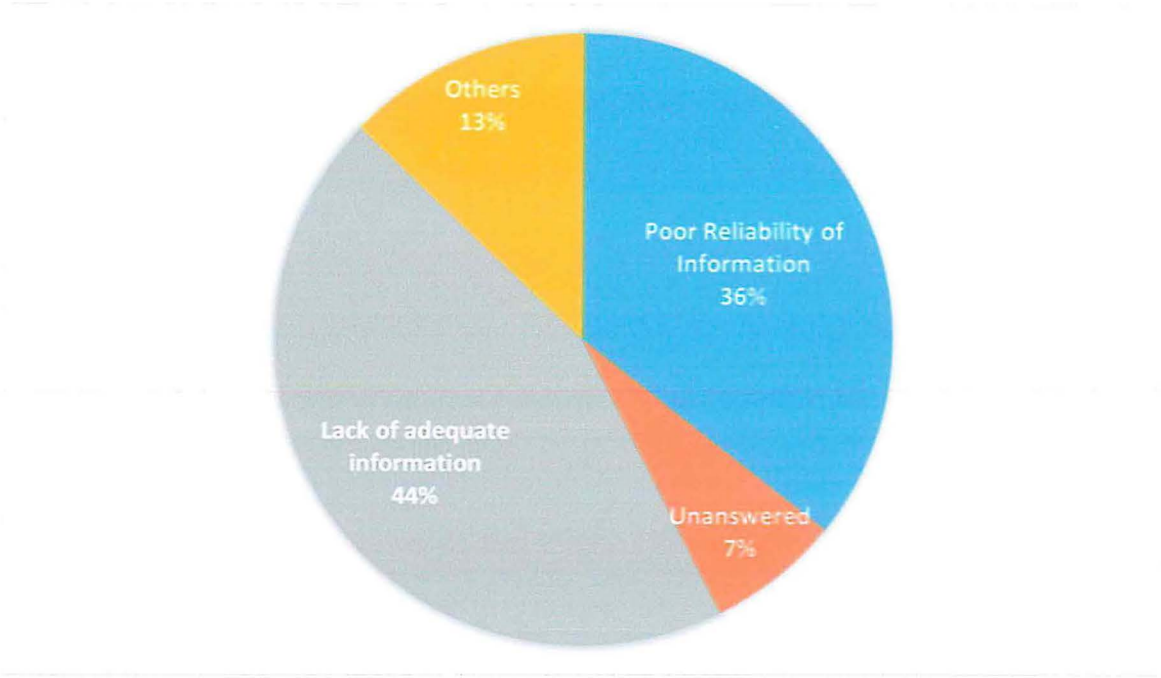

Figure 4.10: Challenges Faced when Searching for a Campsite in Kenya

Figure 4.10 shows most of the respondents in the research indicated that lack of adequate information on camping sites was their main challenge when looking for camping sites; this represented 45% of the respondents. 36% of the respondents could not trust or thought the information provided on social media platforms or e-commerce was unreliable. The rest offered other reasons which represented 12% of the participants and 7% did not provide a response for this question.

4.4.4 Current Ways Campers Find Information on Campsites

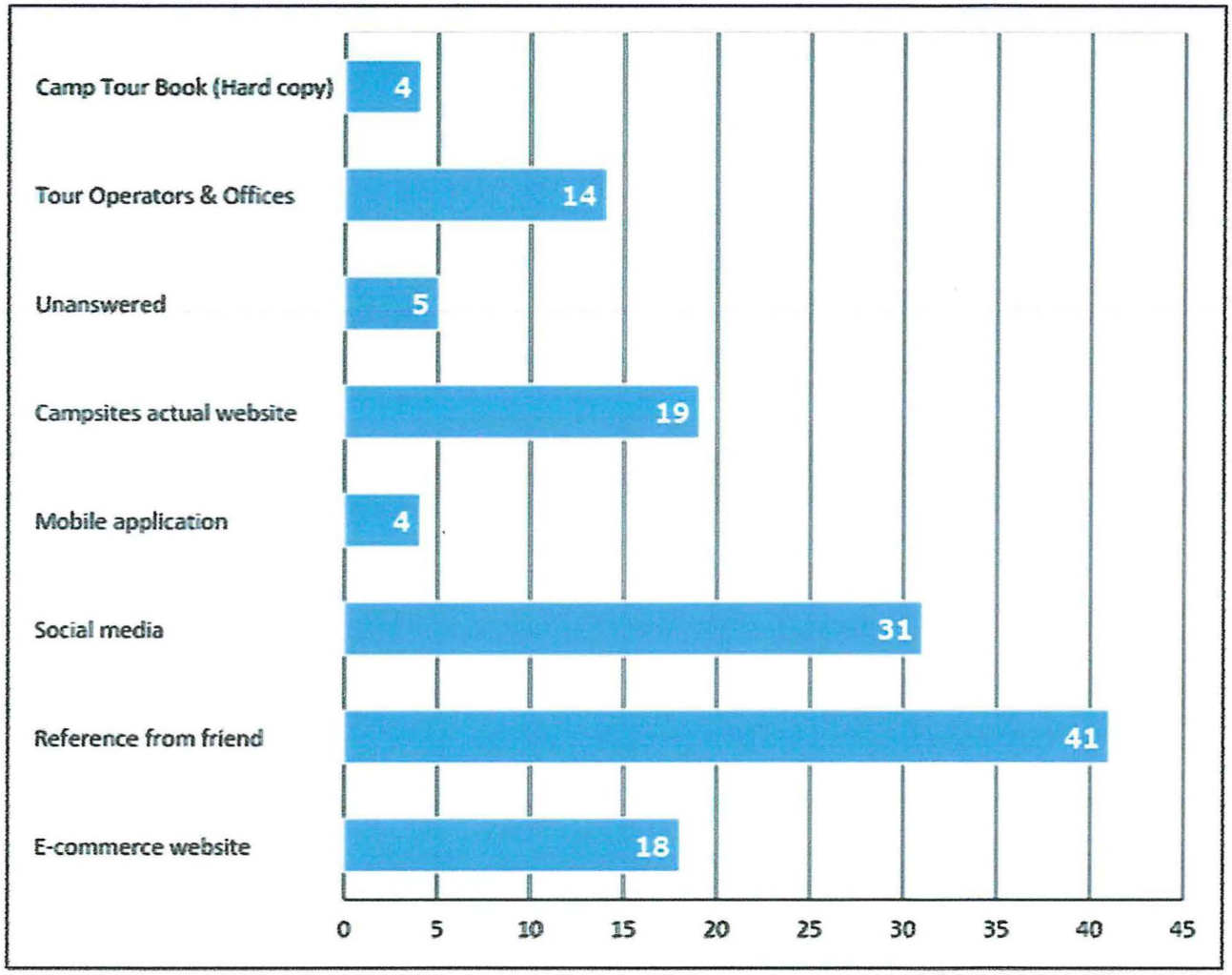

Figure 4.11: Current Ways of Finding Camping Information in Kenya

Figure 4.11 shows how campers currently find information on camping sites. Many participants used a reference from a friend, this represented 41 of the respondents (30%) while 23% of the respondents representing 31 respondents used social media platforms. E-commerce websites was rated by 18 users (13%) while the use of a mobile application represented only 3% representing 4 respondents. 19 respondents representing 14% used the camping sites website to obtain information and tour operators was only used by 10% of the respondents. 5 users did not answer the question while only 4 users made use of camping tour book.

