

# Role of Smartphones on Improving Quality of Life

T.Dinesh<sup>1\*</sup> and D.Saraniya<sup>1</sup>

<sup>1</sup>Eastern University

\*Corresponding Author: [tdevaranjan@yahoo.co.uk](mailto:tdevaranjan@yahoo.co.uk)

**Abstract**— The number of users using smartphone is increasing dramatically in global scenario and several M-Commerce applications have been introduced in global level. Among several M-Commerce applications, location-based service (LBS) and Quick Response (QR) Code System are two new concepts which are being introduced and developed in several countries to increase the quality of life of people. The aim of this study was to identify the role of smartphone on improving the quality of life of working crowd in Batticaloa and Colombo districts. A total of 100 workers in several industries were surveyed regarding the usage of smartphone in some circumstances and to access location-based service, and QR code system. Data collected after the survey were analyzed using excel tools, and then percentage analysis was done to find the role of smartphones on improving the quality of life. The results of this study revealed that the role of smartphone on improving quality of life is in low level with respect to location-based service and QR code system usage. However, there are some circumstances through which organizations can create the awareness on these two M-Commerce tools.

**Keywords**— *Location-based service, M-Commerce, QR code system, Smartphone*

## I. INTRODUCTION

In the 21st century, smart phones have made lots of enormous changes. These changes have delivered many benefits to the people who are interested in technological advancement. Using technology is one of the best method to make things easier. According to Sarwar and Soomro [8], smart phones are performing important role in communication and reaching extensive range of applications. In contemporary world, human beings have been forced to face many challenges to live their life easier than ever. And, technology is an influential factor to contribute the people's quality of life. Life turns into modernized and flexible with convenient facilities to be associated with people and resources at any time. The approach of communication is exposed over numerous techniques permitting people to appreciate and create greatest usage of advancements. Similarly, people acquire superior exposure to their lifestyles when they use smart phones with various applications and accessories. People in all sectors use smart phones on a routine basis.

## II. PROBLEM STATEMENT

Among the different usages of smartphones, location based service and QR code system are becoming well known as mobile commerce elements in global scenario. Several global organizations have launched their virtual stores with the help of QR code system and have developed mobile apps to work with

customers' real time locations. However, the prevalence of such applications and QR code usages in Sri Lanka is in question. Little consideration has been given to this concept by the researchers in Sri Lanka though it exerts major role in developing quality of life. Thus, there exists a clear empirical gap with respect of the role of Smartphone on improving quality of life. This empirical gap becomes a problem to Smartphone Industry to know whether their service is successful or not among the customers. Indeed, there is a need to evaluate to what extent the stimuli influenced on society. Therefore, the specific research question of this study is, "What is the role of smartphone on improving quality of life?"

## III. RESEARCH OBJECTIVES

The primary objective of this study is to examine the role of Smartphones on improving quality of life in Batticaloa district and Colombo district. Further, this study also aims to achieve the following as the secondary objectives.

- Identifying the level of awareness on Location based service (LBS).
- Identifying the level of awareness on QR code system usage.
- Identifying the level of Usage of Smartphone.

## IV. LITERATURE REVIEW

### A. Smartphones

A smart phone is a mobile phone that comprises facilities of a personal computer operations system and additional features with an advanced mobile operating system that offers value for mobile and handheld users, as in Andrew [2]. Sarwar and Soomro [8] indicate how smart phones modify the social and cultural life style and what the impacts of smart phones on competitive society are. It illustrates that more than 55% of teens believed that they are extremely habituated to the smart phone and use it for socializing than adults. It contains the key areas of human life; some of them are business, education, health, and social life on which smartphone impacts. The study confirms that it makes variation in the cultural behaviour of an individual by its positive and harmful effects. There are numerous benefits which can be resulted from a smartphone; some of them are calls, email, calendar, maps, social networking, web browsing, texting, podcasting, recording, camera, news, weather, chatting, playing games, reading books, mobile commerce activities, etc. According to mobile commerce activities, there are some products and services

available; Mobile money transfer, Mobile ATM, Mobile ticketing, Mobile vouchers, coupons and loyalty cards, Content purchase and delivery, Location-based services, QR code system applications, Information services, Mobile Banking, Mobile brokerage, Auctions, Mobile browsing, Mobile purchase, In-application mobile phone payments, and Mobile marketing and advertising, as in Tiwari, Buse, and Herstatt [13].

