HCI Factors Affecting the Mobile Internet Uptake in Jordan

A thesis submitted for the degree of Doctor of Philosophy

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ABSTRACT

The aim of this research is to highlight the factors and barriers that render mobile phone users averse to using their mobile handsets as an internet platform in Jordan. Three studies were conducted to achieve the aim of the conducted research of this PhD thesis. Both quantitative and qualitative approaches were used in all studies. Data was collected from the participants using questionnaires, open-ended questions and sketching techniques.

Firstly, mobile internet usage in Jordan was explored in its wider sense. On the basis of these results, the second study compared PC and mobile internet use. This comparison resulted in the preference of PC internet rather than mobile internet. The study covered many aspects such as usability, familiarity, achievement and satisfaction in dealing with both mobile and stationary tools internet.

The third study was divided into two sections. The first part required participants to design (using a sketching technique) a mobile application with regard to handling a critical issue (car violations), to establish the possibility for internet users in Jordan to perform tasks on a mobile platform that they currently perform on stationary internet tools. The second part of the study was an evaluation of this prototype application. The results revealed that the application was found to be very easy and useful by the participants of the study. They added that they would benefit from using such applications in their lives.

There was an observed issue of security and trust related to the payment option provided as an option in the application. Participants were cautious and declined to use any "untrusted" method of payment. In addition to lacking trust in e-commerce, participants lack trust and confidence in online payment methods, and stated that they would not recommend the payment option to anyone.

Finally, the outcome of the study showed that the application is a novel idea in Jordan, and it is very easy to handle and use. Participants commented that it was easy to interact with the mobile application in order to complete different tasks.

The key benefit of the application for participants lies in saving time, by avoiding long queues at the Traffic Department.

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Publications and Presentations

- Omar,F; Love,S and Hassouna,M (2012) “Personal Computer versus Mobile Internet in Jordan" Information Technology & People, (Under Review)

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- Omar, F. and Hassouna, M. (2011) “Modeling Customer Churn in the Mobile Market - A Comparative Study of Decision Tree and Logistic Regression”, Proceedings of the First Global Conference on Communication, Science & Information Engineering CCSIE 2011, Middlesex University, UK, London. (This paper is indirectly related to the thesis)

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Chapter 1: Introduction

1.1 Overview

The aim of this research is to investigate the factors and barriers to the uptake of people using their mobile handsets as an internet platform in Jordan.

This chapter begins by discussing the motivation behind the research programme conducted and presents a brief background to the research. Afterwards, the chapter represents the research aim and objectives. The research methodology employed to investigate the research questions is then introduced. Finally, an outline of the thesis structure is presented, giving a brief description of the contents of the remaining chapters.

1.2 Research Motivations

Many researchers have predicted that in the future most people will access the internet using mobile devices. This will be due to the flexibility they offer people to connect to the internet at any time or anywhere (Cui 2008; Buchanana et al., 2001). In order to investigate this claim, an exploratory study was conducted in Jordan. Jordan was selected because it has been observed that there is currently a very low uptake in the usage of mobile phones to access the internet. The study evaluated people's attitudes towards accessing the internet using mobile phones. Results of the exploratory study clearly showed that participants had problems accessing the internet using their handsets. Problems are mainly categorised in terms of familiarity and usability issues, such as the mobile phone screen size. This highlights an issue which users in Jordan are currently experiencing. They are at a transitory stage between using their mobiles as an internet accessing platform, which offers them the flexibility of anytime and anywhere access, and

ordinary internet access methods, including PCs, with all of their mobility restrictions (Buchanan et al., 2001).

From the exploratory research study findings, it was decided that the remainder of this thesis should investigate further the barriers that cause mobile users in Jordan to avoid using their mobile handsets as an internet platform. As part of this research, the aim was to look for ways to resolve this problem and cover the gap (PC versus mobile internet access) found within the Jordanian context.

Culture was identified as one of the main reasons for creating this gap. According to Hofstede (2001), culture can be defined as "the collective programming of the mind which distinguishes the members of one group from people from another (Hofstede, 2001, P. 391)." Additionally, culture cannot be clearly understood by studying a single person or individual. Culture can only be dealt with as a set of shared characteristics within a group of people that affect the behaviours of individual members by providing rules for that group.

One of the earliest definitions of culture was given by Tylor (1871). He described culture as "That complex whole which includes knowledge, belief, art, morals, law, customs and any other capabilities and habits acquired by man" "(Tylor,1871, P.410). Harris (1987) stated that cultures can possibly be learned acquired, and they reflect patterns of thinking, feeling and acting. One of the most important definitions of culture was given by Kluckhohn (1951), who declared that "Culture consists of patterned ways of thinking, feeling and reacting acquired and transmitted mainly by symbols consisting of the distinctive achievements of human groups including their embodiments in artefacts, the essential core of culture consists of traditional and historical derived and selected ideas and especially their attached values" (Kluckhohn, 1951. P.86). Hofstede highlighted "Values" as the building bricks of any culture which are set early in childhood and shapes subjective definition of rationality. Hofstede added that values have both strength and direction, or alternatively they have a size and a sign.

Culture can be defined as a way of life, how people in a specific area or society learn how to dress, eat and communicate together. Particularly, it refers to socially learned and absorbed behaviours, beliefs and values that members of the same group or society share with others. It is absolutely a fact that different cultures exist in the world, each of which has its own cultural aspects and features, such as symbols and language, rules and values.

Culture could possibly be understood by identifying a set of common characteristics that shape and identify the behaviour of people within the same group. Culture holds both the visible aspects of the group, such as food, values, religion, and intangible aspects such thoughts, behaviour and values.

Culture can be viewed as the number of attributes that people acquire from their childhood rearing. These attributes are fundamentally associated with their surroundings and environment that influence the responses of people in that culture to precede with the production of new ideas, use of new technology and practice it, taking into consideration that culture may affect the way people act and behave in general.

Because of the difficulty of the culture concept, Hofstede (1996) and Masaaki (2002) developed conceptual models to illustrate the different dimensions by which culture can be understood. Cultural models tend to compare various cultures on a set of values. For example, Hofstede model focuses on determining the patterns of thinking, acting and feeling. The main dimension that addresses the Jordanian context was Uncertainty Avoidance. Basically this can be defined as "the extent to which the members of a culture feel threatened by uncertainty and ambiguity along with their eagerness to avoid such situations" (Hofstede, 2001, P.161).

People in high uncertainty avoidance cultures view uncertainty as dangerous and show a low acceptance for risk. They tend to avoid new or uncertain situations by believing in absolute truths and knowledge. These beliefs could be achieved by seeking stability and by rejecting unusual ideas and behaviours. At the opposite

side, people in low uncertainty-avoidance cultures deal well with ambiguity and can be classified as risk takers.

Uncertainty-avoidance possibly has a significant behavioural effect on the use of mobile data services. Users from a culture that tends toward uncertainty avoidance are more likely to avoid using mobile services when the quality of service is uncertain or uneven compared to that of traditional internet services. (Choi et al. 2005)

In addition to the above mentioned reasons, Trust has a role in the gap addressed by this research. Beatty et al. (2011) defined trust in a broad sense as the confidence an individual has in his/her favourable expectations of what other people will act with or do, based on previous interactions in many cases. Although previous individual or group (of individuals) behaviour cannot always guarantee that the subject will behave as expected, increased trust is simply the belief that another party will behave as the subject believes.

Through this trust, people reduce the complicity of understanding others into manageably understandable units, making an unjustifiable belief about the future subjectively justifiable (Dikoma et al., 2010; Flink and Schreiterer, 2010). Without trusting others in this way, people would be met with the incomprehensible complexity of considering every possible possibility of every person around before deciding how to act. Such complexity would be so overpowering that, in many cases, people would choose to stop doing a thing.

Over time, increased attention has been focused on the development process of trust in e-commerce. Trust became a serious topic for research because it is the cornerstone in creating satisfied and probable outcomes as a result of transactions (Gefen and Straub, 2003; Pavlou, 2003) Also, as explained by Salam, Rao and Pegels (2003), trust can be developed by the trustee to positively create a trustor. Such perception is important to reduce the uncertainty and risks of transaction that exist for the individuals willing to trust about a potential or existing relationship-business, social or otherwise (Tomlison and Mayer, 2009).

In addition to trust, familiarity is a very important element in this research. Familiarity is an understanding, often based on previous interactions, experiences, and learning of what, why, where and when others do what they do (Beatty et al., 2011). By itself, familiarity and trust are distinctly different. Familiarity handles the understanding of the current actions of other people or of objects, while trust deals with opinions about the future actions of other people (Flink and Schreiterer, 2010).

For example, familiarity with Amazon.com, one of the largest book selling internet vendors, would be the knowledge of how to search for books and information about them, and how to later order these books through the website interface. Familiarity in this context is a specific activity-based cognizance based on previous experience or learning of how to use the particular interface.

On the other hand, trust in Amazon.com, might involve providing credit card information based on the favourable belief (i.e. trust) that the information will not be wrongly used in any way in the future. Accordingly, familiarity and trust complement each other as complexity-reduction methods. Familiarity reduces uncertainty by establishing a solid reliable structure (Flink and Schreiterer, 2010); trust reduces uncertainty by letting people hold "relatively reliable expectations" (Flink and Schreiterer, 2010) about other people's favourable future actions (Flink and Schreiterer, 2010). In the case of using Amazon.com, familiarity in its turn will reduce complexity through an understanding of how to search and buy books through the site and what the procedure involved.

Trust, on the other hand, would reduce other aspects of complexity by a prior ruling out unethical behaviour, such as misuse of credit card information. Trust and familiarity, however, are not of equal importance (Flink and Schreiterer, 2010), because trust relates to the unknown future actions of others, and these are inherently more dynamic, general, complex, risky and less specific. In the case of Amazon.com, users' trust should be more important when buying books, Mp3s etc. than when enquiring about books, not only because the consequences of credit

card misuse deal with the future, but also because the nature of potential credit card misuse is more complex and risky.

Since in many cases prior experience is the basis of trust (Perrons, 2009), familiarity can both create trust when the experience was favourable, and ruin trust, when experience is not favourable (Flink and Schreiterer, 2010). In the case of Amazon.com, people familiar with Amazon.com had probably previously bought from the site and in the process had likely noticed that the vendor behaved in accordance with what they expected, such as respect of privacy, accurate charges to their credit card account, and sending updates on the status of their orders.

Finally, usability issues forms a solid reason of why mobile users might avoid using their mobile handsets for accessing the internet. Howart et al. (2009) defined Usability as the effectiveness, efficiency, and satisfaction in which users of a certain application is capable of achieving precise goals (ISO, 1998). For many years, usability did not require justification anymore in most quarters; due to the continuously growing awareness of its value, products of software production, organizations have been spending resources for ‘‘doing usability’’, building privileged usability laboratories, which was achieved in many ways, such as buying usability equipment, conducting usability testing and training developers in usability engineering methods.