4.4.5 Previous Usage of Mobile Applications that Locates Campsites

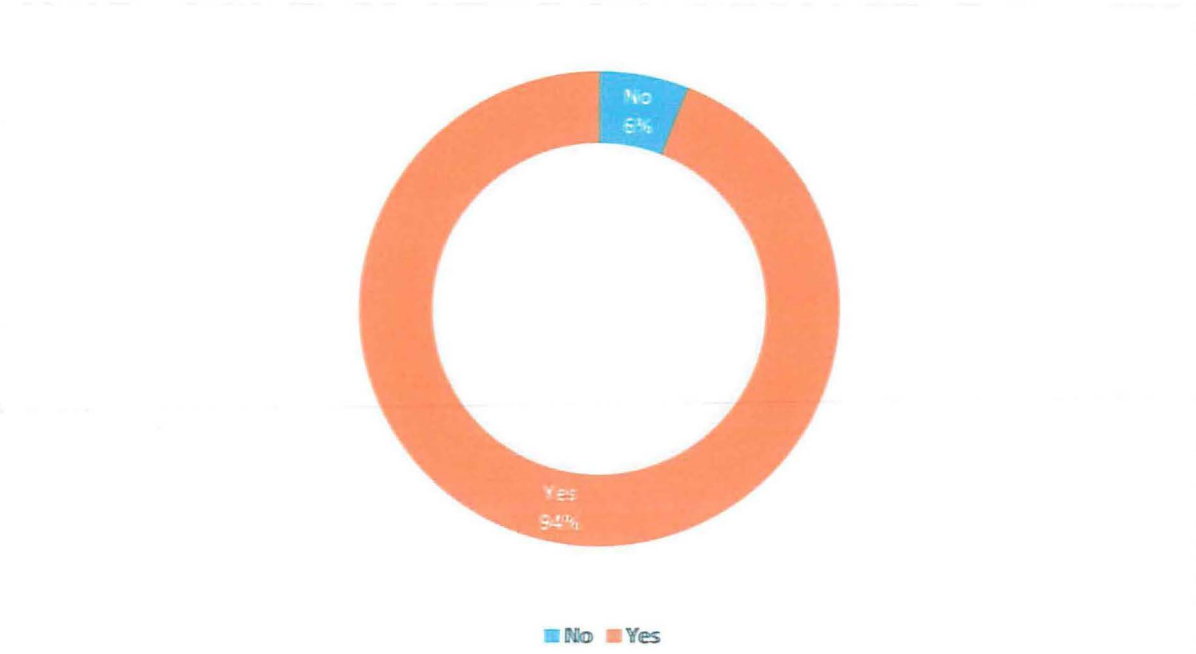

Figure 4.12: Previous Usage of Camp Locating Application

Figure 4.12 shows many respondents representing 94% have never used a mobile application for locating camping sites while the rest representing those who have used a mobile application were 6%.

4.4.6 Difficulty in Using the Application

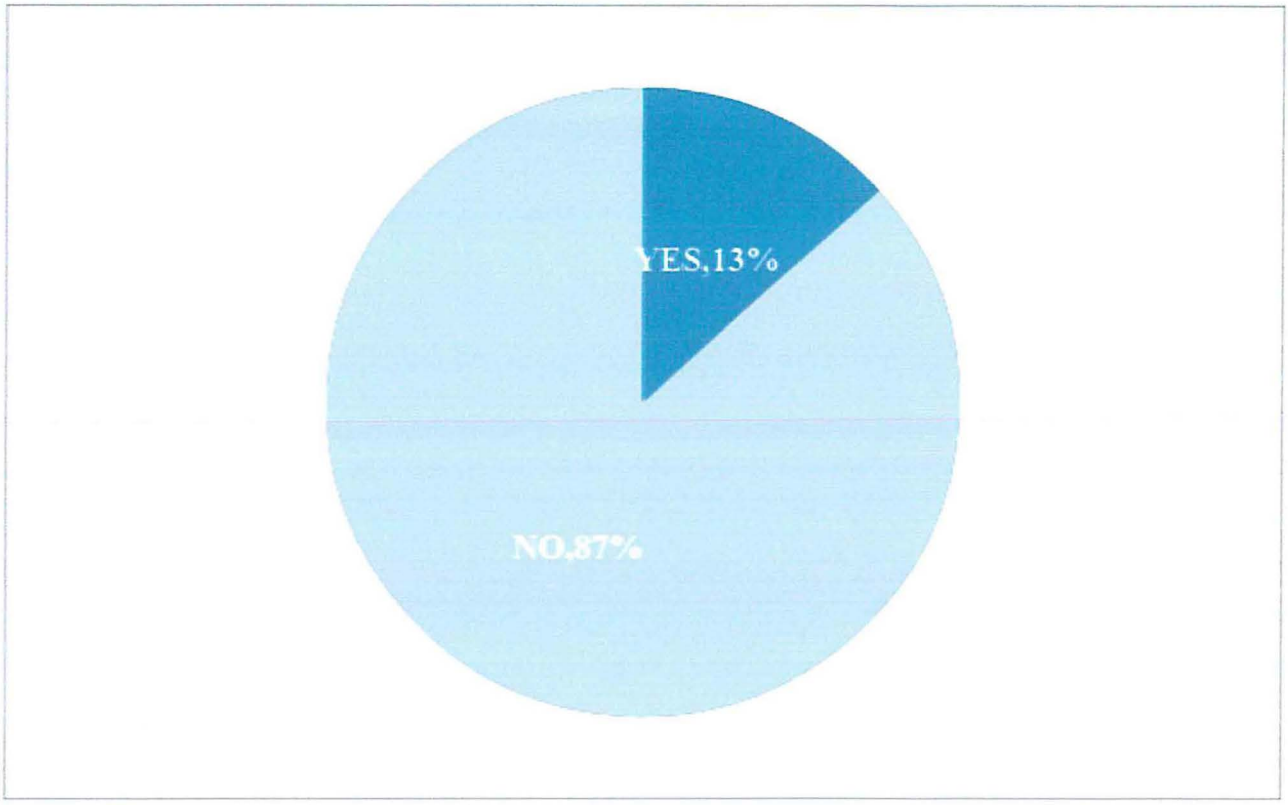

Figure 4.13: Users Experiencing Problems using Application

Figure 4.13 indicates that only 13% of the respondents had problems while using the application for the first time, this represented 18 users while 87% of the respondents representing 118 users had no difficulty in using the application. These problems range from ability to install the application in the mobile device and ambiguous notifications or error messages that users cannot understand and difficulty in navigation from one screen to the other.

4.4.7 User Awareness of Application Status

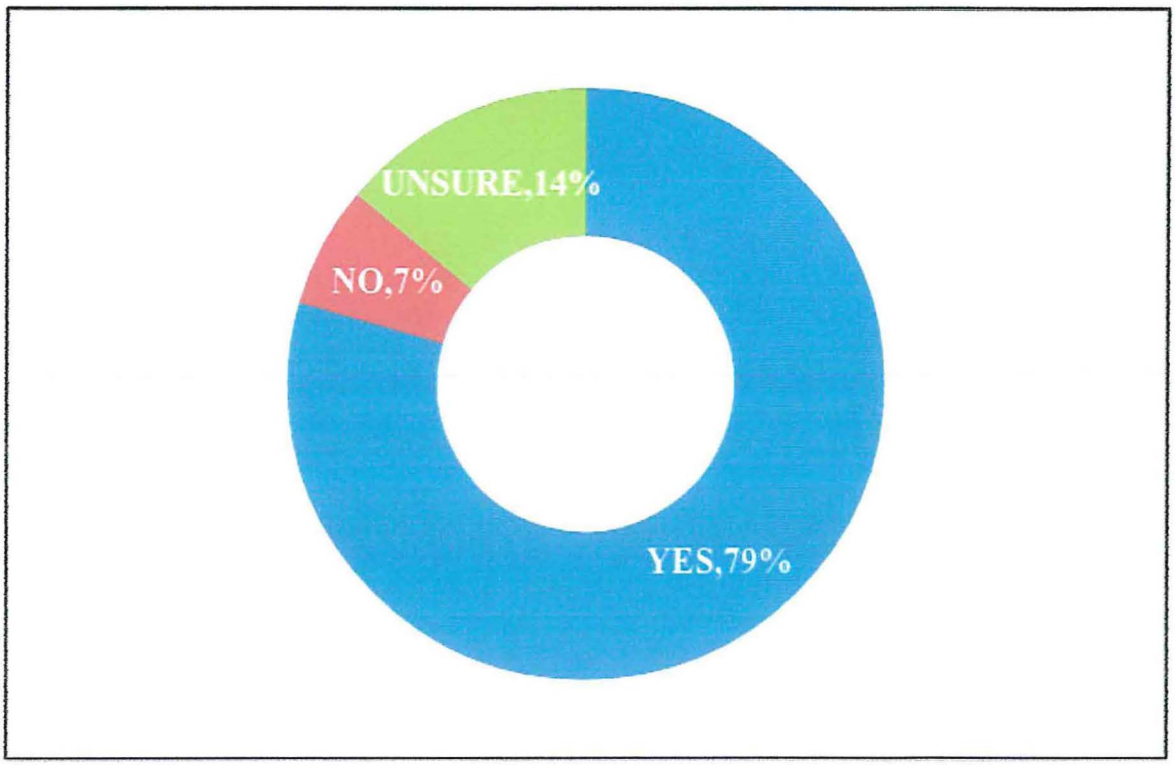

Figure 4.14: User Awareness of System Status

Figure 4.14 shows that 79% of users representing 108 respondents were able to tell the system status of the application at any given time while interacting with the application. Only 7% of the users (9 users) could not tell the status while 14% representing 19 users where unsure of what is happening.