#### B. Location-Based Service (LBS)

Location-based services (LBS) use location data to regulate the unique features that is one of the common classes of computer program-level services. As such LBS is most popular information service that has several uses in social networking currently as an entertainment service, which is reachable with mobile devices over the mobile network and that consumes information on the geographical position of the mobile device. This has converted to significant with the extension of the smartphone and tablet markets as well, as in Shu Wang, Jungwon Min and Byung [10]. LBS consist of services to recognize a location of a person or object, such as discovering the nearest banking cash machine (ATM) or the whereabouts of a friend or employee. LBS contain parcel tracking and vehicle tracking services. LBS can include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location. They comprise personalized weather services and even location-based games.

#### C. Quick Response (QR) Code System

QR code (abbreviated from Quick Response Code) is a machine-readable visual label that includes information about the element to which it is attached. A QR code practices four identical encoding methods (numeric, alphanumeric, byte/binary, and kanji) to efficiently store data; extensions may also be used as in QR code [1]. The QR Code method converted to popular outside the automotive industry due to its fast readability and larger storage ability compared to standard UPC barcodes as in QR code [1].

There are many numerous benefits of QR codes. QR codes have turned into mutual in consumer promotions. Classically, a smartphone is used as a QR code scanner, showing the code and transforming it to certain valuable formula (such as a standard URL for a website, thereby avoiding the necessity of a user to type it into a web browser). QR code has become an emphasis of promotional tactic, since it offers a technique to reach a brand's website more speedily than by manually entering a URL as in [11]. The use of QR codes for "virtual store" arrangements started in South Korea as in [12], and Argentina as in [5] but is presently growing globally as in [4]. Walmart, Procter & Gamble and Woolworths have already implemented the Virtual Store model as in [14]. During the month of June 2011, according to one study, 14 million mobile users scanned a QR code or a barcode. Some 58% of those users scanned a QR or barcode from their homes, while 39% scanned from retail stores. QR codes can be used to store bank account information or credit card information, or they can be precisely designed to work with specific payment provider applications.

There are some trial applications of QR code payments across the world as in [6], [9].

In November 2012, QR code payments were installed on a larger scale in the Czech Republic when an open design for payment information exchange - a Short Payment Descriptor - was introduced and endorsed by the Czech Banking Association as the official local solution for QR payments as in [3].

#### D. Quality of Life (QOL)

Quality of life (QOL) is the common well-being of individuals and societies. QOL has an extensive variety of perspectives, including the fields of international development, healthcare, politics and employment in [15]. This paper investigates the extent to which smartphones contribute to quality of life through international development.

### V. METHODOLOGY

Primary data are collected through well-structured and administered questionnaires with closed statements and distributed to the working people in Batticaloa and Colombo districts through social networks for data collection as primary source. 100 workers from all levels have been surveyed for the purpose of data collection. The data was collected based on convenience methodology. The data collected were analyzed through percentages and frequencies and the data were presented in table formats, pie charts and bar charts which were obtained using Excel. The study was conducted during October 2015 to December 2015.

### VI. RESULTS AND DISCUSSION

According to Fig. 1, 86 per cent of workers own smartphones while 14 per cent of the workers do not own a smartphone. Therefore the improvement of the quality of life of those 14 per cent through using smartphones is in questions unless they all are motivated and encouraged to buy a smartphone.

According to Fig.2, among the 86 workers who own smartphones, majority of the workers (53 workers) do not access location based service (LBS) through their smartphones. Only 33 workers access this service. And among the 33 workers who access LBS, majority (24 workers) is from Colombo district. Further, among the 53 workers who do not access LBS, majority (41 workers) is from Batticaloa district.