In the last few years, mobile devices reached optimum popularity to become essential consumer devices. Mobile devices’ functionality has expanded from being merely a device to press and dial numbers to the form of personal digital assistants (PDAs) (Barnum, 2002).

Currently, almost all mobile devices comprise a mobile phone, a calendar or memo, an alarm clock, an appointment schedule, a digital camera, an internet platform and many games. These functionalities were exclusively operating in PDAs before they became combined with mobile phones, during which time it

became increasingly important to learn how to evaluate their use and the optimum ways to design mobile devices' functionalities.

Usability, which is related directly to mobile services that run on mobile devices, must be concerned with the mobile user and outlines of what interfaces for mobile services are appreciated and expected by the user.

1.3 Research Methods

To complete this study, three studies were conducted. Both qualitative and quantitative research methods were used effectively in this work. The mixed-method approach used in the studies benefits from the strengths of combining both qualitative and quantitative methods. The studies were conducted to ensure that everyday conditions of using a mobile handset in Jordan were accurately reflected. In addition to that, it is aimed to subsequently increase the ecological validity of the results.

The data were collected from different layers of mobile handset users in Jordan. Different age groups were involved effectively within the sample. Several instruments were used to collect the data from the participants such as questionnaires and sketching. In each study, participants' attitudes towards using their mobile handsets to browse the internet were measured by using a questionnaire designed for the purpose. Moreover, opinions and comments of the participants were investigated using open-ended questions method.

1.4 Thesis Structure

Following this introductory chapter, Chapter 2 reviews the relevant literature related to this field. The purpose of the review is to provide both background and justification for the research undertaken in this thesis. The chapter starts by looking at how previous researchers have defined culture, what it is and what it means. This involves prominent cultural theorists such as Hofstede and

Trompenaar and the dimensions they discussed. Additionally, the chapter reviews work on many related topics such as usability, familiarity, HCI, trust and familiarity, which are discussed thoroughly to ensure that all of the literature topics cover the work conducted in the PhD thesis.

Chapter three describes the general methodology and techniques used for the work conducted in this thesis. The chapter is divided into four main sections: overview of the research problem; an overview of research approaches used in this work; data collection instruments; and the data analysis techniques.

Chapter four describes the first study undertaken in this research, the focus of which was to investigate mobile internet usage in Jordan. The chapter explained the study in detail. The research methods, participants, data collection instruments, procedure and data analysis are explained. Finally, results are reported and discussed followed by conclusion of the study.

Chapter five describes the second study, the aim of which was to compare PC internet and mobile internet in Jordan. The steps and methodology are presented in the chapter, including the sampling data, collection instruments, procedure and data analysis. The results of the study them were included and discussed followed by concluding remarks and a summary of the study findings.

Chapter six of the study describes the third and final study of this thesis. In this chapter, a mobile application was developed and evaluated. The prototype application was designed by participants with the underlying aim of to investigating and understanding the thoughts and ideas of participants of a mobile application designed to handle a critical issue that occurs in daily life (car violations). As in both chapter four and five, the methodology, results and discussion were clearly presented in the chapter.

Chapter seven presents a conclusion of the research findings from chapters four, five and six. A discussion is then presented of the findings of this thesis and the contribution to knowledge in the scope of the thesis subject. The chapter also identifies potential limitations of the conducted research work and possible areas

of any future work that might extend the usefulness of the current research findings.

1.5 Chapter Summary

This chapter presented an explanation of the motivation behind the research work of this thesis. A background to the research was discussed and the research aims and objectives were introduced. Finally, an outline and brief description of the thesis was presented.

The following chapter is a detailed background of relevant research. This will provide a backdrop for the aim and objectives of the conducted research.

Chapter 2: Literature Review

2.1 Overview

This chapter sets out to review some of the previous research on culture and mobile internet use from usability, trust, and E-commerce points of view. This will aid the researcher in the aim of this PhD thesis in relation to previous work in this area.

2.2 Research connection to literature:

The research conducted in this PhD thesis is liked directly to the literature review. Culture is the main aspect in this thesis, the factors covered in most of the studies covered culture and its dimensions particularly to address the reason behind this low uptake of the mobile services.

Mobile HCI was also covered in the literature in order to insure the full understanding of how human would interact with mobile handsets to in order to raise the level of uptake within the Jordanian context. Age is a key aspect in the process of up taking any new technology there for it was covered in literature to assure better quality of research.

Trust, Familiarity and usability forms a solid background for this research conducted to complete the PhD thesis. Trust and familiarity are a major factor in up taking the mobile internet service in Jordan. Both factors are slightly unavailable when we speak about this service in jordan and it was mandatory to spot the light on such in order to address the issues and concerns surrounding the gap. Finally it was mandatory to address the usability issues related to this research in order to increase the feasibility of the conducted research.

2.3 Culture:

According to Hofstede (2001), culture can be defined as "the collective programming of the mind which distinguishes the members of one group of people from another" (Hofstede, 2001. P.4). Additionally, culture cannot be clearly understood by studying a single person or individual; it can only be dealt with as a set of shared characteristics within a group of people that affect the behaviours of individual members by providing rules for that group.

Additionally, culture combines itself on both the visible aspects of a group and a wide range of elusive aspects, including values, thoughts and behaviour. Culture can be conceptualized as a set of major variables that informs the responses of individuals in that culture to new practices, ideas and technologies, such as mobile data services.

One of the earliest definitions of culture was given by Tylor (1871). He described culture as "That complex whole which includes knowledge, belief, art, morals, law, customs and any other capabilities and habits acquired by man" (Tylor,1871. P.410). Harris (1987) stated that cultures can possibly be learned or acquired, and they reflect patterns of thinking, feeling and acting. One of the most important definitions of culture was given by Kluckhohn (1951), who declared that "Culture consists of patterned ways of thinking, feeling and reacting acquired and transmitted mainly by symbols consisting of the distinctive achievements of human groups including their embodiments in artefacts, the essential core of culture consists of traditional and historical derived and selected ideas and especially their attached values" (Kluckhohn, 1951, P.86). Hofstede highlighted "Values" as the building bricks of any culture which are set early in childhood and shapes subjective definition of rationality. Hofstede added that values have both strength and direction, or alternatively they have a size and a sign.

Culture can be defined as a way of life, how people in a specific area or society learn how to dress, eat and communicate together. Particularly, it refers to socially learned and absorbed behaviours, beliefs and values that member of the

same group or society share with others. It is absolutely a fact that different cultures exist in the world, each of which has its own cultural aspects and features, such as symbols and language, rules and values.

Culture can be viewed as the number of attributes that people acquire from their childhood rearing. These attributes are fundamentally associated with their surroundings and environment that influence the responses of people in that culture to precede with the production of new ideas, use of new technology and practice it, taking into consideration that culture may affect the way people act and behave in general.

Because of the difficulty of the culture concept, Hoft (1996) and Masaki (2002) developed conceptual models to represent the different dimensions through which culture can be understood. Cultural models tend to compare various cultures on a set of values. For example, Hofstede model focuses on determining the patterns of thinking, acting and feeling.

2.4 Cultural Dimensions:

In order to establish a basis for localizing product design, it is a must to identify key factors that distinguish cultures from another. In order to do this, we need a strong conceptual framework through which we understand culture. Next four of the most important dimensions in the area of cultural dimensions are discussed (Choi et al., 2005)

2.4.1 Hofstede Analysis:

One of the most important compilations of national cultural characteristics was produced by Geert Hofstede (2001). Hofstede managed to build up an empirical-based study of cultural attributes by analysing data obtained from several surveys done between individuals in 53 countries between the years 1968-1972.

The survey questions were designed mainly to measure work-related values. He used these measures of values, which are defined as components of culture, to

identify national-level cultural characteristics common between all respondents. The analysis dimensions are:

Individualism vs. Collectivism:

Individualism is known for its loose social boundaries and frameworks whereby people are expected to take care of themselves and their own interests. Conversely, collectivism is known for its well established and tight social boundaries and frameworks wherein people look out for their welfare and where personal goals comes in second place to those of the group (Choi et al., 2005).

Like the uncertainty-avoidance dimension, this dimension might have important behavioural implications for the use of mobile data services; users from individualist cultures tend to select services based on personal appropriateness. Such users choose mobile data services that are more personalized. Meanwhile, people with a collectivist tendency may be likely to use services that enable them to feel more connected to other people. Also, because highly individualistic cultures emphasize personalized goals, users from such cultures may prefer a mobile data services interface they can customize (Choi et al., 2005).

Power Distance:

According to the theory of power distance theory, it is known that less powerful members of a society accept the unequal distribution of power. The main two poles of this dimension are high and low power distance.

Aspects of inequality could be found in many forms, such as physical or mental abilities or characteristics, social status and prestige, power, law and wealth. A good example of a high power distance culture is Jordan. The UK is an example of a low power distance culture.

Some of the well observed consequences related to the high power distance culture are obedience of people to authority, represented in certain figures such as boss, parent, religious figures, and officials who address others in a language filled with power and authority. On the opposite side, equality is the main

common characteristic of low power distance cultures; in other words, people are considered to be equal, and there is no one who is regarded as intrinsically better than others.

Masculinity vs. Femininity:

Masculine societies are typically characterised by some values such as the acquisition of wealth, ambition and differentiated gender roles. In such cultures, men are seen as assertive and they learn to be competitive and visible, stressing success and being job-oriented.

In such cultures, women are seen as growing and caring agents, with the emphasis on women's' fundamentally different role, which may lead them to avoid certain types of jobs, such as taxi or bus driver.

On the other hand, in a feminine society, the dominant values for men and woman are development and caring behaviours. This society places less emphasis on assertiveness for both men and women, and the main goal or focus is on cooperation and sexual equality. According to Hofstede (2001), a good example of masculine culture is Japan. Malaysia would be a good example of feminine culture.

Uncertainty Avoidance:

Uncertainty avoidance can be defined as "the extent to which the members of a culture feel threatened by uncertainty and ambiguity along with their eagerness to avoid such situations" (Hofstede, 2001.P.83).

People in high uncertainty avoidance cultures view uncertainty as dangerous and show a low acceptance for risk. They tend to avoid uncertain situations by believing in absolute truths and knowledge, seeking stability and rejecting new or unusual ideas and behaviours. Conversely, people in low uncertainty-avoidance cultures deal well with ambiguity and can be classified as risk takers.

Uncertainty-avoidance possibly has a significant influence on behaviour related to the use of mobile data services. Users from a culture that tends toward uncertainty

avoidance are more likely to avoid using mobile services when the quality of service is uncertain or uneven compared to that of traditional internet services (Choi et al., 2005).