4.4.8 Look and Feel of the Application

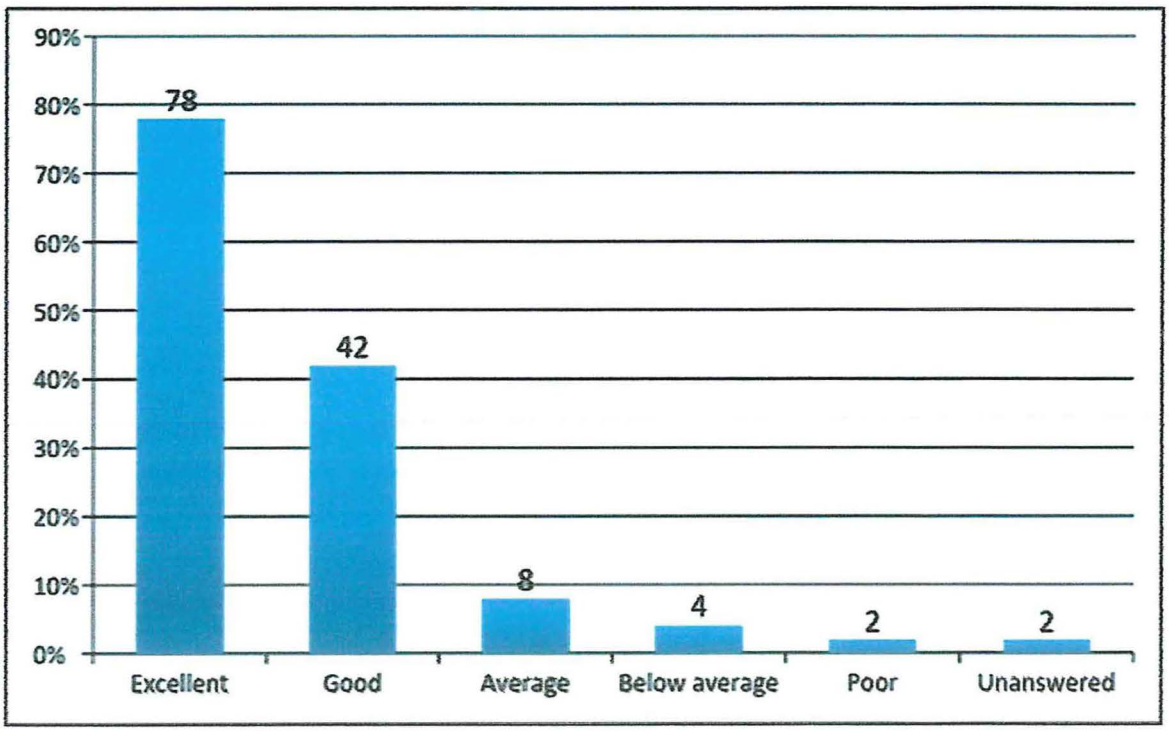

Figure 4.15: Overall Look and Feel of the Application

Figure 4.15 shows that 78 respondents representing 57% of the users rated the application had an excellent look and feel followed by 42 respondents representing 31% thought the application was generally good. 8% rated the application average while below average and poor were rated 6% 7and 0.01% respectively. 2 respondents did not answer this question.

4.4.9 Users Satisfaction with Major Functionalities of the Application

The main functionalities that users were asked to rate in the questionnaires were the view comments or review functionality, the search functionality, the view campsite on map functionality, travel options and rating of campsites which resulted in favorites list of camping sites. A summary of the results collected from the study is shown in **Table 4.1.**

Table 4.1: Data Findings on User's Satisfaction of Functionalities

Functionality		5	4	3	2	1
View comments or Review camp	Frequency	20	38	53	17	8
	Percentage (%)	15	28	39	12	6
Search for a camping site	Frequency	84	33	15	4	0
	Percentage (%)	62	24	11	3	0
Locate campsite on map	Frequency	69	47	7	10	3
	Percentage (%)	51	35	5	7	2
Rate campsites or Favorites	Frequency	58	56	11	7	3
	Percentage (%)	43	41	8	5	2
Travel Options	Frequency	65	42	19	5	4
	Percentage (%)	48	31	14	4	3

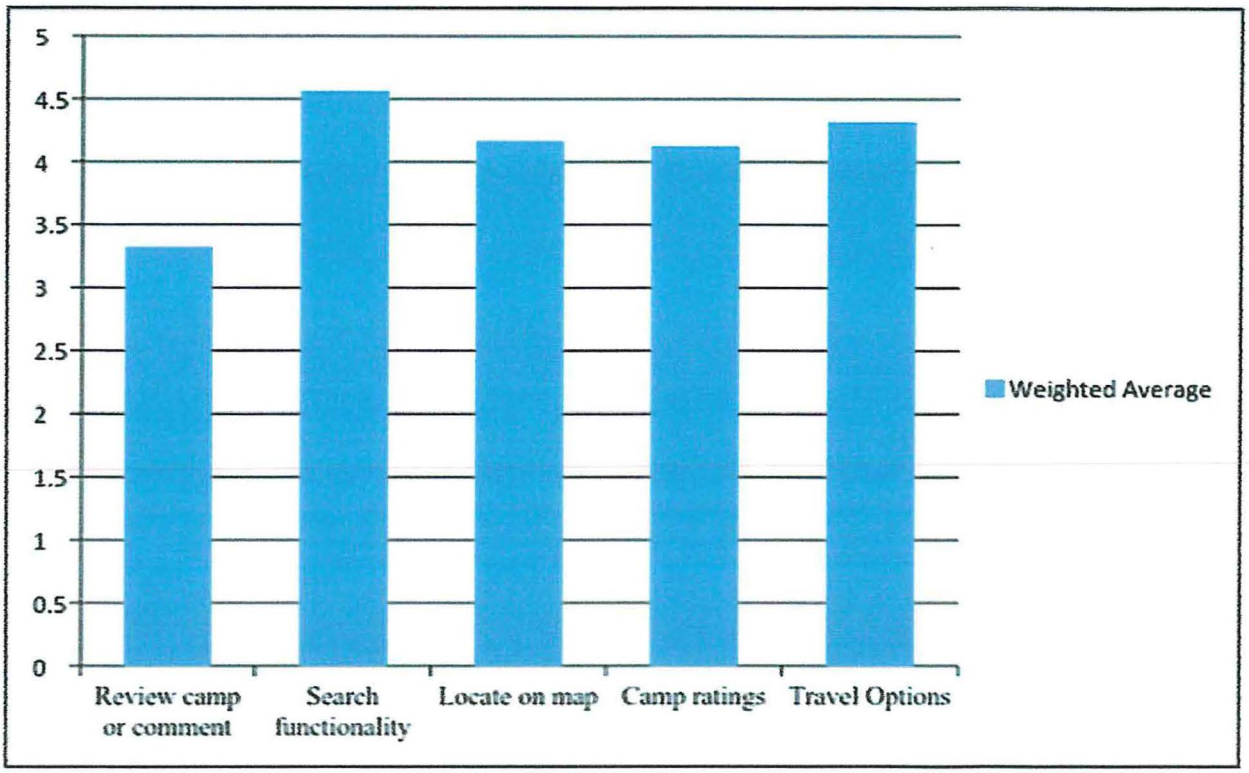

Figure 4.16: Average Weighted Mean of Applications Functionalities

Figure 4.16 shows the average weighted mean of user's assessment of the major applications functionalities. The functionality with highest score is the search campsite functionality with a score of 4.57 out of 5 followed by the travel options functionality with 4.32 score. The locate on map feature was rated 4.17 out of 5. The camp ratings feature scored 4.13 while the lowest score was scored by the review camp or comment functionality which received only a 3.33 score.