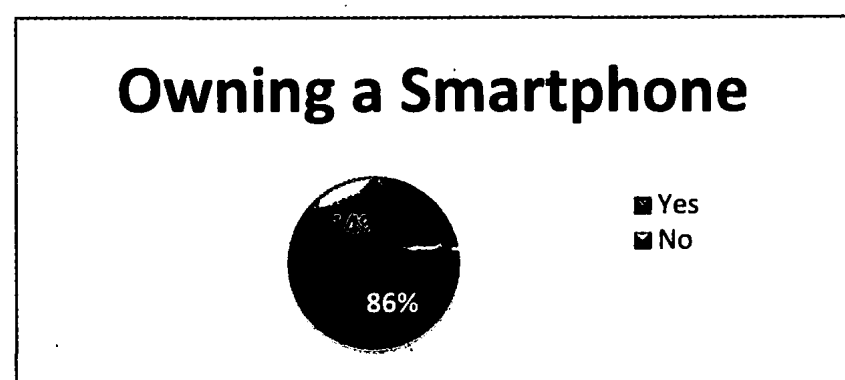


Fig. 1. Possession of Smartphone

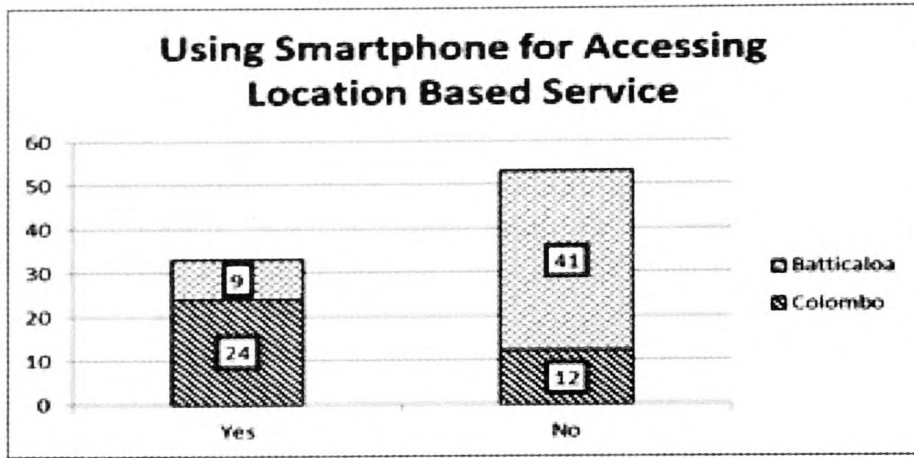


Fig. 2. Usage Level of Location Based Service

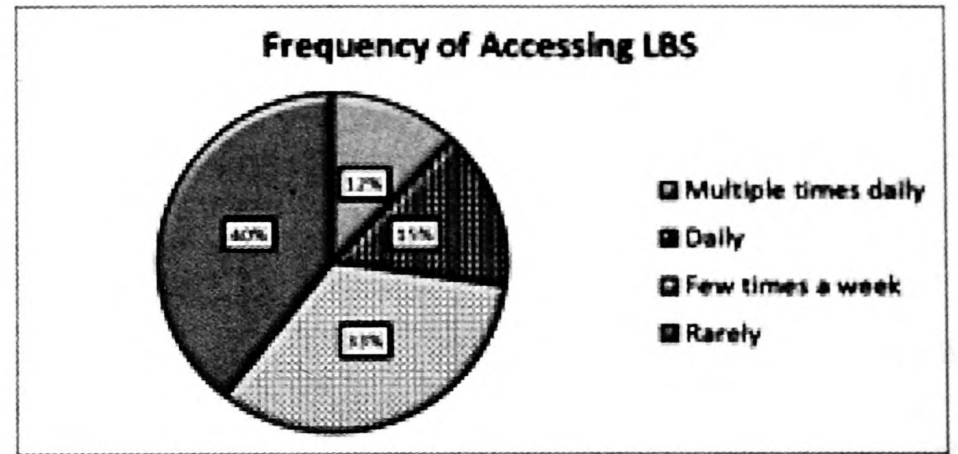


Fig. 4. Frequency of Accessing LBS

According to Fig.3, the main reason for not accessing LBS is that the workers are not interested to access, as 51% of the workers who do not access LBS have said this statement. 36% of the workers who do not access LBS are unaware of LBS while 4 workers have mentioned that there are few LBSs in Sri Lanka and 3 workers have mentioned that these LBSs are not user friendly.

The following table (Table I) shows how workers in Colombo and Batticaloa districts are using Location-based Services.