Long-Term vs. Short-Term Orientation:

According to Hofstede (2001), this dimension is based on a study conducted by Michael Bond (1989) in Hong Kong, which observed that Hofstede's previous four cultural dimensions did not sufficiently reflect the Asian viewpoint on culture, but rather the latter was more related to the time orientation of Kluckhohn and Strodbeck (1951).

According to Hofstede (2001), the dimensions of both time and values are related to the future; "Long Term Orientation stands for the fostering of virtues oriented towards future rewards, in particular perseverance and economy". Its opposite pole is "Short Term Orientation" (Hofstede, 2001. P.351).

A good example of long-term culture is Pakistan. Short-term orientation stands for the fostering of virtues related to the past and present, in particular "respect for tradition, preservation of 'face' and fulfilling social obligations." A good example of short-term orientation culture is the UK.

2.4.2 Hall Analysis:

Hall (1976) produced a cultural model of five dimensions:

Space:

Basically, this dimension points to that unseen border around the individual which is considered personal in the use of physical space within a society. According to Hall (1966), personal space could be divided into four distance zones:

1. Intimate distance: it is considered to be an approval, touching or whispering distance. The close phase is defined to be less than six inches and the far phase are 6 to 18 inches.

2. Personal distance: known as the interaction between close friends. The close point is 1.5 to 2.5 feet, far point is known for 2.5 to 4 feet distance.

3. Social distance: it is for interaction among associates. The close point is 5 up to 7 feet and the far point is 7 to 12 feet.

4. Public distance: generally dedicated for public speaking. Close point is 12 to 25 feet; the far point is 25 feet and more.

According to Hall's findings, different cultures have different standards of personal space. For example, in the Arabic culture, the relative distances are smaller and people tend to be more comfortable standing close to each other, while Northern European culture is the opposite (relative distances are greater, and people tend to be uncomfortable standing close to each other).

Time Perception:

According to Hall (1966), there are two distinct conceptions of time: monochromic and polychromic. Users in monochromic cultures can perform only a single task at a time proceeding in a sequential and linear manner. Normally they are considered to be task-oriented, draw attention to speed and stick to their plans.

On the other hand, users in polychromic cultures perform many tasks at the same time; they are multitask-oriented people. They often proceed in an immediate manner and tend to change plans and place importance on relationships rather than on tasks (Choi et al., 2005).

Context:

The term context was defined by Hall (1976) as the information that surrounds an event.

In high context cultures, communication is usually indirect and implicit. In contrast, cultures with low context are characterized by explicit messages and usually direct communication. As a result, people in cultures with high context

tend to rely on visual elements and symbols whereas people in cultures with low context tend to rely on hard facts and statistical data.

The degree to which culture depend on context may affect how it uses mobile data services. Users in cultures with high context may prefer implicative and indirect expressions when they communicate with people using mobile data services. Also they might prefer symbolic and animated forms of information and implicative menus with icons. In contrast, people in cultures with low context might want information in the form of explanatory tests and text-based explicit menus (Choi et al., 2005).

Time perception might play an important role in the use of the mobile data services, since polychromic users are known to be less organized; such users may use mobile data services not only for planned purposes but also for unexpected ones. Time perception might also influence users' perceived waiting time.

It has been found that users from polychromic societies like Nigeria and Jordan were less bothered by download delays and they perceived the delays to be shorter than people from monochromic cultures. As a result, when users of mobile data services perform a task that involves a given time delay, polychromic users will most likely be more flexible to the delay than monochromic users (Choi et al., 2005).

Action Chains:

Action chains are defined as the sequences of events necessary to lead to the achievement of a certain goal. Cultures vary in the degree to which members are committed to completing an action chain in a specific amount of time and in a certain order.

As we can see, this dimension is strongly connected with the time dimension. The theory behind this is that monochromic cultures are not affected by interruptions. For example, in a country like France, the sequence needed to accomplish the goal or the target is much longer than the sequence of events in a country like the USA.

Information Flow:

Information flow is all about the time a message takes to move within an organization to produce the expected effect. According to Hall (1976), it shows that high context cultures need very fast information flow. A good example of such culture would be the UK. Conversely, low context cultures function with much slower information flow, such as Nigeria.

2.4.3 Trompenaars Model Analysis:

Trompenaars (1993) developed a cultural model which has seven dimensions:

Achievement vs. Ascription:

This dimension describes how valuable and important the status of the individual. Basically, at the achievement oriented cultures persons are valued and judged for what kind of achievement they completed in their lives.

It is found by Trompenaars (1993) that in achievement oriented cultures, titles are only used in relevance to competency brought to the job. Usually, the respect for superior in hierarchy is based on how successfully the job is performed and how sufficient their knowledge.

As mentioned by Trompenaars (1993), the UK is classified as an example of the achievement oriented society. In ascription oriented societies, individuals derive their status from age, birth, gender or wealth. Also, respect for superior position in hierarchy is observed as an indication of the person commitment to the organization and its mission. Trompenaars cited Argentina as a typical example of ascription oriented societies.

Universalism vs. Particularism:

Refers to the level in which an individual is committed to the set of standards and rules. Usually in universalistic cultures, the main focus is on rules while in particularistic cultures the focus is on relationships.

Normally in universalistic cultures, there is only one truth or reality, while in particularistic cultures there are number of perspectives on reality. Universalists treat all cases in the same way, while particularists treat cases according to their special qualities and create private understandings.

According to Trompenaars (1993), North Americans as well as 80% of the Protestant countries are Universalists, while Brazil and the rest of Latin America are considered particularistic.

Individualism vs. Communitarianism:

Refers to the level of which the individual's prioritise themselves over and ahead of the group needs. Usually, in individualistic cultures, authority might be the negotiator responsibility, while in the communitarian cultures; the negotiator is only a pass-on person who reports back to the group which approves the final decision.

In individualistic cultures, the decision maker normally accepts personal responsibility, while in communitarian communities it is always a joint responsibility standard.

Normally, individualists have the feeling that their achievements are mainly the results of their own hard work and effort, while communitarians believe that they achieve more as a group. According to the analysis of Trompenaars (1993), American people are considered to live in an individualistic culture, where individual freedom is prized more highly than the need to care for other individuals in the same society.

Based on the findings of Trompenaars (1993), French people are recognised as a part of the collectivistic culture, where the individualistic approach is not adopted in the society, and priority is given always to the group rather than to the individual.

Neutral vs. Affective:

Refers to the level in which persons of the society show or hold back their emotions and feelings. People in affective societies lean to reveal thoughts and feelings verbally and non-verbally. According to Trompenaars (1993), emotions flow easily and strongly without inhibition, and physical contact, gesturing and strong facial expression are common in affective societies while in neutral societies people tend not to reveal what they are thinking or feeling physically.

According to Trompenaars (1993), Egypt belongs to the affective culture, with their meaningful emotions and feelings, while Japan is an example of neutral societies, with their sharp abilities to keep their feelings and expressions quiet and controlled.

Diffuse vs. Specific:

Refers to the level at which diffuse people get involved deeply with other people's life space, while specific people believe that relationships with others need to be explicitly defined and regulated, as if dealing with a contract.

Trompenaars (1993) reported that Swedish culture is considered to be a specific culture, in which people tend to strictly separate work and personal life.

Diffuse oriented cultures are characterized by high degree of interpersonal relationships. In other words, people in such cultures engage with others in large areas of their private lives. Borders and barriers between personal life and work do not exist in a practical way. According to Trompenaars (1993), Nigeria is a standard example of diffuse oriented culture.

Time Orientation:

This dimension points to the time response of the culture. Moreover, it has two types: Monochronic (sequentially) and polychronic (synchronic) time.

Monochronic (sequentially) time is known and characterised by promptness, schedules and categorization or isolation of activities. Trompenaars (1993)

classified Sweden and many other north-west European countries as part of the sequential culture, where people perform only a single task at a time and stick to the schedule is a must.

According to Trompenaars (1993), in polychronic time culture, such as in India, people tend to engage with many things simultaneously, and emphasise the involvement of people. Even if there was a target or a final goal it might take several steps to accomplish it, especially when there are activities that are running in parallel.

Internal vs. External Control:

This dimension describes the attitudes of people on the subject of nature. According to Trompenaars (1993), internal control cultures instil certain beliefs that people can and must control nature by enforcing their strength on it. He described the UK as a typical example of internal control culture.

In external control countries such as Egypt, people believe in the external determinism of the environment, and submit to its laws, description and forces.

2.5 Cross-Cultural Studies:

It is true that culture might affect the interaction and behaviour of people in a general way. Ciborowski (1979) clearly identified a link between knowledge and culture. Through such contexts, many cross-cultural studies investigated differences in attitudes, especially towards using new technologies.

Smith et al. (2001) used Hofstede's model to study British and Chinese user's satisfaction and preferences for websites. He adapted the Taguchi method, which is known as a partial factorial experimental design which allows for the investigation of cultural differences. It was found that there are significant differences between British and Chinese users in their preference of detailed e-finance product information. The latter Chinese adopt a much more holistic method to view web content compared to British users.

Honold (1999) found that German mobile users preferred clearly written, inclusive and rich user manuals. On the other hand, Chinese mobile users focused more on the quality of the symbolic information.

Rose et al. (2003) carried out a study on the effect of culture on the attitude of e-commerce users towards web download time. The study was based completely on Hall's (1976) cultural model, mentioned in detail above. According to Hall (1976), perceptions of time in different cultures are monochromic or polychronic. The monochromic cultures learn to work on a single issue at a time. As a result, delaying one task has a delaying impact on other tasks. Usually, people in monochromic cultures learn to be task-oriented individuals.

According to Bluedorn et al. (1992), monochronic people value speed and do not change plans at the last minute. A good example of monochromic culture is North America and European countries.

People in polychronic cultures learn to modify or change plans and focus on relationships rather than completing their tasks. Tella (2000) illustrated a good example of how polychronic people execute their tasks in a parallel way. He also added that polychronic people find it acceptable to talk to a student while leaving a foreign partner waiting on the line, or even answer their phone at the same time they are having a videoconference with foreign partners. Polychronic cultures lean to execute more than a single task at once; in other words, polychronics carry out other tasks rather than focussing on the completion of the initial task.

In polychronic culture, people could easily divert their attention between tasks that can be performed in parallel time slots. Since polychronics perform multiple tasks simultaneously, they are more accommodating of delays in web download times. A good example of polychronic cultures is Latin American and the Middle East.

Rose et al. (2003) compared US and Finnish cultures as a representative of monochronic cultures with Egypt and Peru as polychronic cultures. The results showed that participants from polychronic cultures were significantly less

concerned with internet download delays than participants from monochronic cultures. In addition, they perceived that waiting times varied considerably between types of cultures.

It was suggested by the results of the mentioned study the reason that polychronics would accept longer download times in e-commerce was not only related to their multi-tasking characteristic, but it could also be related to their cultural training, which prepared them to sustain longer waits, even in the absence of parallel tasks to fill their time.