4.4.10 Usability of the Application

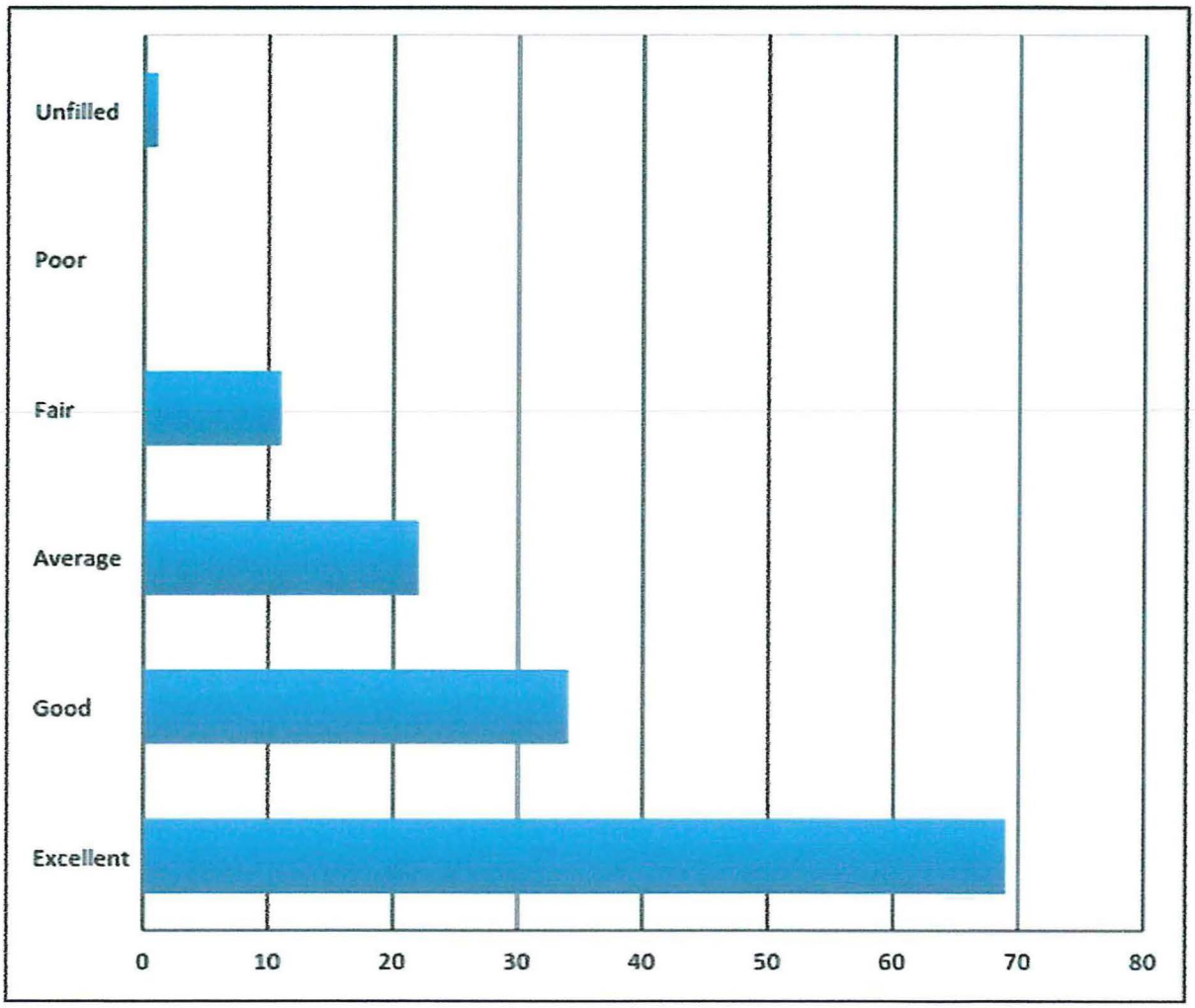

Figure 4.17: Usability of the Application

Figure 4.17 shows that 50% of the users representing 69 respondents rated the applications usability as excellent followed by 25% (34 respondents) who thought the application was generally good. 16% rated the application's usability as average i.e. 22 respondents while 8% representing 11 respondents rated the application as fair. Only 1 respondent did not respond to the questionnaire.

4.4.11 Ease of Location of a Campsite

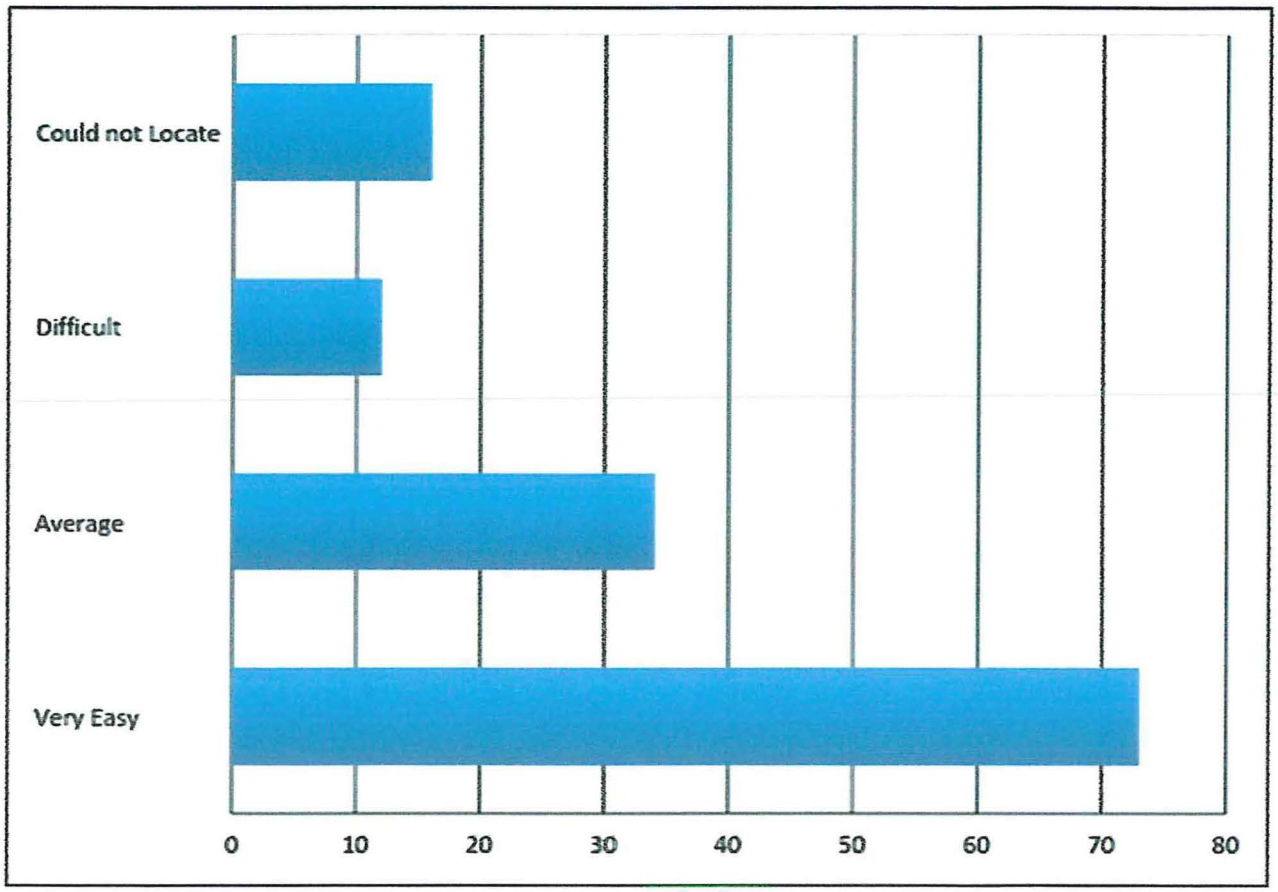

Figure 4.18: Ease of Location of a Campsite Using the Application

54% which represented 73 respondents felt that the application was very easy to use when locating camping sites while 25% rated the ease of camp location as average this represented 34 respondents. 9% of the respondents felt that the application was difficult to use while 12% (16 respondents) could not locate a camping site at all. The results are shown in **Figure 4.18.**

4.4.12 Overall User Satisfaction

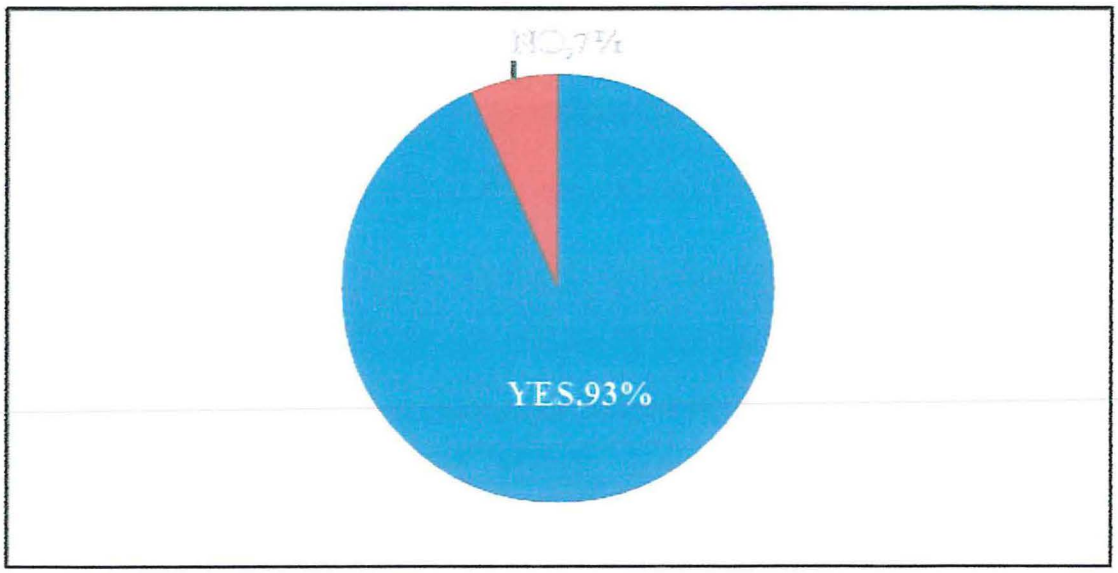

Figure 4.19: iCamp Kenya Overall User Satisfaction

Figure 4.19 shows that 93% of the users of the application were satisfied with the mobile application while only 7% were not satisfied with application. This shows whether users were generally satisfied with all the general aspects of the application from look and feel, navigability and core functionalities of the application.