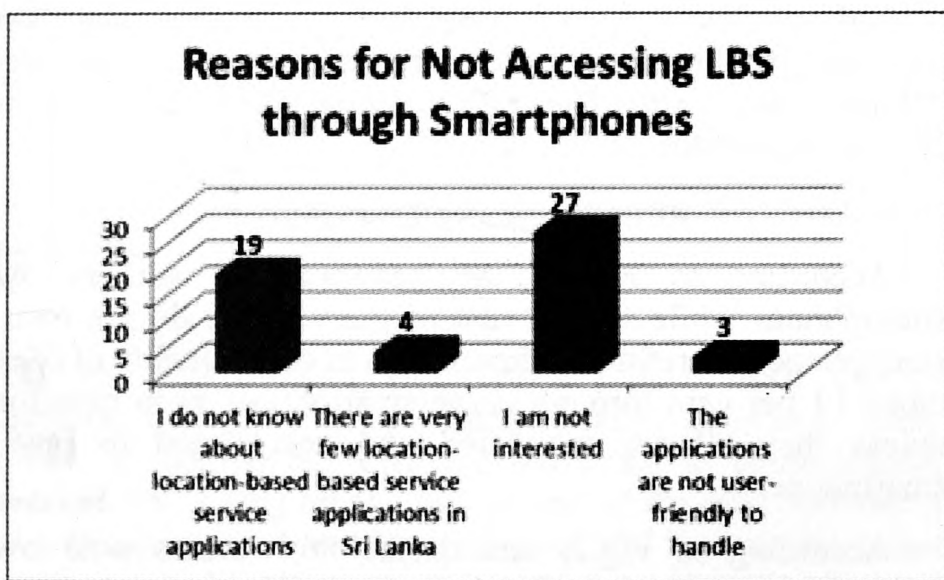


Fig. 3. Reason for Not Accessing LBS

TABLE I. POSSIBLE USES OF LBSS IN SRI LANKA

Mobile Application	Uses
Google Map	To get the directions
Not mentioned	To find nearby shopping centers
Foursquare	To find out users' feedback about a place
Dialog DApp	To get information about offers and discounts
Pickme.lk	Cab service to travel
Viber	To post locations
Banjo	Discover social media posts posted near to my place. Use it to find nearest Twitter / Instagram users to send direct sales offers.
TouHotel	Searching hotels/restaurant p&s.
Aroundme	To find out city special places and restaurants
Not mentioned	Pointing dress points.
Yamu	Location service for hotels and restaurants
Zomato	Location service for hotels and restaurants

Even though there are some workers who use smartphones to access location-based service, the frequency of use was analysed to check whether they use the service frequently or not. According to Fig. 4, 40% of the workers access LBS rarely, while 33% of the workers access few times a week. Frequent usage of LBS is tackled by only the balance 27% of the workers.

The next important emphasis after location-based service is given on the usage level of QR code system. Fig. 5 depicts the usage level of QR code system. According to Fig. 5, among the 86 workers who own smartphones, majority of the workers (64 workers) do not use QR Code system through their smartphones. Only 22 workers use this system. There is no much difference on the use of QR Code system between the workers in Colombo district and Batticaloa District. However, there is a huge difference shown in not using QR Code system between two mentioned districts. Among the 64 workers who do not use QR Code system, majority (41 workers) is from Batticaloa district.

The reason for not using QR code system was analysed and it is depicted in Fig. 6. 12 workers did not give answers as to why they are not using QR code system. According to figure 6, the main reason for not using QR Code System is that the workers are not aware of it, as 46% of the workers who do not use QR Code System have said this statement. 31% of the workers who do not use QR Code System are not interested to use it while 9 workers have mentioned that they did not face such situations to use QR Code System.

22 workers stated that they are using QR code system and thus, the purpose of using QR code system was questioned and the responses are as follows:

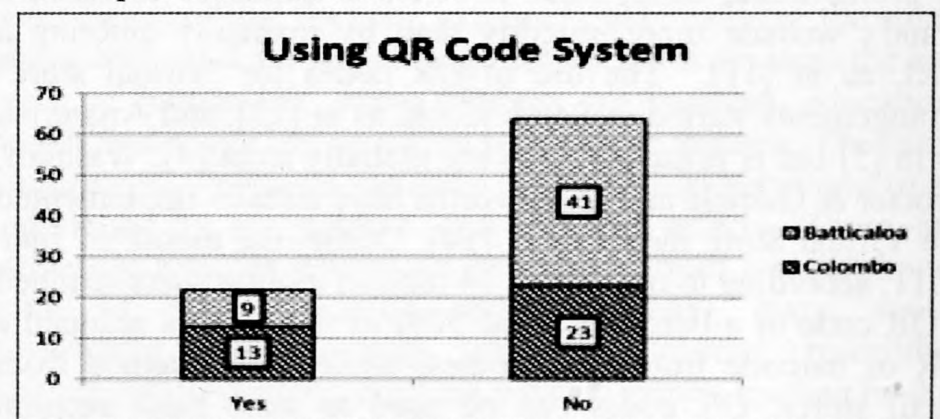


Fig. 5. Using QR Code System

- For sharing information in Superbeam
- To add friends in Viber
- Add people to WeChat App
- For reading visiting cards of VIPs
- To get the mobile website from PC
- To add Contact Cards
- To approve Identity and Login
- To get product information through online