Moreover, people in monochronic cultures would tend to prefer a reduction in some functionalities and features in order to reduce the time delay compared to their polychronic counterparts. Rose et al. (2003) indicated that this finding might lead to suggesting that polychronic cultures can cater for more services than would have been assumed, and all is based upon Monochronic interests.

Choi et al. (2005) studied the role of cultural differences in the design of mobile data services in Korea, Japan and Finland. They specified all the critical attributes that users in the three cultures may require. Significantly, the outcomes of the study showed that users' preferences of design attributes of the mobile data service vary from one culture to another. Choi et al. (2005) adopted the well-known four dimensions developed by both Hall (1976) and Hofstede (1980) in order to analyse the data. According to Hofstede (1980), Koreans and Japanese are a part of high uncertainty avoidance cultures. Finnish participants belong to low uncertainty avoidance culture.

The results clearly indicated that Korean and Japanese participants were found to dislike unclear situations; they preferred a completely efficient layout or space usage, clear menu labelling, a large amount of information within a screen and secondary information about content. Korean and Japanese users preferred to visualise the overall structure of menu items with no need to move to the next page. Marcus and Gould (2000) repeated the same results when they studied the effect of culture on the website design and found that a huge amount of information within the screen and clear menu labelling and secondary information

about site contents decreased unclear situations and ultimately met user-specific uncertainty avoidance cultural needs.

Conversely, Finnish users had negative attitudes to secondary information about content. According to Hofstede (1980), they are a part of the low uncertainty group, and they are more ready to take risks and consequently explore their required data without the need of having much information about the content.

Finnish and Japanese are classified according to Hofstede (1980) as individualistic societies (Choi et al., 2005). Finnish and Japanese participants were positive about having a limited variety of options for content and were not really keen about having too much information on the actual content, as this possibly interferes with their individualising. They apparent the range of options available on content in order to enhance their interaction experience. One good example is information about popular mobile phone ring tones, which can be practical but was not considered necessary information by Japanese and Finnish users.

Korean users preferred to have a wide range and varied content. The ranked content highly, valuing detailed information about the topics covered in the website such as songs, books and movies. For example, having detailed information about the name of a movie, its ratings, and how many people watched it helped Korean participants make their decision in the process of buying the film. Accessing information that has already been browsed and ranked by others helps other web surfers from a collectivistic society to feel more connected to others, and this attitude corresponds with their collectivistic nature, as defined by Hofstede (1980).

According to Hall (1976), Japanese and Koreans belong to high context cultures in which people prefer implicit messages and the usage of metaphors. They also lean to prefer visual elements and symbols. Conversely, low context cultures such as the Finnish culture prefer explicit information in clear and simple messages.

The results obtained by Choi et al. (2005) gave a clear indication that Korean and Japanese participants preferred to have an iconic menu style, selection of font size

and a variety of font colours. Finnish participants were found not to be interested in iconic menus and font colours, preferring the monochrome and basic screen layouts instead.

Time perception was the fourth dimension used to interpret the results of this study. Hall (1976) found that Korea and Japan are monochronic time cultures, while Finland is part of the polychronic culture.

Choi et al. (2005) gave an indication that Japanese, Finnish and Korean participants all showed monochronic traits. An example of would be that participants from the mentioned countries choose to perform only a single task at time when using mobile data services such as downloading games, downloading ringtones, reading sports news and reserving a movie.

2.6 Age:

2.6.1 OLD:

The percentage of older adults in developing countries is growing up day by day and their mobile interaction has increased because of better general health and financial resources (Goodman and Gray 2003). However, as people age, they experience a normal decline in a number of abilities, such as sensory information and mental abilities. Therefore, to remain liberated older adults often require more support. As the percentage of older adult's increases, the possibility of relying on human care contributors to provide this support declines, increasing the need for other types of support such as mobile computer devices (Goodman et al. 2004).

Mobile devices can support older adults in lots of forms; for example mobile phones can help older adults remain connected, new memory aids that enable them to remember important information (Inglis et al. 2003), and transportable game systems that provides them with fun and interesting mental exercises(Nintendo 3DS).

Older adults, though, have been slower to adopt mobile computer technologies. In addition, they found such technologies pretty difficult to be used (Kurniawan et al. 2006). For instance, Ofcom survey conducted at the UK in 2006, only 49% of seniors (age 65+), compared with 82% of all adults participants had reported owning a mobile phone (Leung et al. 2009). From these seniors, 44% reported that they can listen to voicemail messages and 29% reported that they can send a text message (compared with 83% and 81% of all adults, individually). Recent HCI research has tested many different usability issues that may in its turn explain the unwillingness of older adults to adopt mobile devices e.g. sigh problems (Jacko et al. 2002) hard to act with interface (Ziefle and Bay 2005).

2.6.2 YOUNG:

Younger users are an important consumer section as they represent a group of almost 70 million users in the USA with a major spending power (Kumar, A & Lim, H, 2006). Younger users typically spend about $187 billion annually or $260 per person monthly in most of the industrial sections including wireless communication .Moreover, Younger users are important for market experts because of the influence that they apply on their families in the form of purchase decisions (Renn and Arnold, 2003).

Younger users are frequently and usually the early adopters of any new technologies and are broad users of the internet. Likewise internet, Younger users are large users of mobile services. In relation of mobile service usage, the latest study reports that more than 50 Percent of US consumers in the age group of 15-24 possess a mobile phone and these users number is more than all other users in terms of number of calls placed, minutes consumed, wireless data transmitted/received and messages sent/received (Wilson,2003).

Short message services (SMS) amounts are rising frequently among Younger users. A recent study specifies that majority of Younger users communication

takes the form of sending and receiving SMS with an average of 126 messages sent each month (Kumar, A & Lim, H, 2006) (Perez and Gen, 2006).
Mobile phones are often known as a tool of self-expression and independence for the younger generations (Ling, 2001; Taylor and Harper, 2001). For instance, Younger users often do personalize their phones by screensavers and message tones, downloading exclusive ring tones even if it was expensive. In addition, Younger users use mobile phones as an important method to uphold peer relations. As Younger users appear to be in the key stream of data service users in the USA, and as mobile data services are a main source of income for mobile carriers, Younger users are a significant element for mobile carriers markets (Kumar, A & Lim, H, 2006).

2.7 Mobile Human–Computer Interaction

The ACM defines human–computer interaction (HCI) as "a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (Hewett et al., 1992).This definition positions mobile HCI as a sub-area focusing on one species of interactive computing systems—the portable and handheld computer. The significant aspect of mobile HCI is user mobility. The user's agency for physical movement changes the conditions of interaction so profoundly that mobility is one of the key challenges for post-millennium research.

Mobile prototypes are being developed in special application domains that tend not to refer to work done in the core of mobile HCI. The case of wireless application protocol (WAP) in Europe is a good example from the recent past. Academic research should not be a slave to the development of technology, but it should steer efforts across application domains.

Nonetheless, the first 10 years of mobile HCI research cannot be judged as being a failure. Mobile HCI has been, by and large, a technology-focused enterprise

(Kjeldskov and Graham, 2003; York and Pendharkar, 2004) and a model of fruitful industry–academia relationships. Numerous commercial products and services have been anticipated by academic publications and almost all major manufacturers and network operators have active research divisions that take part in academic conferences.

Location-based services, awareness, remote monitoring, media-capturing and sharing, browsers, online banking, business processes, games, office documents, voice communications, short messaging, email, and input interfaces are prime examples of research areas that have contributed to industry efforts. However, the bulk of this work has been local in a sense, specific to the application or setting, without generalizable understanding that carries over to new applications and settings. We need stronger basic science without letting industry needs "off the hook."

The current research in this general area is breaking new ground by bringing into focus the expanding scope of mobile HCI, from the user interfaces designed for the moving user to the immediate situations at hand, all the way to more advanced social and organizational cultures. In the end, the core of mobile HCI that links these scopes is how the users' actions will change their relation to their contexts, and how this in turn affects the use of computers. In other words, the unique aspect of mobile HCI is the strong influence of the environment, almost to the extent we could talk about human–environment–computer interaction (Kjeldskov and Graham, 2003; York and Pendharkar, 2004).

Mobility is essentially about change, something transforming to something else as a consequence of a user's cycle of actions that provide new resources and place constraints for the resulting actions. Mobility is therefore both a limiting as an enabling factor.

Herein lies the greatest advantage of mobile technologies over stationary tools as a platform for HCI. They should not simply be conceived of as smaller or lower versions of desktop applications; they enable a host of new services that leverage their contexts for the benefit of the user. The environment is not only a condition

for achieving something, but it can be actively exploited. The full spectrum of the conditions that are relevant spans the physiology of joint movement as well as to the sociology of human mobility.

Mobile HCI has been an active area for more than a decade, yet this research will be targeting not all of mobile HCI, but specifically the problems of user mobility and mobile use. The activities studied in HCI literature are illustrative of how mobile devices are becoming one of the most pervasive platforms for HCI. The diversity of frameworks needed to address mobility in these papers implies that we do not have a unifying framework for mobility, and may not have in the future. Instead, the phenomenon is tackled from multiple perspectives that are irreducible to each other.

The fluid and natural interactions enabled by modelling physics are common in games and are moving into mobile phones. Physics engines have been used in games for many years to make movements and interactions more realistic, or alternatively to be able to play with the laws to physics to create new game play. Mobile phones now have the processing power to do some of the same things in their interactions. Signs such as flicking pages to turn them or throwing a scrollbar and seeing it slow down the further it scrolls are easy for users to understand and make for playful and engaging interactions. Many phones now also join accelerometers so that in the future the whole device could be used to gesture, for example tilting to zoom or scroll.

Eslambolchilar and Murray-Smith (2008) suggest that techniques such as zooming and scrolling based on dynamic models for mobile phones are in their infancy, with many techniques hard-coded into applications, rather than using general models that could be applied across the whole interface. One reason for this is that many interaction designers are not familiar with the concepts, specification mechanisms and calibration tools needed to make these techniques work. Eslambolchilar and Murray-Smith (2008) proposed a theoretical framework to underpin these dynamic interactions and show how it can be used to model tilt-based speed-dependent automatic zooming.

Until recently, most mobile devices used a small keyboard, or a touchscreen and stylus for input. Things are now changing with a new generation of devices based on touchscreens operated by fingers. The removal of the physical keyboard allows designers more flexibility to alter the size and shape of a device and to allow input on different parts of it, for example on the back, so that the screen is not obscured during input. However, it is not clear how effective users will be at interacting on devices such as these. It requires them to use fingers, thumbs or two hands together in different ways, sometimes on the front of the device and sometimes on the back. Wobbrock, Myers and Aung (2008) presented three detailed studies characterising input using different hand positions on the front and back of the mobile phone devices to show the performance of these different surfaces. Their results show that the index finger is good for input on the front or back surface of the mobile device, while the thumb is usually preferred to be used on the back rather than front. However, the index finger has its limitations when complex motions are needed, wherein it performs better on the front of the device. These studies can help device designers understand how to create more effective interactions in future devices which may have very different form factors to the ones we are currently using.