4.5 Summary

The findings of the data collection in summary indicate that most of the respondents felt satisfied with the overall application. The respondents enjoyed using and interacting with the application and most of the functionalities of the application worked for them. It was also important to note that most respondents use references from friends before choosing a camping destination. An interesting finding in the results was that a large percentage of respondents had never used a mobile application for locating camping sites before. This was encouraging as it offers tremendous opportunities for the research to be realized into success in the real world owing to the rapid growth of mobile phone usage in Kenya.

Chapter 5: DISCUSSIONS

5.1 Introduction

Purposive sampling was used in this research targeting population of Vagabond Travels club members. The sample size was composed of 136 respondents. The sample age group was between 18 and 45 years old. Primary and secondary data collection tools were used in collecting data for user testing of the mobile application. Questionnaires and informal interviews were used to collect the primary data. The results of the findings were analyzed using Statistical package for Social sciences (SPSS) and Microsoft Excel.

5.2 Discussion on Personal Information

Most the respondents were between ages 20 and 30 years old representing 62% of the respondents. The age group 31 to 40 years old represented 19% of the respondents while below 20 years old and over 40 years old scored a low 12% and 7% respectively. This shows that most of respondents who took part in the study were the youth i.e. aged between 20 and 30 year and this are the group that is mostly involved in travelling and camping activities in the country followed by the age group 31 to 40 years old. This could be because these age groups are youthful and can also afford paying to travel around the country.

53% of the respondents were students while another 21% were employed. The number of respondents representing the self - employed users was 15% while the rest representing either the unemployed or voluntary respondents made up only 11% of the users. This was expected as Vagabond Travels club mainly targets the youth in all the universities Kenya and those who have finished their studies and are pursuing employment.

5.3 Discussion of Camping Ecosystem in Kenya

5.3.1 Challenges Faced when Searching for a Camping Site

45% of the respondents cited lack of adequate information on camping sites in Kenya while 36% indicated that lack of reliable information provided on social media websites was a major challenge when looking for a camp. 12% of the respondents indicated other challenges when searching for a camping site

in Kenya, this represented 17% of the results. 9 respondents representing 7% of the users did not answer this question.

Some of the comments by many of the respondents indicated that when looking for a camping site to visit they had to vigorously search for them on the Internet or ask their friends. Others stated that they could not trust some of the social media platforms such as advertised Facebook camping groups because they were fearful or heard someone had a bad experience before. This negative attitude of these respondents could because of the many fraudulent activities that take place in our social networks and the Internet in Kenya resulting in many of the respondents resulting in consulting a friend before making a decision. The rest had other varying reasons such as lack of a central repository of information where they could compare different camping sites in terms of prices, accommodation facilities in terms of tents available or cottages available for sleeping space and activities offered by the camping site. The respondents cited that while there might be a few websites that provided this information, none was consistent with frequently updated information or could verify if the information provided was true.

5.3.2 Current Ways Campers Find Information on Camping Sites

30% of the respondents were referred to a camping site by a friend who had already visited the camping site before or knew someone who had visited the camping site. 23% of the respondents used social media platforms such as Facebook travel and camping groups while 13% relied on e-commerce websites such as rupu and zetu that advertised for camping activities. A low number of respondents that is 14% used the camping sites own website to find information such as prices, activities on offer, contact information and directions to the camping site. 3% of the respondents used mobile applications to locate as they cited applications such as Camp Where to locate camping sites. Tour operators were used by 10% of users while 3% of users camping tour books. 3 respondents left the question unanswered.

It was interesting to note that the preferred way by most respondents was the referral by a friend or friend of a friend due to the trust factor. The results show that many Kenyans rely on references from friends as they felt they could trust each other more, this could be because of fear of the rise of fraudulent activities in the Internet and social media platforms in Kenya. The respondents could have seen the name of a good camping site on social media or the Internet but the primary way of finding the information or verifying the information was to ask a friend. Use of social media was not left behind in this question as it is primarily used by youth for interactions with each other. The rise of Facebook groups, liked and fan group pages has increased the number of businesses engaging in social media to get the attention of the youth. Most

respondents interviewed cited Vagabonds Travels and Travel Kenya as a major Facebook fan page used to get the best camping and other travelling destinations in Kenya. Many of the respondents could attest that the information provided on this platform was trustworthy as they had not had problems using the platform before.

The main problem with respondents who used e-commerce sites is that they advertise camping information only when there is an offer available furthermore the number of campsites that can afford to use these e-commerce websites to advertise their business ventures is very low. Another important finding was that a low number of respondents use the camping sites actual website to view information despite many of these camps having their own company websites, this could either mean that they do not know that these camp websites exist or poor marketing of their company websites by camping businesses. It is also important to note that a high number of camps in Kenya do not have their own company websites. Only 3% of the respondents had used a mobile application for locating camping sites before with the mention of American and European based applications such as iCamp USA, Campground and Alan Rogers Camping being mentioned. Other respondents had used camping applications before but they were primarily utility applications that helped them cook, enjoy games and generally ease their stay at the camp.

Tour operators and offices were used by only 14 users indicating that respondents still use this method to obtain camping information. A few users still used hard copy camping tour books but this only represented 4 users. This indicates that despite the rapid growth of mobile phone usage in Kenya there are some sectors or industries that are practically untouched and this offers tremendous opportunities for entrepreneurs.

5.3.3 Previous Usage of Camp Locating Mobile Applications

A resounding 94% of the respondents had never used any mobile applications for locating camping sites before, this means that a very small number of respondents i.e. 6% had used mobile applications that helped them to locate campsites and other destinations in Kenya. The applications used before include iCamp USA, Camp & RV and Camping Cookbook, Campground& Meal Planner. Most of these applications were utility applications that helped them in enjoy their stay at the camp. The features provided by these applications included food recipes and how to cook manuals; GPS location functionalities; how to tie knots; compass features and checklist functionalities. On the other hand, iCamp Kenya mobile application assists campers in planning their trip to the camp site, viewing different prices, activities on offer, arranging for transport and reviewing other camper's experience.

The low usage of mobile applications to locate camping sites is thought-provoking considering the increase in both domestic and international tourism numbers of the years combined with the rapid growth of mobile phone usage in Kenya. The few respondents who had used a mobile application to plan their trips before were mainly from foreign countries where more of these applications were very common. These results have both positive and negative implications. The negative effects of very poor usage are when new methods or applications such as the developed iCamp Kenya mobile application are introduced, there is very poor initial uptake as most potential users might be people who are resistant to change or stick to what has worked before for them. As discussed before many Kenyans prefer references from other friends for advice on the best places to camp due to their lack of trust of many of the platforms offering this information. The positive implication of the results is the immense opportunities for growth in this untapped market. Owing to the rapid increase of the smartphone population in Kenya and the increasing number of both domestic and international tourism, the future is very bright for the mobile applications that provide ease in finding important, elusive and reliable information on tourism activities such as camping in Kenya.

5.4 Discussion on Usability of the System

5.4.1 Difficulty in Using the Application

Only 13% of the respondents had difficulty using the application indicating that the application had a relatively easy to learn curve with users knowing where to go and how to get what they want without the need for guidance. The few that had problems indicated that comment boxes were out of shape, one respondent cited that after long usage of the application the regions list would not fully load. 1 respondent could not get the application to install on his phone. These problems could be attributed to phone memory running out in some of the lower end mobile devices due to the long usage periods. It was resolved that more tests would be carried out on different range of phones especially the Nokia range to remove all these system bugs. A resounding 87% had no difficulty when using the application which shows the application was largely successful.