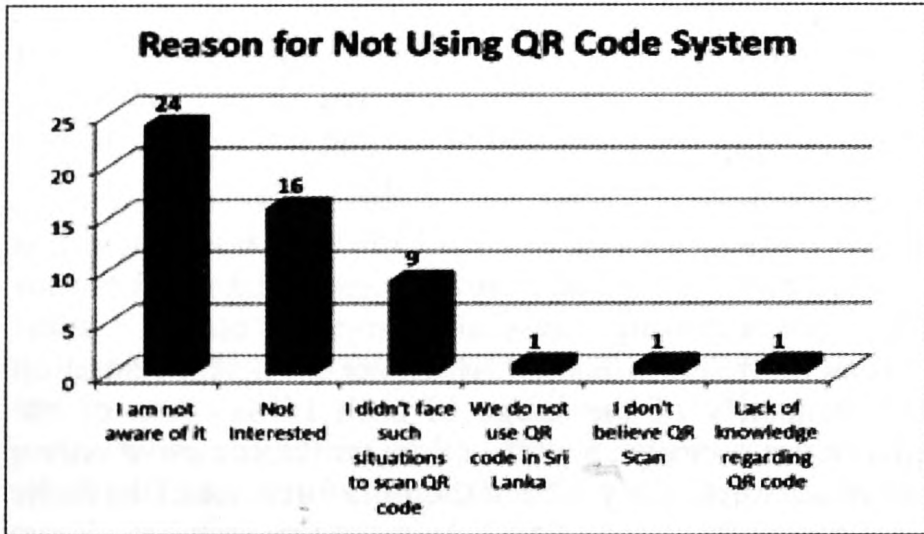


Fig. 6. Reason for Not Using QR Code System

In addition to the above analyses, usage level of smartphones in some circumstances were analyzed to see whether there are any implications from those usage levels. According to Fig. 7, from 86 respondents 19% of users use smart phone multiple times daily, 37% of users use smart phone daily, 15% of users use smart phone few times a week, 6% of users use smart phone weekly, 12% of users use smart phone rarely and 12% of users never use smart phone during commercials while watching TV. Within these, majority of workers use smart phone daily during commercials while watching TV.

According to Fig. 8, from 86 respondents 48% of users use smart phone multiple times daily, 26% of users use smart phone daily, 8% of users use smart phone few times a week, 12% of users use smart phone rarely and 7% of users never use smart phone during idle time at work. Within these, majority of workers use smart phone multiple times daily during idle time at work.