Fickas, Sohlberg and Hung (2008) pointed that there has been a very fast growth in the use of in-car navigation devices over the past few years. The same is starting to happen in the area of pedestrian navigation, with many new mobile phones including GPS around us, receivers and mapping software. This has unlimited possibilities for all pedestrians, but there may be certain benefits for people with cognitive impairments.

Cognitive impairments can affect navigation skills which are fundamental to personal independence, community integration and travel. The right technology could help overcome some of these problems. Due to their disability, cognitively impaired people's needs and requirements are different and standard navigation tools are not always suitable, particularly in the way that route following assistance is presented. Fickas, Sohlberg and Hung (2008) studied a range of different presentation methods to discover the most effective way to provide

route-following assistance for this user group. They studied the use of aerial maps, point of view maps, and audio and textual directions with a group of twenty cognitively impaired users.

Results showed that speech-based directions were the most effective, followed by text reminders. Speech was also given the highest preference rating by the study participants. The main reason for this is that it placed the lowest request on visual attention, a resource that was required in order to navigate their way through. The results of this work may also be beneficial to designers of general pedestrian navigation tools as route following can be cognitively demanding for everyone, and reducing the load on visual attention will allow all users to focus on the environment they are moving through.

Trains, buses, planes and taxis ought to be prime contexts of use for mobile devices. Using mobile devices while travelling is not only common; it is the selling point of business phones and PDAs. There is something in the "betweenness" of travelling that is easily seen as promising for mobile technologies. In their article entitled "Mobile technologies in mobile spaces: Findings from the context of train travel,"

Axtell, Hislop and Whittaker (2008) investigated train travellers in the UK. Their argument was a strong empirical study revealing the physical, material, technological, social, and organizational problems of interaction while travelling. On the one hand, despite owning a good number of mobile devices, travellers are not able to do work anytime or anywhere they want. At times they have to limit their work to those tasks where communication is not necessary, and they may be forced to return to pens and papers to do the job. On the other hand, workers are not powerless in face of resource deprivations, but they exhibit quick-witted local adaptations to overcome restraints; and they plan themselves to address these limitations within a specific timeframe; in best cases they turn these limitations to their benefit.

The broader point that Axtell, Hislop, and Whittaker (2008) made is that users place not only to the restraints of their immediate surroundings; they adjust their

practices to organizational expectations and norms. They conclude with a convincing critique of naive notions of "context"; even train travel is no clear-cut, unitary context of use, but users actively construct conditions for work by adapting local resources to their practices and their devices, yet they are continuously sensitive to non-present, non-visible demands.

In their article entitled "Organisational usability of mobile computing—volatility and control in mobile foreign-exchange trading", Sorensen and Al-Taitoon (2008) expanded on the point that non-visible conditions shape the use of mobile technology. They traced the long-term evolution of technologies of foreign exchange trading from face-to-face bartering in the Babylonian civilization to the modern 24-hour on-floor and off-premises model, whereby traders orchestrate their use of phones, pagers and PDAs. Al-Taitoon and Sorensen (2008) studied the traders of a Middle Eastern bank who used their mobile devices to make decisions in face of uncertainty and shifting risk. On the one hand, market volatility creates a need for off-premises trading and quick decision making under uncertainty, but on the other, this clashes with the need for organizational control. Mobile traders need special technical and social skills to manage with this problem. Al-Taitoon and Sorensen (2008) presented evidence for the claim that what was understood as the usability of a mobile system depends critically on balancing individual and organizational control. Here, the strong role of mobile devices appears in the context of dynamically switching spheres of work and personal identities that demands looser coupling and more discretion.

Studies since the turn of the millennium (Kopomaa, 2000; Katz and Aakhus, 2002; Ling, 2004) have repeatedly pointed out the importance of mobile phones in the coordination of interpersonal activities and (at a higher level) in the management of one's social networks. For many years now, Japan has been located at the lead of mobile services. Recently, the country has witnessed a massive jump from the use of pagers and SMS to mobile e-mail. In their article entitled "Kei-Tying teens: using mobile phone e-mail to bond, bridge, and break with social ties—a study of Japanese adolescents" , Boase and Kobayashi (2008) reported that Japanese youths not only established relationships with phones; they

use phones to actively add new contact points to their networks. Japanese teenagers use mobile e-mail to bond and bridge with their friends, but not to break ties. These findings are exciting not only because they are telling of a recent expansion in the interpersonal uses of mobile phones, but also as they are telling of how mobile devices expand to the territory of social networking sites.

Boyd and Ellison (2008) defined social networking sites as web-based services that "allow individuals to construct a public or semi-public profile within a bounded system, clear a list of other users with whom they share a connection, and finally view and traverse their list of connections and those made by others within the system". The findings of Boase and Kobayashi (2008) bring about an attractive idea: that mobile e-mail, although not designed for this purpose, can be and is being used for social networking activities. Instead of traversing digital connections, phones are chosen by users to "digitalize" connections that are created face-to-face. The authors report that meetings in halls and lobbies that are too brief for face-to-face conversations are opportunities to exchange e-mail addresses, and connection is maintained by sending messages throughout the day. E-mail messages reach recipients across device boundaries and help maintain connections, no matter whether one is on or off the desktop. The authors also report an association between the amount of bridging a user does and the strength of use: more bridging leads to more use of mobile phones. Mobile e-mail may be a sign of what may turn into Web 2.0 on mobile phones.

In their article "Theorizing mobility in community networks", Carroll and Rosson (2008) analysed the possibility of mobile technologies supporting community networks. Their target community was a rural town of 80,000 people located in the Appalachian Mountains with the purpose of facilitating information dissemination, discussion and collective activity. Their study was an exercise in and an extension of scenario-based analysis to the space of mobile services. Scenario-based analysis (Carroll, 2000) has been one of the most powerful ideas in design-oriented HCI during the last decade.

The term "the conundrum of human–computer interaction" is explained by Carrol (2000) thus: an imaginative person can entertain almost any form of interaction or

interface, yet there are hard limits on the use of technology. A designer can assume a user who can type with two hands while walking, and a marketing researcher that train travellers are interested in killing time by watching advertisements on their devices. Carroll and Rosson (2008) take the reader by the hand and lead them through a process to show how their framework lends itself to difficult phenomena like communities and mobility. The authors not only elaborate the notion of community for this purpose, but they draw from theoretical and empirical literature to build a scientific basis for their design choices. They developed principles for wireless community networks and discuss the special nature of mobility. The resulting scenarios show convincing ways of using the physical world and the proximity of community members. The article has a timely focus, since communities and more generally "social networking" is an important ingredient of the Web 2.0 movement.

As a starting point for their article entitled "Storied Spaces: Cultural accounts of mobility, technology, and environmental knowing", Brewer and Dourish (2008) referred to the sociologist John Urry (2000), who suggested that mobility rather than society may be the primary animating metaphor for the present century. Brewer and Dourish (2008) wrote that: "If mobility is culturally shaped, then we must think about mobile technologies not so much as devices that help solve problems, but as sites at which social and cultural categories are enacted." By claiming that space is also a social product, they go beyond the argument of Harrison and Dourish (1996), that what we call space can be understood from the perspective of geometry and experience. Technological representations of space are never devoid of perspective, but are always implicated in ways of movement and knowing the world. They argue that cultural logics feature in the collective understanding of space, and that technologies are not uncertain about conflicts between logics. Brewer and Dourish (2008) developed this argument further through numerous examples whereby they re-interpreted context-aware services from new perspectives of cultural legibility, literacy and legitimacy.

2.8 Trust and familiarity:

2.8.1 Importance of Trust (Interpersonal):

Beatty et al. (2011) defined trust in a broad sense as the confidence an individual has in his/her favourable expectations of what other people will act with or do, based on previous interactions in many cases. Although previous individual or group (of individuals) previous behaviour cannot always guarantee that the subject will behave as expected, increased trust is simply the belief that another party will behave as the subject believes.

Through this trust, people reduce the complicity of understanding others into manageably understandable units, making an unjustifiable belief about the future subjectively justifiable (Dikoma et al., 2010; Flink and Schreiterer, 2010). Without trusting others in this way, people would be met with the incomprehensible complexity of considering every possible possibility of every person around before deciding how to act. Such complexity would be so overpowering that, in many cases, people would choose to stop doing a thing.

Trust is not the only complexity reduction method; rules are also substantial techniques for reducing complexity. However, even with the existence of rules, trust is vital because there is no guarantee that other people will fully stand by them (Bachmann and Inkpen, 2011). Trust does not really enable people to control or even expect others behaviour without error, but it does make it possible for people to create an understandable organization of their interactions with others (Luhmann, 1988; Flink and Schreiterer, 2010). Trust is a prerequisite of behaviour and is no less than a "basic fact of social life" (Luhmann, 1979, p. 4).

However, the relative importance of trust depends on the nature and the complexity of interaction with other people. The greater the necessity to interact with other people and one's own exposure to their misbehaviour, the greater the need to trust (Rousseau et al., 1998; Salamon and Robinson, 2008; Flink and Schreiterer, 2010). Trust is therefore intrinsically complex, multidimensional (Gillespie and Dietz, 2009), and therefore context-dependent (Flink and

Schreiterer, 2010). The early psychological and sociological studies on trust defined it as a belief that other people would achieve their expected favourable commitments (Flink and Schreiterer, 2010). Recent business research has taken a similar stand by defining trust as the expectation that other individuals or companies will behave morally dependably, and will fulfil their expected commitments under conditions of vulnerability and interdependence (Schoorman et al., 2007).

Unsurprisingly, trust has a significant effect on business relationships in general (Salamon and Robinson, 2008). It reduces the need for extensive negotiations, detail-resolution comprehensive legislation and enforced regulation, and fitted organizational control (Schoorman et al., 2007). Trust encourages long-term orientation (Salamon and Robinson, 2008), and increases the acceptance of interdependence and creates commitment (Cannon et al., 2010).

Trust when applied also reduces supposed risk (Cannon et al., 2010) can reduce transaction costs when warranted (Salamon and Robinson, 2008), and is to some extent important in almost any contractual agreement because of possible opportunistic behaviour of the other party. To conclude, trust determines the nature of the social and business order (Salamon and Robinson, 2008; Flink and Schreiterer, 2010) as well as the quality of business relationships. The observation that people need to trust in order to participate in an activity with another person and would rather abstain from any activity with others whom they do not trust (Luthmann, 1988) further supports these observations.