5.4.2 Look and Feel of the Application

A large percentage of respondents representing 57% felt the overall look and feel of the application was excellent and well done while another 31% rated the application Good. 6% felt that the application was average while 3% rated the generally application as below average. Less than 1% of the respondents felt that the application was poor. 2 respondents did not answer the questionnaire. Most of the respondents loved the look and feel of the application especially the color scheme and the camp profiles coupled with the images of the camp sites. While the overall scores of the applications look and feel were high, it is important to note some of the comments of the users during the informal interviews. Some cited that the application was too dark brown and hence felt the application was too dark meaning they could not view some parts of the application. The brown scheme would be made a bit lighter to cater for those with poor vision or color blind.

5.4.3 Usability of the Application

In terms of usability of the system the research looked at navigability, aesthetics, consistency, responsiveness and ease of use of the application without difficulty. Half the number of respondents representing 50% rated the usability of the application as excellent while another 25% scored the applications usability as good. Only 8% of the respondents gave a rating of fair while none of the respondents gave a poor rating. Only 1 respondent did not answer the question. This shows that the respondents were highly satisfied with the application in terms of navigability and ease of use as they did not encounter any major problems and this indicated that the application had passed the usability tests. The home screen was well laid out offering easy shortcuts to all the applications major functionalities offering users a minimalistic feel. However, during the interviews conducted some respondents requested for help screens in some of the more detailed screens to assist them in understanding some of the functionalities. Another suggestion by 1 respondent was a home button when a user has accessed many subsequent screens from the home or main menu screen, this was to reduce the number of times the user had to press the back button so as to reach the home screen.

5.4.4 User Awareness of Application Status

This refers to whether the users of the application would know the status of the application at a particular point in time when using the application. The application should be able to alert the user on the

status of the application using notifications, error messages when incorrect actions have been performed and success messages when a certain task has been completed successfully by the user. An example is when a user rates a campsite more than once an error message tells the user that he has already submitted a camp rating.

A high number of respondents representing 79% of the users said that they were aware of what was going on when using the application. Only 7% of the respondents could not the application status and 14% of the users representing 19 respondents were not sure. Respondents who were not sure cited that sometimes when they could not distinguish the profile view of a camp profile when searched, when viewed as a favorite and when viewed normally. This might have a caused a small confusion between the 3. It was resolved to properly label the screens so as to provide a clear distinction between the 3 screens.

5.4.5 Overall User Satisfaction with the Application

An analysis of the findings indicated that 93% of the respondents representing 127 out 136 users were satisfied with the overall application while only 7% of the respondents representing 9 users indicated that they were not satisfied with the overall application. This indicates that iCamp Kenya was an overall success with over 90% of the users having being satisfied with the application and what it offers. The very few who were not satisfied mainly cited that they could not find their desired camp sites as the camps were not in the applications database.

5.4.6 Features to be Added or Removed from the Application

Features or functionalities that users recommended to be added or removed in the application was regarded as vital feedback as these might be incorporated into the application in the future versions. As discussed earlier some of the respondents requested to have a help information page in some of the more detailed screens containing several functionalities. An example of this is the camp profile screen in which a user can view the profile of a camp, view on map, get directions, rate camp and review camp. This would seem like a lot of information or buttons for a new user to take in hence the need for a help screen.

Another interesting feature requested by users is the ability to add a new camp that they have discovered to help in discovering new campsites and covering a wider range of camps in the country. This is a good idea but the problem lies in distinguishing between legitimate and correct information posted by

users and false information. It was decided that a similar feature may be considered in the future but users give a recommendation of a new camp. Afterwards the system administrator researches on these recommendations and only adds them when they are confirmed the legitimacy with the camp owners.

Users also requested for a comparison functionality that compares 2 camp sites against each other in terms of prices, accommodation space, camp ratings and other features. This was considered a good recommendation as it helped other campers in deciding quickly and reduces navigation to and from screens when making comparisons. Users also requested for a home button to provide a quick shortcut to the home screen and ease navigation to and from the main menu. None of the users requested for any functionality to be removed.

5.5 Discussion on Efficiency of the System

5.5.1 Ease of Locating a Camping Site using the Application

One of the core functionalities of the application was ability to locate a camping site. Locating a camp as earlier discussed could refer to either location by regions of the country example Maasai Mara, Naivasha or Samburu areas; locating a camp by searching through the database of camping sites or locating camping sites by Map view using Google Maps. Over 50% of the respondents could locate their desired camping sites with ease using the application. 25% of the respondents rated the ease of location of a camping site as average. Only 9% and 12% found it either difficult or could not completely locate the camp site they wanted respectively. These few respondents who could not locate their desired camps mainly cited that the application had not stored their camps. The camps that were not in the applications database were remote or unknown. Due to the high number of camping sites in Kenya, the initial plan of the research project was to first collect data and information on known camps that many Kenyans frequently travel to and then spread out to other areas of the country.

5.5.2 Users Satisfaction with Major Functionalities of the Application

The findings of user's satisfaction with major functionalities of the application showed very high ratings of 4.1 and above out of 5 for the search functionality, locate camp on map feature, travel options and rate campsites or favorites list. The review campsites or post comments received an average score of 3.33 out of 5 points.

The user testing shows that the highest rated functionality (4.57 out of 5) was the search functionality which worked very well without any problems displaying results of the searched key words in a quick and efficient manner. The Locate on map feature which scored a 4.17 was also a success however those with a fast Internet connection could load their Google Maps quicker than those with a slow connection. The rate campsites functionality which worked together with the Favorites list was also received a high score from user i.e. 4.13 out of 5. When users rate the camps, they have visited, the top 10 highly rated camps or favorites list is also updated immediately showing the best camps according to user ratings. Other users of the application could therefore make a choice based on the best camps. The comment feature received an average rating of 3.33 out of 5 as some of the text boxes that displayed user's comments could sometimes lose their rectangular shape. This was to be rectified on the next release of the application. The travel options also passed the user testing with 4.32 out of 5 as users easily accessed the desired travel options of air transport or tours and travel agencies with convenience. In general users were generally satisfied with the functionalities or features of iCamp Kenya application.

5.6 Summary

The results of the findings revealed several key aspects. The most important finding was the overall satisfaction of the application which indicated that most of the respondents were satisfied with what the application had to offer. From the findings, Kenyan campers lack a suitable platform where they can locate a desired camp; get camping information easily; get complementary information such as travelling information, ratings and camp reviews. The findings of the user testing indicate that users were relatively satisfied with most of the applications functionalities.

The results show that only 13% of the respondents had difficulty with the application, this indicates that the application had a relatively easy to learn curve with users knowing where to go and how to get what they want without the need for guidance. Looking deeper into the findings of the research, when users were asked to rate the overall look and feel of the application, the application once again passed the test showing that users were satisfied with overall color schemes, design layouts, font types and design elements such as buttons, text boxes and text fields. Users were also satisfied with ease of use of the application when looking for a camp site i.e. ability to search key words, locate via Google Maps and search by geographical region. The navigability of the application was also a key factor contributing towards the success of the application. Users could easily use the application to find what they needed, navigate from one screen to the other without getting lost or confused and the application was consistent in terms of layout, aesthetics and feel.

Despite these positive results it was important to note user feedback in the findings, this includes addition of more features such as home button, more camps and help screens which made the application better. User's feedback on the some of the color schemes of the graphical user interface being too dark for those with visibility problems was also an important finding of the research.

In summary, the main advantages of the application are:

i. **Easy look up of camps on offer in Kenya:** Campers can easily look for a camp through regional categories of Kenya, they can also locate camps through use of either Google Maps and through searching for the camp using the camp name or key words in case the camper forgets the correct name.

ii. **Trusted crowd sourcing capabilities:** the ability of campers to review other campsites by posting feedback and their reviews or read reviews of other camps before making a decision will most campers in making a more informed decision before embarking on a trip.

iii. **Easy decision making process for campers:** campers also can rate camps from their own experiences and view favorites list showing the highest rated camps enabling them to make better decisions based on this information;

iv. **Abundance of important camping information:** the information provided by the application will prove to be invaluable to campers. Campers can easily access information on the best campsites in Kenya, the most reliable transport options to and from the camp, contact information of each camp which includes, ratings, reviews, camping tips, accommodation prices and information for foreigners such as what to encounter in terms of culture when travelling in the country. This provides the camper with an "all in under one roof" feel where users get everything they require for their trip before embarking on the camping journey to the desired destination.

The limitations of the application are the few number of camping sites available compared to the total number of camping sites available in Kenya and currently only users with java enabled phones will be able to access the application for use.

Chapter 6: CONCLUSIONS

6.1 Conclusions

Over the years tourism has been one of the key contributors to the GDP of Kenya. While Kenya mainly focuses on beach and wildlife tourism other key areas such as culture and local travelling activities are ignored. The problem lays in the lack of adequate information and suitable means of easily locating camping sites and activities by tourists in Kenya hence a slow uptake. It is therefore important to expose these excluded aspects of local tourism to both our domestic and international tourists in order to even contribute more to the national income of the country and grow the economy.