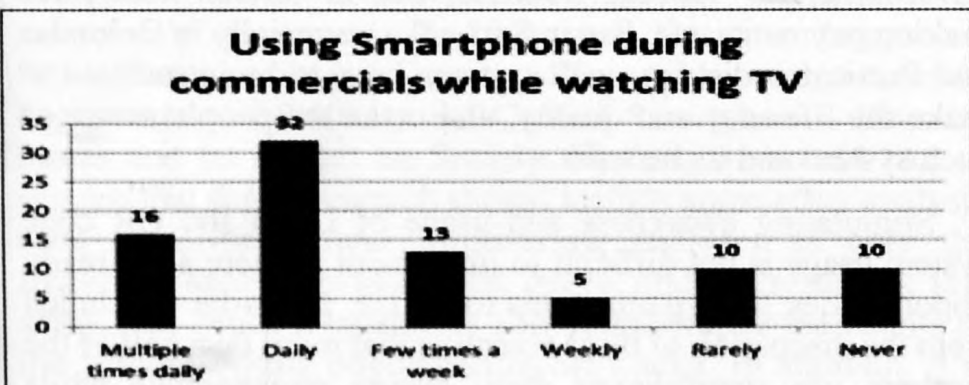


Fig. 7. Using Smartphone during commercials while watching TV

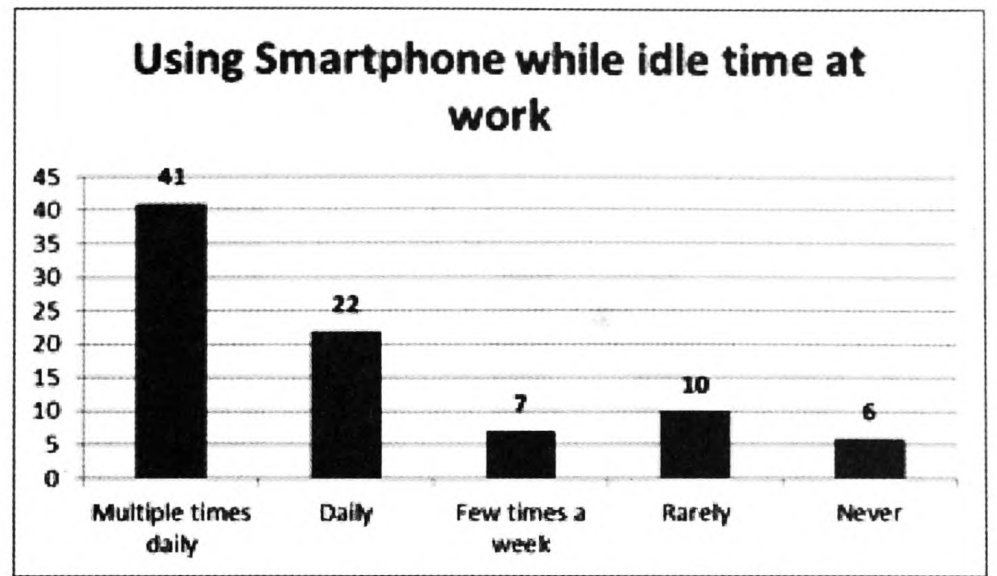


Fig. 8. Using Smartphone while idle time at work

According to Fig. 9, from 86 respondents 19% of users use smart phone multiple times daily, 12% of users use smart phone daily, 35% of users use smart phone few times a week, 3% of users use smart phone weekly, 22% of users use smart phone rarely and 9% of users never use smart phone while waiting in line. Within these, majority of workers use smart phone few times a week while waiting in line.