According to Tomlison and Mayer (2009), trust in business "is the salient factor in determining the effectiveness of many relations". It is also considered to be a key promoter of behaviour in general (Gefen, 2000). Its importance is not only in its role in defusing concerns of adaptable behaviour, but also because by resolving such concerns it reduces the need to invest in promised counter measures (Schoorman et al., 2007).

Similarly, lack of trust creates control-oriented and defensive communication that damages communication effectiveness and distorts crucial information (Schoop et

al., 2010). In addition, it might result in an overall discouragement of the will to take risks (Flink and Schreiterer, 2010).

These effects of trust, especially the willingness to engage in activities where a person is unprotected to risk without the ability to control the related behaviour of others, and its importance in successful acceptance of new technology (Salamon and Robinson, 2008), make trust a potentially important precondition for e-commerce, a fact about which internet and credit card industries are apparently well aware.

2.8.2 Trust in Mobility

Over time, increased attention has been focused on the development process of trust in e-commerce. Trust became a serious topic for research because it is the cornerstone in creating satisfied and probable outcomes as a result of transactions (Gefen and Straub, 2003; Pavlou, 2003) Also, as explained by Salam, Rao and Pegels (2003), trust can be developed by the trustee to positively create a trustor. Such perception is important to reduce the uncertainty and risks of transaction that exist for the individuals willing to trust about a potential or existing relationship-business, social or otherwise (Tomlison and Mayer, 2009).

According to Mayer et al. (1995), trust is not taking risks as such, but rather it is an enthusiasm to take a risk. McKnight, Choudhury and Kacmar (2002) further defined trust in terms of ability, integrity and benevolence. Ability is related to skills and competencies of the trustee in a specific context. Integrity concerns if the trustee follows moral and ethical principles that are considered to be acceptable by the trustor. Kindness concerns the degree to which the trustee has care or understanding towards the trustor. Perceptions of these elements will affect the trustor to have trust towards the trustee.

2.9 Familiarity:

Another way people subjectively lower uncertainty and simplify their relationships with others is familiarity. Familiarity is an understanding, often based on previous interactions, experiences, and learning of what, why, where and when others do what they do (Beatty et al., 2011). By itself, familiarity and trust are distinctly different. Familiarity handles the understanding of the current actions of other people or of objects, while trust deals with opinions about the future actions of other people (Flink and Schreiterer, 2010).

For example, familiarity with Amazon.com, one of the largest book selling internet vendors, would be the knowledge of how to search for books and information about them, and how to later order these books through the website interface. Familiarity in this context is a specific activity-based cognizance based on previous experience or learning of how to use the particular interface.

On the other hand, trust in Amazon.com, might involve providing credit card information based on the favourable belief (i.e. trust) that the information will not be wrongly used in any way in the future. Accordingly, familiarity and trust complement each other as complexity-reduction methods. Familiarity reduces uncertainty by establishing a solid reliable structure (Flink and Schreiterer, 2010); trust reduces uncertainty by letting people hold "relatively reliable expectations" (Flink and Schreiterer, 2010) about other people's favourable future actions (Flink and Schreiterer, 2010). In the case of using Amazon.com, familiarity in its turn will reduce complexity through an understanding of how to search and buy books through the site and what the procedure involved.

Trust, on the other hand, would reduce other aspects of complexity by a prior ruling out unethical behaviour, such as misuse of credit card information. Trust and familiarity, however, are not of equal importance (Flink and Schreiterer, 2010), because trust relates to the unknown future actions of others, and these are inherently more dynamic, general, complex, risky and less specific. In the case of Amazon.com, users' trust should be more important when buying books, Mp3s etc. than when enquiring about books, not only because the consequences

of credit card misuse deal with the future, but also because the nature of potential credit card misuse is more complex and risky.

Despite the fact that familiarity and trust are different, they correlate to each other. The reason for this is that trust in another person or organization is built when the other person or organization behaves in accordance with one's own favourable expectations of them. Since these favourable behavioural expectations (trust) are naturally context-dependent, understanding the given context.

Familiarity is often an important antecedent (Flink and Schreiterer, 2010). Likewise, without familiarity with the context, it would be obvious that trust cannot be effectively attached to specific favourable behaviours and thus cannot be as strongly conferred. Familiarity creates this background "precondition for trust" (Flink and Schreiterer, 2010.p.670). Once again in the case of Amazon.com, people's familiarity with the concept of secure internet communications could enable them to entertain specific beliefs concerning the security measures they expect from the vendor (this is trust). Likewise, buyers who are not aware of spying on the internet (lack of familiarity) have no reason to hold such expectations (trust). Another reason that familiarity can build trust is that familiarity not only provides an outline for future expectations, but also lets people create solid ideas of what to expect based on previous interactions (Cruz et al., 2010).

In many cases, prior experience is the basis of trust (Perrons, 2009) and familiarity can both create trust, when the experience was favourable, and ruin trust, if experience is not favourable (Flink and Schreiterer, 2010). In the case of Amazon.com, people familiar with Amazon.com had probably previously bought from the site and in the process had likely noticed that the vendor behaved in accordance with what they expected such as respect of privacy, accurate charges to their credit card account, and sending updates on the status of their orders.

2.10 Usability:

In the last few years, mobile devices reached a very popular place within the lives of consumer then have became one of the very essential gadgets. Mobile device functionality has expanded from just a device to press and dial numbers to the form of personal digital assistants (PDAs) (Barnum, 2002).

Currently, almost all mobile devices comprise a mobile phone, a calendar or memo, an alarm clock, an appointment schedule, a digital camera, an internet platform and many games. These functionalities were exclusively operating in PDAs before they became combined with mobile phones, during which time it became increasingly important to learn how to evaluate their use and the optimum ways to design mobile devices' functionalities.

Usability, which is related directly to mobile services that run on mobile devices, must be concerned with the mobile user and outlines of what interfaces for mobile services are appreciated and expected by the user.

Most traditional usability studies focused on the user of stationary devices, who can control the situation (that is the environment) in which it is to be used. Running traditional testing for mobile devices increases the risk for unrelated results due to failing to consider mobile characteristics. Therefore, in order to produce effective end-user programming in mobile devices, it is essential to create a new usability testing method based on consideration of mobile devices' characteristics (Barnum, 2002).

Howarth et al. (2009) defined the term usability as the effectiveness, efficiency, and satisfaction in which users of a certain application are capable of achieving precise goals (ISO, 1998; Howarth et al., 2009). For many years, usability did not require justification in most quarters due to continuously growing awareness of its value, and software production organizations' investment in "doing usability", building privileged usability laboratories. This was achieved in many ways, such as buying usability equipment, conducting usability testing and training developers in usability engineering methods.

These investments have helped to make usability engineering an important part of the overall software development lifecycle. Accordingly, organizations want to maximize the effectiveness of their usability engineering processes. The literature, however, suggests that usability practitioners experience a number of difficulties that negatively impact the effectiveness of their work, which in turn impacts the effectiveness of the usability engineering processes within which they work.

According to Nielsen (1993), usability is defined as the measure of the quality the user practices when interacting with something like a traditional software application, web site, or any other device the user can operate in some way. Usability is not something that we can apply on a surface to give it extra shine at the last minute; it is deeply affected by every decision in design and development. In order to achieve additional usability and user satisfaction, we do not consider a single component but deem multiple components that are related to users and the product. Therefore, by focussing on the user, authentic usability can be characterized by the following (Nielsen, 1993):

1. Learnability: The system must be easy to master, so users can rapidly start completing work with the system.

2. Efficiency: The system must be easy to remember, so when the user has effectively learned the system, a high level of productivity will be achievable.

3. Memorability: The system must be easy to remember, so that the casual user will able capable of returning to the system after some period of not having used it, with no need to learn everything from the start point.

4. Errors: The system must have a low error rate, so that users will be making a smaller number of errors during the use of the system. If they make errors, they can easily recover from them. In addition, terrible error possibilities must not happen.

5. Satisfaction: The system must be pleasing to use, so users are individually pleased during the time of usage.

In the case of a product, usability is decided by many factors such as the user's ease of use, user's perception of the quality of the product; the product's intuitiveness for the user; ease of learning and relearning, and the user's appreciation of the usefulness of the product (Barnum, 2002).

In both users' and products' cases, usability must be planned by matching the use to a user, so that increasing the user's satisfaction of the product is the ultimate goal of applying usability. Therefore, useful usability in a computer system means that the application will provide the users with well-structured computing environments. According to Mayhew (1999), to achieve usability efficiently, a number of factors should be integrated:

1. Cognitive, perceptual, and motor capabilities and constraints of people in general.

2. Special and unique characteristics of the planned user population in particular.

3. Exclusive characteristics of the users' physical and social work environment.

4. Exclusive characteristics and requirements of the users' tasks, which will be supported by the product.

5. Exclusive abilities and constraints of the selected software and or hardware and platform for the product.

Usability testing is the method of doing usability evaluation on the product development (Lee and Grice, 2008). Generally, the goal of usability testing is to find as many usability problems as possible during the test, afterwards, altering them before the product is released. Sometimes, the procedure for building usability testing ("usability engineering") starts with identifying a user, analysing tasks, and setting usability specifications (Lee and Grice, 2008).

It then passes through developing and testing prototypes and continues through repeated cycles of testing and development. Thus, the key goal of usability testing

is to improve the usability of a product, and then, in the end, to increase the satisfaction of users.

2.11 Conclusion:

This chapter discussed the research literature relating to Culture, trust and familiarity and usability. The review presented material from a varied range of sources to highlight the numerous of social and cultural implications on the use of mobile internet. The research indicates that mobile phone use as a means to emphasise social connection between society groups or to meet individuals' needs in terms of usability and E-commerce trust is essential to all people in various cultures.

In the next chapter, the methods chosen to investigate these issues in the research work reported in this thesis will be discussed and justified.

Chapter 3: Research Methodology

Introduction

This chapter contains four main sections, the first of which consists of a general overview of the questions that this PhD thesis attempts to answer. Secondly, a general definition of the approach used in conducting the research is provided. After that, a detailed description of the data collection approaches used in this research is given. Finally, an overview of the analytical procedures used on the data collected is presented.

3.1 Overview of the research questions

The aim of the research presented in this thesis is to identify the reasons why mobile users in Jordan reject mobile internet and the main issues behind this.

Overview of research approaches used in thesis

For the completion of the PhD thesis reported here, three studies were conducted with a mixture of qualitative and quantitative research methods used in these studies. The reason behind using such a mixture of research methods is to take advantage of the strengths of both approaches. Creswell (2003) stated that there are three methodological research approaches: qualitative, quantitative and mixed-method approach. Quantitative research refers to studies whose findings are concluded by statistical summary. The data gathered using such methods relies on interviews, case studies and observations. In the case of mixed data collection approach, the researcher collected the data using both qualitative and quantitative methods. By doing so, the researcher aims to provide a better understanding of the research problem. Usually, this method of data collection starts by collecting

statistical data using a quantitative method such as questionnaire, and afterwards focuses on qualitative methods such as open-ended questions.