There has been an aggressive adoption of the mobile platform in tourism as a means to provide services such as advertising, booking and information provision to customers. This is seen especially when tourists are planning their trips, the normal life cycle of a tourist is normally dreaming, researching, booking, experiencing and sharing their experiences afterwards. The potential for innovation especially for this research project of location of camping sites in Kenya was immense especially in the early stages of dreaming, researching (looking or searching for a camping site) and sharing their experiences.

Mobile location based services in the world have been used in various categories of life with great success. Categories such as navigation, nearby location checking and maps have been instrumental to the success of this research. In Kenya finding camping sites and tourist activities to do proves to be a tedious task for both domestic and international tourists. Before this research what was lacking was a localized application tailor made to suit Kenyan campers' unique needs. The applications that were present in the market were not suited for the Kenyan camper as they lacked complementary information needed by a local camper such as how to get to the camp and available means of transport, what to carry or wear to the trip, the local culture to be encountered and local fees to be paid at these remote campsites/parks. The research therefore embarked on solving these problems by providing campers with a suitable camping application for both domestic and foreign tourists travelling in the country.

The solution was a mobile application called iCamp Kenya. The main functionalities of the application that were considered are locating a campsite and providing important camping information needed by a camper when planning for a trip. The application passed most of the usability and functionality tests indicating that it is ready to be launched in the market. It was also noted from the research findings that the major challenges faced by Kenyan campers when looking for a camping site in Kenya are lack of adequate camping information and poor reliability of existing platforms. References from friends and social

media platforms are the key methods campers in Kenya use when searching for information of a camping site in Kenya. Surprisingly technological platforms such as camping applications and camping company websites are almost non-existent or rarely used in this generation where smartphone usage is rapidly growing in all age groups in Kenya. Therefore, the potential for success and growth for the research project is very high.

6.2 Recommendations

From the research findings, the following recommendations were made:

i. More campsites should be added to the applications database of camps to provide users with more options. The research should expand to all the counties of Kenya to ensure at least each 5 camps in every county are represented. This enables users to have a wider variety of options.

ii. Based on user feedback it was recommended that new application functionalities and features should be added to make the application better. This include comparison feature to compare different campsites packages, help information screens for detailed screens and a home button to enable users to navigate to the home screen quicker and easily.

iii. More local tours and travel agencies and air travel companies will be incorporated into the application to give campers more options.

iv. The application should start generating revenue by incorporating a business model such as charging camp owners, tours agencies and local airlines to advertise their services on the application. The business owners would be subjected to a monthly subscription fee. This would turn the application into a revenue generating business.

6.3 Suggestions for Future Research

The future goal of the application is to eventually increase usage by both domestic and international tourists from the East African region to our main international tourists from regions such as the Europe and the Americas region. It is also important for the application to be developed on multiple mobile OS platforms such as Android, Windows, iOS and Blackberry to increase its market share, increase number of users or customers thereby increasing revenues. The application should also be widely advertised to achieve the same goal. The application should also not only deal with domestic tourism (Kenyan citizens) but can also expand its scope to deal with international tourists who frequently visit the country. The research can

also venture into other forms of tourism such by focusing on the culture of Kenya, the hotel industry, our beautiful scenery and other neglected sectors of tourism in Kenya.

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APPENDICES

Appendix A: User Testing Questionnaire

The researcher is conducting research in the use of mobile applications to aid campers in finding camping sites in Kenya and providing them with the necessary camping information. Please answer the questions correctly and truthfully.

SECTION A: PERSONAL PROFILE

(Please Tick √ where appropriate)

1. Name (optional) _____
2. What is your age:

1	Below 20yrs	[ ]
2	20 – 30yrs.	[ ]
3	31 – 40yrs.	[ ]
4	Over 40yrs	[ ]

3. What is your occupation:

1	Student	[ ]
2	Employed	[ ]
3	Self – Employed	[ ]
4	Other _____	[ ]

SECTION B: CAMPING ECOSYSTEM INFORMATION

(You can choose more than 1 option.)

4. What challenges do you face when searching for a suitable camping site to visit in Kenya?

1	Lack of adequate information on camping sites	[ ]
2	Lack of reliable information provided in social media /e-commerce platforms	[ ]

3	If other, please specify _____ _____ _____	[ ]

5. How do you normally find information on camping sites before planning your trip?

1	E-commerce Website e.g. rupu, zetu	[ ]
2	Reference from a Friend	[ ]
3	Camp Locating Mobile application`	[ ]
4	Social Media Platform	[ ]
5	Camps Actual Website	[ ]
6	Camping Tour Book (Hard copy)	[ ]
7	Tour Operators and Offices	[ ]

6. Have you ever used a camp locating mobile application before?

   a. YES [ ]

   b. NO [ ]

   If yes please specify which one

   _____

SECTION C: USABILITY TESTING

(Please Tick √ where appropriate)

7. Did you have any problems when using the application?

   a. YES [ ]

   b. NO [ ]

   If yes please specify

_____

_____

8. How would you rate **look and feel** of the application?

1	Excellent	[ ]
2	Good	[ ]
3	Average	[ ]
4	Below average	[ ]
5	Poor (Please give reason) _____ _____ _ _____ _	[ ]

9. How would you rate the **usability** of the application (Was the application easy to use or navigate from one screen to the other)?

1	Excellent	[ ]
2	Good	[ ]
3	Moderate	[ ]
4	Below average	[ ]
5	Poor (Please give reason) _____ _____ _ _____ _	[ ]

10. Is it easy to accomplish application tasks?

    a. YES [ ]

    b. NO [ ]

If no please specify which one

_____

_____

_____

11. Please rate your **satisfaction** with the following functionalities in the application appropriately

	Statement	**1 Poor**	**2 Fair**	**3 Good**	**4 Very Good**	**5 Excellent**
1	Comment/Review camps					
2	Rate campsites					
3	Locate camp on Map					
4	Search camp					
5	Travel Options					

12. How would you rate the **efficiency** in locating camping sites? (How easy was it to locate your favourite camping site?)

1	Very Easy	[ ]
2	Average	[ ]
3	Difficult	[ ]
4	Could not Locate If option (d) why? _____ _____ _ _____ _	[ ]

13. Were you satisfied with the application?

    a. YES [ ]

    b. NO [ ]

14. Which other feature would you like to be added or removed from the application?

_____

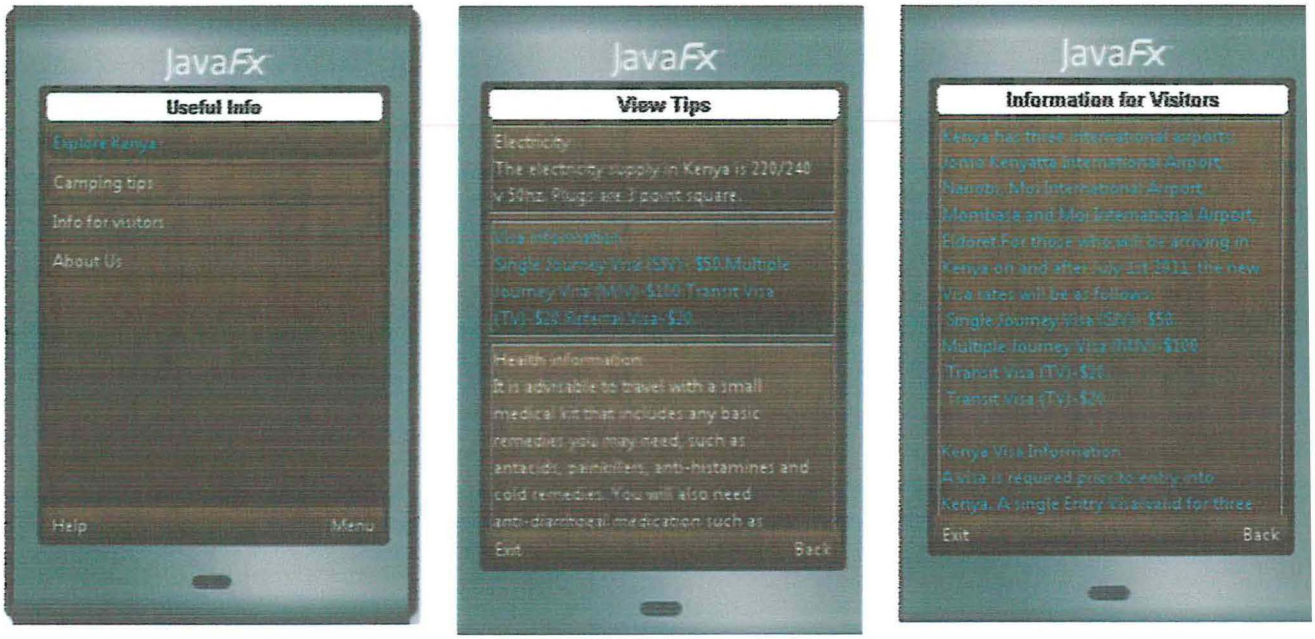
_____

_____

_____

Thank you for your participation!