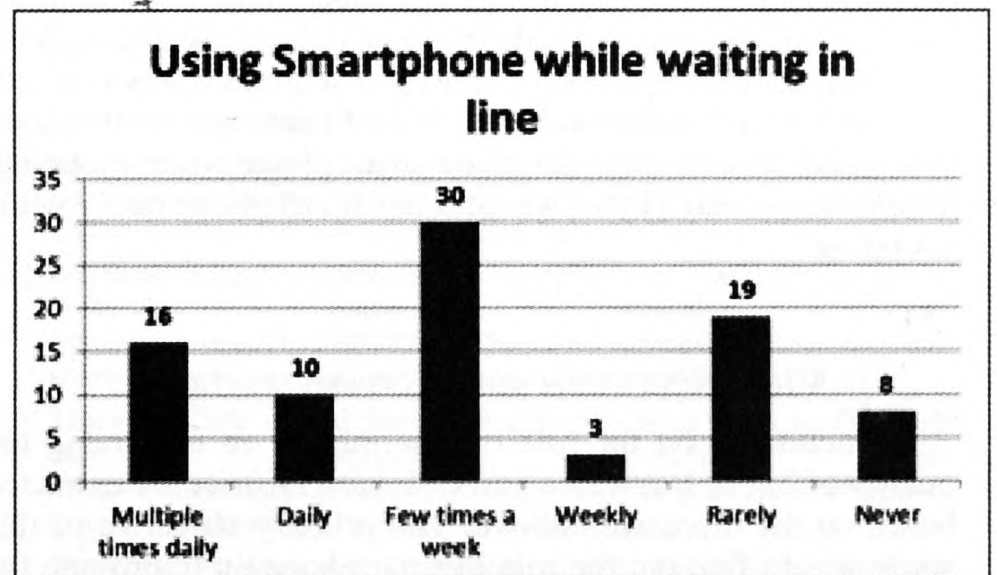


Fig. 9. Using Smartphone while waiting in line

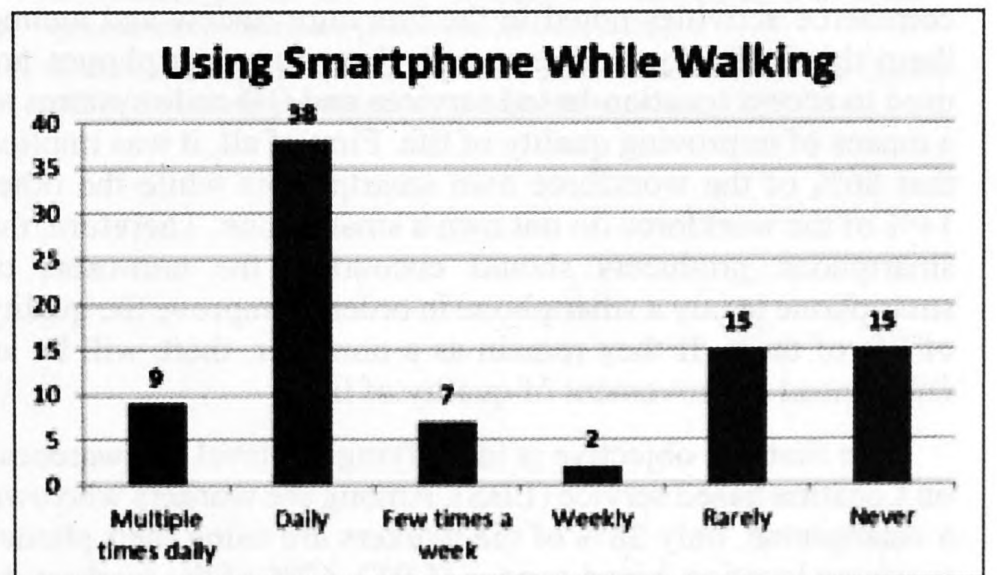


Fig. 10. Using Smartphone while walking

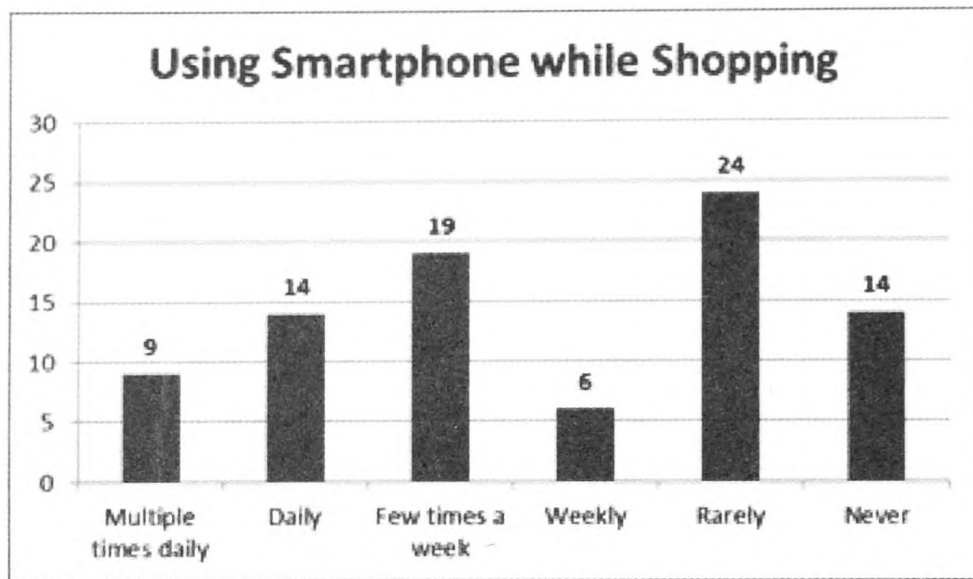


Fig. 11. Using Smartphone while shopping

According to Fig. 10, From 86 respondents 10% of users use smart phone multiple times daily, 44% of users use smart phone daily, 8% of users use smart phone few times a week, 2% of users use smart phone weekly, 17% of users use smart phone rarely and 17% of users never use smart phone while walking. Within these, majority of workers use smart phone daily while walking.

According to Fig. 11, From 86 respondents 10% of users smart phone multiple times daily, 16% of users use smart phone daily, 22% of users use smart phone few times a week, 7% of users use smart phone weekly, 28% of users use smart phone rarely and 16% of users never use smart phone while shopping. Within these, majority of workers use smart phone rarely while shopping.

## VII. CONCLUSIONS AND RECOMMENDATIONS

Conclusions on the role of smartphone on improving the quality of life in Batticaloa and Colombo District are extracted based on the discussion above. The primary objective of this study was to find out the role of smartphone on improving the quality of life. As per the literature survey in the beginning, there are several uses that can be gained from a smartphone. Among those uses, mobile commerce is one that has gained more attention nowadays. There were several mobile commerce activities noted in the literature review and among them this study focused especially how the smartphones are used to access location-based services and QR code systems as a means of improving quality of life. First of all, it was implied that 86% of the workforce own smartphones while the other 14% of the workforce do not own a smartphone. Therefore, the smartphone producers should encourage the non-users of smartphone to buy a smartphone in order to improve the quality of life of them. If they remain as a non-user, there will be an unbalanced improvement of quality of life.

The first sub objective is identifying the level of awareness on Location based service (LBS). Among the workers who own a smartphone, only 38% of the workers are using their phones to access location-based service (LBS). 62% of the workers do not use this location-based service which is widely used in

foreign countries for several reasons such as 62% of the workers do not use this location-based service which is widely used in foreign countries for several reasons such as suggesting and mentioning about community occasions in a city, searching the nearby business or service, some of them are ATM, movie theaters, coffee shops or hotels, turn by turn direction to any address, supportive Healthcare Methods, tracing the location through mobile phone, receiving alerts, some of which are discount offers on or announcements regarding traffic jam, location-based mobile advertising, games where your location is part of the game play, for example your activities throughout your day make your avatar transfer in the game or your position unlocks content, and real-time questions and answers circling around hotels, services, and other places. Further it was revealed that most of the non-users of LBS are from Batticaloa district. While inquiring the reason for not using such service, it was found out that almost half of the respondents were not interested to use the service and around 36% of the workers are unaware of LBS.