According to Breakwell et al. (1995), hypotheses are 'formal statements of predictions derived from evidence from earlier research and theory or simply from results of a guess'. Hypotheses are usually tested by manipulating a number of variables (Preece et al., 2002). According to Robson (2002), an experiment usually involves the following: the assignment of participants to different conditions; manipulation of one or more of the independent variables; the measurement of the effects of this manipulation on one or more of the dependent variables and finally the control of all other variables.

There are two different types of experiments: experiments that are performed in the laboratory and those that are conducted in the work environment or in the field. When an experiment is conducted in a laboratory, the participants must be taken out of the environment where they would usually use the system and then be situated in a controlled environment such as a usability laboratory. The advantage of using a laboratory is that it allows the isolation and control of the tested variables in order to measure the cause and effect accurately (Coolican, 1994), thus allowing different designs to be compared. Moreover, the laboratory can be stocked with the technology and devices to allow extensive data recording and offers the participant an environment which is of course free of distraction agents.

Coolican (1994) effectively isolated two other potential weaknesses of the laboratory setting, namely artificiality and the inability to generalise. Artificiality refers to the way in which the artificial situation created by the laboratory setting affects participants. Participants might feel nervous or intimidated by the laboratory setting, which feelings could be compounded if the experiment sticks too rigidly to standardised protocols and neglects normal human interactional norms, leading to a totally negative impact on performance.

There is a possibility of preference to occur as a result of the demand characteristics of the experiment situation; participants might modify their

behaviour in accordance to their understanding of what the experiment is testing and what it requires them to do. This affect is shown to be most pronounced amongst participants who have chosen to participate voluntarily in experiments (Rosenthal and Rosnow, 1975).

Though such preference may be mediated by keeping experimenter-participant interactions to a minimum, which is often the case with human-computer interaction experiments, many have argued that these weaknesses lead to results which cannot be generalised to the real world beyond the laboratory.

Field study is the alternative of laboratory studies. It situates participants in their normal real-world environment and allows the experiment to capture interactions between systems and other people. According to Coolican (1994), this would never happen within the laboratory environment. In field studies, the participant usually interacts in real-world conditions comprised of many factors, such as surrounding noise, movement, interruptions and distractions. These factors are hard to replicate within a laboratory environment. Such factors might enable the results to be generalized to the real world, as a result promoting external validity.

The natural situation of the field experiment reduces the demand characteristics of the experiment by the effective use of both experimental and ordinary realism, and therefore reduces the tendency for participants' preference to affect performance. Robson (2002) stated that if an ethical means of random allocation of participants to experimental conditions can be achieved then field studies are more desirable than laboratory studies. For the reasons mentioned above the three studies reported in this thesis used a mixed-methods approach Data collection

A number of instruments were used to collect necessary data for the research reported in this thesis. Data was gathered by using questionnaires, open-ended questions and sketching techniques. Each of these instruments is explained in the following section.

3.1.1 Questionnaire

To gather data for the work conducted in this thesis, Likert scale type were designed. Likert scales are used for investigating opinions, attitudes and beliefs. A number of advantages of Likert scale were outlined by Coolican (2004): it has been shown to have a high degree of validity and reliability; it has been shown to be effective at measuring changes in attitude over time; and it is more natural to complete and maintains the direct involvement of respondents.

Likert scales typically range from 1 to 3 or 1 to 5 points, but can reach a maximum number of 1 to 9 points. It is generally agreed that having a neutral midpoint by using scales of 1 to 5 or 1 to 7 with a neutral midpoint of 3 or 4 is known to be the most effective method (Dix et al., 2003). Therefore for the work reported in this thesis, it was decided to proceed with the 1 to 5 scale because of its popularity

For the design process, the attitude scale had a combination of positive and negative statements in order to control for any possible acceptance effect from the participants when they were completing the questionnaire. This is an observable fact whereby participants in a study may unknowingly try to respond positively to each question. According to them, they think that by doing this they are helping the researcher. This type of questionnaire format is one of the most common methods used to extract attitudes from users in HCI research (Love, 2005).

On the studies reported in this PhD thesis, a fully revised version of the Computer System Usability Questionnaire (CSUQ) developed for IBM by Lewis (1995) was used in all of the three studies (see appendix D, G and I). The scale of which has a 5-point format, with responses ranging from strongly disagree to strongly agree, with a neutral mid-point.

The attitude scale had a combination of positive and negative statements in order to control for any possible acquiescence effect from participants when they were completing the questionnaire. Participants responded to the all of statements, with

a 5-point response scale ranging from ‘strongly disagree’ to ‘strongly agree’. Scores were recoded so that a high score for a factor indicated a positive attitude and a low score indicated a negative attitude.

Questionnaires were designed carefully for each study of the PhD research. Further details are presented within the related study chapters four, five and six. The general purpose of the three designed questionnaires was to measure the Jordanian mobile user attitude towards the usage mobile handset to complete internet related task and what experience they might come up with. Two types of questions were used in the questionnaires: closed and open-ended questions. Closed questions have many forms, such as:

- Yes or no questions, e.g." Do you use the internet at PC?"
- One true answer, e.g. "How often do you use internet on your mobile phone?"
- Choosing from different available answers, e.g. “I use my phone for internet”:

1. Hourly
2. Daily
3. Weekly
4. Monthly

- Open-ended questions such as: “Please list 3 reasons why you would use the internet on your mobile handset”

Coolican (2004) mentioned that the attitude scales are highly structured measures which usually contain statements to which participants provide the most appropriate responses. The researcher should in turn be aware that each attitude scale attempts to be solely measuring instruments; it should not be an opinion

questionnaire. Many popular types of questionnaire scales were explained thoroughly Coolican (2004):

- Equal appearing intervals (Thrustone, 1931):

In this scale, a score equivalent to the strength of every statement that a person agrees with is given. The researcher needs to fulfil the following steps to successfully structure this scale:

1. Present a large number of both negative and positive statements towards the attitude object.

2. Ask a group of independent judges to scale the statements ranging from 11 (highly positive) to 1 (highly negative).

3. Find the scale values by calculating the mean value of all the ratings for each statement.

4. Reject the statement which was rated very differently by the judges.

5. The overall attitude score is the total of all scale values on items that participants agreed with.

This scale is not without difficulties. For example, judges will not be entirely neutral, and it is not easy to select the most distinguishing statements from items that have the same value.

- The Symantec differential (Osgood, Suci and tannenbaum, 1957):

This scale can be used to measure the connotative meaning of an individual. In the following question, the respondent is asked to mark a scale between bi-polar adjectives according to what they feel where the object holds on the scale. For example:

"Bus Driver"

Good _ _ _ _ _ _ _ bad

Weak _ _ _ _ _ _ _ strong

Active _ _ _ _ _ _ _ passive

All of the bipolar pairs might be attached to the next three general meaning factors:

- "Active" (along with slow-fast, hot-cold) is an example of the activity factor
- "Strong" (along with rugged-delicate, thick-thin) is an example of potency factor
- "Good" (along with clean-dirty, pleasant-unpleasant) is a clear example of the evaluative factor.

Revised to attitude measurement, the semantic differential apparently produces good reliability values and effectively relates well with other attitude scales. There is a weakness that participants might have a tendency toward a "position response bias" whereby they tend to mark the extreme end of the scale (or even do not use it) without considering possible weaker or stronger responses.

3.1.2 Summated rating (Likert, 1932):

The researcher needs the following steps in order to structure this scale:

1. Similar to the Thurstone scale, present a set of favourable and unfavourable statements about a certain attitude.

2. Ask participants to give their response to each statement using scales ranging between strongly agree to strongly disagree. For example:

"Mobile internet is easy to use"

1	2	3	4	5
Strongly agree	Agree	Neutral	Disagree	Strongly Disagree

Table 3.1 Likert Scale Options

Normally, the scales range from 1 to 3 points up to the maximum of 1 to 9 points. Most of researchers agree to use a middle type such as 1 to 5 or 1 to 7 scales. According to Dix et al. (2003), it is the most effective method among all the others. For the work conducted in this PhD, it was therefore decided to design the questionnaires with the scale of 1 to 5 as the previous example illustrated.

Each value in the scale could possibly be used as a score for each participant on each item. "Five" will be the score for strongly disagree with unfavourable item; while "One" indicated strongly agree with an favourable item. All in all, attitude scores will be given by adding the score together for each item.

However, there is a difficulty in using the Likert scale. The midpoint score "3" or "Neutral – Undecided" is not clear, for the reason of that it is unknown whether it resembles no opinion or a neutral opinion, therefore the central value in an overall score distribution is quit unclear

Likert scale was successfully used in forming all of the questionnaires used in in this research study, because of the many advantages cited by Coolican (1994), such as that it is more natural to complete and it maintains participants' direct involvement; it has been shown to have a high degree of validity and reliability; in addition, it has been shown to be effective at measuring changes over time.

3.1.3 Interviews

In all of the studies conducted to complete this PhD research, the interview technique was used. The reason of using this technique is to collect as much data as possible from participants. Interviews are considered to be a good method for collecting qualitative data. The interview might consist of both open-ended questions and closed questions. There are multiple types of face to face interview techniques ranging from unstructured to fully structure. (Coolican 2004 and Arndt, 2011) described various types of interviews:

- Non-directive interview: in this sort of interview, the interviewee could talk about any topic they like to discuss; hence the interviewer does not give any directions to influence the topic under discussion. Helping the interviewee to deal with personal problems and to increase self-awareness are the main aims of this sort of interview, which is used by psychotherapists and counsellors. This sort of interview is not suitable for academic research data gathering at any stage which depends on discipline.

- Informal interviews: in this sort of interview, the interviewee could talk on any topic because they do not have to give answers for pre-set questions. The interviewer might give directions to the interviewee to keep on topic, and on some occasions to stimulate the responses of the latter. An interviewee should know what the topic is and what is really expected from them, and how their information would help the interviewer.

- Semi-structured interviews (informal but guided): this sort of interview is very popular because it has the advantage of keeping the procedure informal. In semi-structured interviews, the interviewer does not ask the question in the same order each time.

- Structured but open-ended interviews: the interviewer in this sort of interview asks a pre-set sequence of open-ended questions in a prearranged order. By doing so, the interviewer remains focused on gathering data and avoiding two-way conversation. In this sort of interview, the interviewer can easily avoid the

looseness and inconsistency that might occur in the other types of interviews. However, participants can still respond in any way they like.