Screen shows useful information for the typical camper i.e. a listing of tourist destinations in Kenya where a camper can obtain information about other tourist attractions apart from camping sites such as museums; useful camping tips for campers such as what to carry to camping locations, cultures to be encountered, visa information, electricity and power supply in Kenya, health information; information for foreign visitors such as parking fees and language barriers; and about the application. This functionality is an information hub for campers and provides summarized set of camping information for users of the application. **Figure B.1** shows useful information screens.

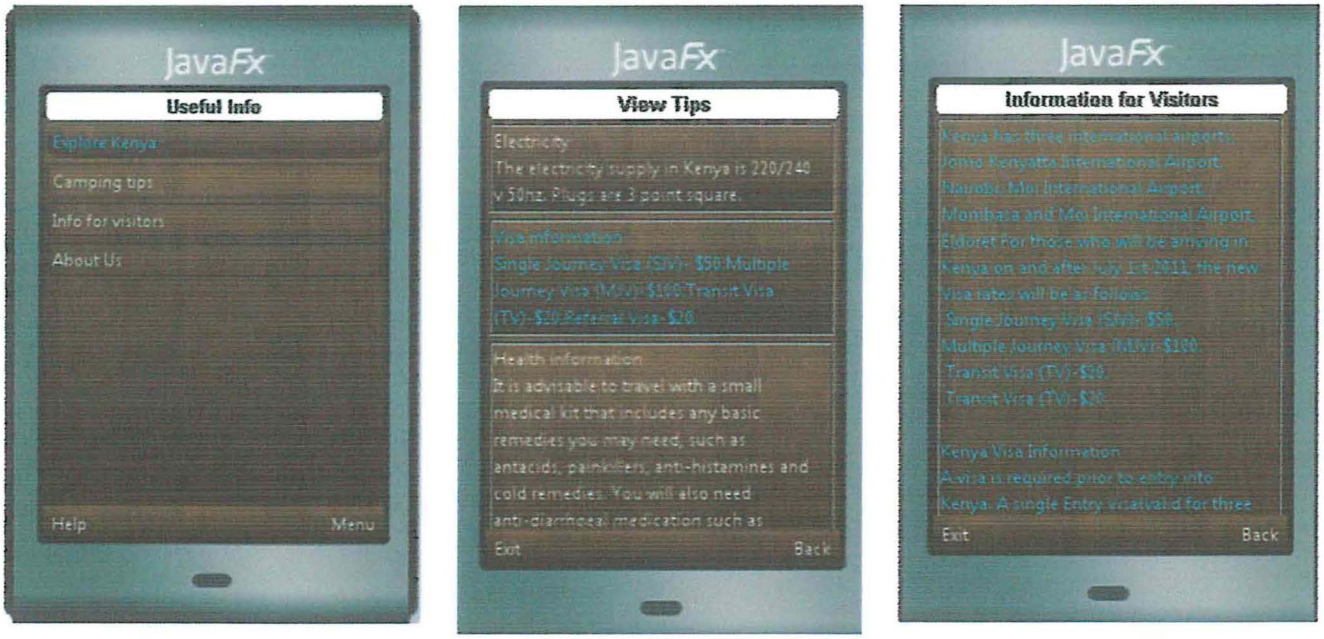


Appendix B.1: Useful Information Screens

Appendix B: iCamp Kenya Application Screenshots

Useful Information

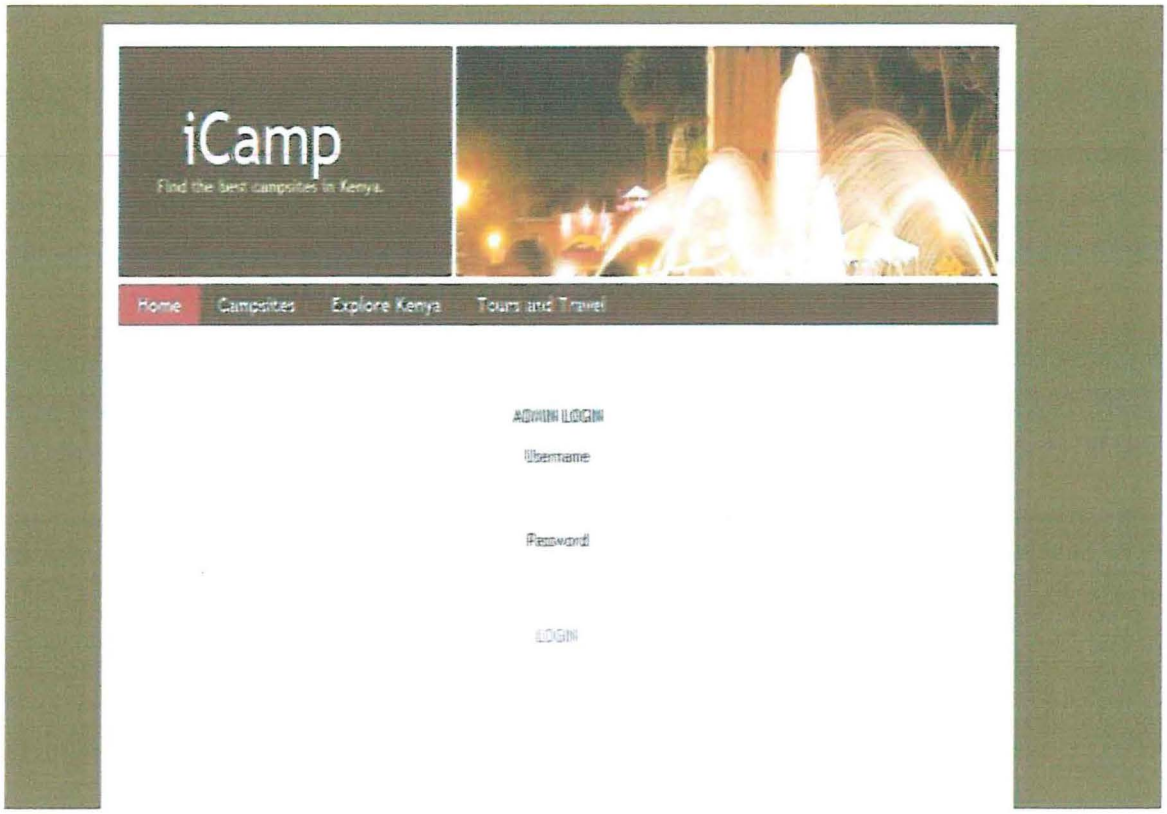
Screen shows useful information for the typical camper i.e. a listing of tourist destinations in Kenya where a camper can obtain information about other tourist attractions apart from camping sites such as museums; useful camping tips for campers such as what to carry to camping locations, cultures to be encountered, visa information, electricity and power supply in Kenya, health information; information for foreign visitors such as parking fees and language barriers; and about the application. This functionality is an information hub for campers and provides summarized set of camping information for users of the application. **Figure B.1** shows useful information screens.



Appendix B.1: Useful Information Screens

The Login Page

This is the first page that will appear when the user or system administrator loads the backend website. It will be used by the system administrator to manage the iCamp Kenya mobile application. The user provides his or her username and password before gaining access to the website as show in **Appendix B.3.**



Appendix B.3: Login Page (Index)

Appendix C: Development Environment

Software Resources

Appendix C.1 shows the software requirements needed to complete the project:

SOFTWARE	USE
NetBeans IDE 6.8	Programming and testing.
JDK 6 (Version 1.6.3)	Program development environment for writing Java based applications.
Pencil Tool	Used to design User interface of the application.
WampServer MySQL	Establishment of database.
Adobe Dreamweaver 8	Design and development of backend website.
SPSS 12.0 and MS Excel	Data analysis and charts.
Mozilla Firefox web browser	Test web pages.
MS Office Word (2010)	Documentation.
MS Visio (2007)	UML diagrams and Gantt chart.
Sun Java Wireless Toolkit-2.5.2_01-win	Mobile emulator.

Appendix C. 1: Software Resources

Hardware Resources

Table D.2 shows the hardware requirements needed to complete the project:

HARDWARE	USE
Core2Duo Laptop, HDD 250GB, Processor 2.0 Ghz	Programming, documentation and running the mobile emulator.
Nokia 2730 or Blackberry Bold 9000	Java enabled device for testing the application

Appendix C. 2: Software Resources