While looking the users of LBS (38% of the workers), it was noted that, in Sri Lanka, there are some mobile applications available for accessing LBSs and they are used for some reasons as indicated in Table I. However, while concentrating on the frequency of the usage of such LBSs, 40% of the workforce use it rarely and 33% of the workforce use it only a few a times a week. Only 27% of the workforce use LBSs daily.

The second sub objective is identifying the level of awareness on Quick Response (QR) code system usage. It was revealed that the usage of QR code system is also a problem in selected districts. 74% of the workers do not use QR code system and the reasons they pose for not using the system are unawareness, having no interest and no situations to use such system. 46% of the workers are unaware of the system and 31% of the workers are not interested and even 17% of the workers do not find any situations to use such systems.

Hence, the organizations in Sri Lanka have to initiate two activities regarding location-based services in order to increase the quality of life of workers; first, they have to make the non-users of LBS aware of LBSs and its benefits as well as they have to make accessing the LBSs interesting to users. Second, they have to increase the current users' frequency of usage of LBSs by making the applications easy to handle and attractive and increasing the benefits of applications.

As far as QR code system usage is concerned, in global scenario it is being introduced in several countries for mobile advertising, for visiting websites, use in virtual stores, for making payments, etc. But in Sri Lanka, especially in Colombo and Batticaloa district, such systems have to be introduced to make the life easy and quality, and make the people aware of such system and its benefits.

Stimulating awareness and usage of LBSs and QR code system usage is not difficult to implement as there are already opportunities for organizations to utilize. It can be concluded from the discussion of third objective that more than half of the workers use smartphones daily during commercials while watching television and while walking. Around 50% of the

workers use smartphone multiple times a day during idle time at work. 30% of the workers use smartphones daily while waiting in line and another 35% use it few times a week. These are the perfect opportunities for companies to promote LBSs and QR code system which will give profits for the companies and at the same time, it increases the quality of life. Another essential opportunity for the above mentioned developments is shopping. 27% of the workers use smartphones daily while shopping and 22% of the workers use it few times a week while shopping. It is easy for companies to promote their products and services through LBSs and QR code system while the customers do shopping.

Smart phone is a "Smart Marketing Strategy" that enables people to access information very quickly wherever they go and need, at any time. Therefore LBS and QR code system are their life supporters, checking and tracing with mobile media at work, home, while shopping or travelling. For marketer's point of view, these applications deliver new path to capture consumer attention with higher level of consideration than traditional Medias. Mobile technology is delivering economic value to people's lives. It is protecting lives and getting the world closer together in a truly remarkable condition. Due to the technological capabilities of these mobile applications, they can increase the rate of efficiency, effectiveness and productivity; make best choice among several alternatives and also save cost and time much of what a computer can do in the rapidly growing environment. Consequently these applications added value to individuals that will increase societal values. Accordingly that will lead to international development, spontaneously improve quality of life.

The results of this survey revealed that compared to Colombo district, there are more non-users of LBS and QR code system in Batticaloa district. Therefore, more prominence should be given for developing districts such as Batticaloa regarding making awareness on LBS and QR code system usage. At the same time, the developed districts also have to give more importance to increase the current usage level of LBSs and QR code system to aid international development through national development.

#### VIII. IMPLICATIONS FOR FUTURE RESEARCH

This study only focuses on level of usage of Location based services and QR Code system to explain the awareness of these services. However, it is explicit that there may be other mobile commerce activities to be considered to explain the variation of awareness. Future studies can be devised to identify those additional mobile commerce activities for explaining the consumer's awareness, Positive and Negative Impact of Smartphones on Society, Impact of Smartphones on Academic Performance of Students and Current Smartphone's Security Issues and Its Impact on Society. Further, we would like to suggest that future research should include some other analysis such as Bivariate and Multivariate analyses as only the frequency analysis was carried out to find the results of this study, and hence it cannot be able to generalize the results to the whole working population in Sri Lanka. In addition, it is also advisable to extend this study by considering other districts in Sri Lanka and even other nations too for further

understanding of target customer's decision making behavior and to improve the quality of life to aid national development.

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