• Fully structured interviews: this sort of interview consists of pre-set of fixed questions asked in prearranged order. Examples of this format are: yes-no questions, statements with multi-choice responses (such as agree, neutral, disagree) or questions with several possible answers (multiple choice). It is particularly useful for gathering data from participants in informal settings (e.g. street surveys). Participants could possibly be counted and analysed numerically.

3.1.4 Sketching

Sketching is well known as one of the HCD techniques that can be used to investigate design ideas (Preece et al., 1994) Sketching is generally used by software designers to help them think of an organising metaphor for a system (Landy and Myers, 2001; Howell, 2004; Roland et al., 2012).

The use of visual representations to discover creative solutions has been proposed as an essential mechanism of scientific discovery as well as in other areas (Qin and Simon 1995; Nersessian, 1995; Gooding 1996).

The strength of sketching lies in the fact that it has been shown to be a valid method to represent mental models. As a result, sketching technique might enable participants to provide a visual representation of their mental model of the structure of items within a mobile phone application (Billinghurst and Weghorst, 1995).

On the other hand, a potential disadvantage might accrue during the sketching process when users might have poor drawing skills. Of course the researcher could overcome such problems by asking the participants to give further clarifications of any unclear details drawn (Howell, 2004).

Sketching was used effectively in the third study of this PhD. Participant were asked to give what would be an ideal application to them by performing sketching.

3.2 Data Analysis

The collected data were grouped into a Microsoft Excel spread sheet. This was done for the purpose of reviewing and running the initial analytic review.

The statistical tests applied to the data must be decided upon during the planning stage of the study to ensure that the data can be analysed and that this analysis will allow the hypothesis to be either supported or rejected (Breakwell et al., 2000). In this PhD Study, a mixture of non-parametric and parametric methods was used.

An important non-parametric statistical test used in this work is the Mann-Whitney U test. It is widely used to test for differences between two independent groups on a continuous measure. For instance, do males and females differ in terms of colour preferences? This is a non-parametric alternative to the t-test for independent sample. Instead of comparing the means of the two groups, as in the case of the t-test, the Mann-Whitney U test actually compares medians. It converts the scores into ranks; the actual distribution of the scores does not matter.

Another important non-parametric test used is the Kruskal-Wallis H test. This test is the alternative to one way between groups analysis of variance. Basically, it allows the researcher to compare the scores on a continuous variable (e.g. attitude) for three or more groups (e.g. age). It is similar in nature to the Mann-Whitney U test but it allows one to compare more than two groups. This is a between groups analysis so different people must be in each of the groups.

In addition to the used statistical test, Cronbach Alpha test was used in all of the three studies. Using such test will assure the validity of the question and wither they correlate to each other effectively

3.3 Summary

This methodology chapter illustrated the general methodologies and techniques used for the work carried out in this PhD thesis. Firstly, an overview of the research problem was given, and then the general research approach was explained. In addition, a justification for the selection of methodological approach was provided. The next section explained the data collection instruments and procedures. Lastly, an explanation of the data analysis procedure and the tests conducted to draw conclusions from the studies were presented.

Chapter 4: Mobile Internet usage in Jordan

4.1 Introduction

Based on the results of the exploratory study (see appendix A) conducted in Amman, Jordan during the month of March 2010, this study was carried out to explore why Jordanian mobile users hesitate to use mobile internet.

4.2 Findings from the initial study

In the exploratory study conducted in Jordan, participants were asked to list three functions they may consider "difficult" while using their mobile phone. The results revealed that internet browsing was the most frequent answer as a hard function to perform using the mobile phone.

GPS came as the second hardest function to use. The explanation for this was that users do not use on a daily basis. Additionally, running GPS or internet browsing requires setting up for the mobile phone; these settings are considerably difficult for most participants. An overriding factor is that internet connection is highly costly in Jordan.

Mobile functions and settings were mentioned as hard functions by most participants. This is due to the fact that mobile users require advanced skills and knowledge in choosing what settings to use and enable for the mobile handset. Many participants also mentioned games and MMS (multimedia short message) as hard functions.

It was clear that there is a gap in using mobile handsets as an internet platform, which requires study and research focus.

4.3 Aim of the study

The aim of the study is to explore and highlight the main reasons behind the low uptake of using mobile handsets to browse the internet in Jordan.

4.4 Pilot study

The pilot study was conducted to ensure that the research plan was correct and feasible. In addition, it is necessary to make sure that the questionnaires and the set-up of the study run were on the correct path. It was also used to detect difficulties that participants may face during completing the questionnaire. It is also aimed to assure the clarity of the additional instructions for completion (Moore and Benbasat, 1991).

A small-scale pilot study was defined by Sanders and Pinhey (1974) as one "performed to sensitize concepts and work out any bugs in the instruments and procedures".

4.4.1 Participants of the pilot study

10 Jordanian participants, 5 males and 5 females, aged between 29-44 years were chosen to conduct the pilot study. The study was performed during August 2010 in Jordan. Participants were handed a copy of the questionnaire to fill in and submit back to the researcher.

4.4.2 Questionnaire

For this study, an adapted version of Lewis (1995) CSUQ questionnaire was used in order to measure users satisfaction towards the questions. The usability questionnaire consisted of 10 liker scale statements. Many researchers have identified the advantage of using likert scale as Coolican (2004). He considered the likert scale as more natural to complete and to maintain the respondent's direct

involvement. Likert scale has been shown to have a high degree of validity and reliability. In addition, it has been shown to be effective at measuring changes over time. Scales ranges usually from 1 to 3 points up to a maximum 1 to 0 points, but it is agreed that taking a middle point of using 1 to 5 or 1 to 7 would be more convenient and more effective according to (Dix et al., 2004).

The scale was then tested for content validity, which can be defined as the extent to which a test actually measures what it is supposed to measure (Rust and Golombok, 1989).

After using statistical methods to check the content validity, a questionnaire of 23 items was developed. The questions were divided broadly into six areas, as summarised below:

(1) Internet knowledge and duration of usage (Questions 4- 6)

(2) Questions examining preference of accessing internet platform. (Questions 7-8).

(3) Mobile handset usability and design issues (Question 9 – 14 and16).

(4) Security of using internet via mobile handset (Questions 15, 20, and 21).

(5) Workflow and performance (Questions 17-18)

(6) Finally, participants were requested to list three reasons why they would use the internet on their mobile handsets, and three reasons why they would not (Questions 22-23).

The upper listed question were grouped and listed together based on the literature review and the purposes of the study (Boyd and Ellison 2008; Fickas, Sohlberg and Hung 2008; Ling, 2004; Katz and Aakhus, 2002; Kopomaa, 2000;)

To determine participants' understanding of the questionnaire and the clarity of the items, four questions were developed. Responses of the respondents to these four questions are summarised in Tables 4.1 and 4.2.

The four developed questions were:

(1) Is the length of the questionnaire appropriate?

(2) Are the questions used in the questionnaire understandable?

(3) Is the layout of the questionnaire acceptable?

(4) How long did it take to complete the questionnaire?

4.4.3 Procedure

A consent form and information sheet (see appendix A and B) were given prior to start then the pilot study. Afterwards, participants were given a written copy of the questionnaire and asked to start. Participants were asked to return the completed questionnaire sheet to the researcher when finished.

4.4.4 Pilot study findings

Table 4.1 illustrates that of the 10 pilot respondents, 8 (80%) agreed that the length of the questionnaire was appropriate. All 10 participants found the questions to be understandable, 9 participants (90%) indicated that the layout of the questionnaire was appropriate.

The results presented in Table 4.2 also show that 20% of the respondents took around 10 minutes to complete the questionnaire, 70% took around 15 minutes, while 10% took around 20 minutes.

Question	**Frequency**		**Percentage**	
	Yes	No	Yes	No
Is the length of the questionnaire appropriate?	8	2	80%	10%
Are the questions understandable?	10	0	100%	10%
Is the layout of the questionnaire acceptable?	9	1	90%	10%

Table 4.1: Respondents' perceptions of the questionnaire instrument (N=10)

Question	**Time required to complete the questionnaire**			
How long did it take to complete the questionnaire?	10 min	15 min	20 min	30 min
Frequency	1	7	2	0
Percentage	10%	70%	20%	0

Table 4.2: Respondents' views on time required to complete the questionnaire (N=10)

4.4.5 Changes to the pilot study

From the questionnaire and based on the findings of the pilot study, questions 11 , 14, 16 and 18 were discarded because of their negative affect on the Cronbach alpha test results. Also, it was shown that the correlation between the questions of the questionnaire and the mentioned questions was very weak. As a result, it was mandatory to remove them from the questionnaire.

Set of Questions	**Cronbach Alpha**	**Number of items per set**
Category 1	.786	7
Category 2	.634	5

Table 4.3: Cronbach alpha results

4.5 Main Study

Following the pilot study, the main study was conducted to investigate the factors that affect people's use of mobile phones to access Internet in Jordan.

4.5.1 Participants

41 Jordanian participants took part in this study: both male and female, ranging from 20 to 50 years old, with an average age of 35 years segmented into two groups: young and old. The participants' level of education varied between high

school higher education. All participants were mobile phone users and had tried mobile internet at least once.

4.5.2 Demographical Data

In the first question, the participants were asked to state their gender; 58.5% of the sample was male, and 41.5% was female.

Participant Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	24	58.5	58.5	58.5
	Female	17	41.5	41.5	100.0
	Total	41	100.0	100.0	

Table 4.4: Gender of participants

In this question, the participants were asked to choose their age group. The majority of the sample (73.2%) was from age group 2 aged between 21 and 30 years old, 17.1% were from age group 3 aged 31-40, 7.3% were from age group 4 aged 41-50, and 2.4% from age group 1 were aged 20 years and under (one participant).

Group Category		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 -30 (Young)	31	75.6	75.6	75.6
	31-50 years (Old)	10	24.4	24.4	100.0
	Total	41	100.0	100.0	

Table 4.5: Age of participant group

In the third question, the participants were asked to determine their level of education The majority of the participants (65.9%), held bachelor's degrees; (26.8%) held higher degrees (masters and doctoral); (4.9%) held diplomas; and 2.4% held educated to high school certificate .

Participant Education		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School and Below	1	2.4	2.4	2.4
	Diploma	2	4.9	4.9	7.3
	Bachelor	27	65.9	65.9	73.2
	Higher Education	11	26.8	26.8	100.0
	Total	41	100.0	100.0	

Table 4.6: Level of Education

4.5.3 Questionnaire

To gather subjective data for the work conducted for this study, a 23 item, likert scale type questionnaire (see appendix D) was designed. In addition to the likert scale questions, two enumerating questions were used. Likert scales are widely used for measuring opinions, attitudes and beliefs. A number of advantages were proposed by Coolican (2004) for using the Likert scale: it has been shown to have a high degree of validity and reliability; it is effective at measuring changes in attitude over time; and it is more natural to complete and maintain the respondents' direct involvement.

Likert scales usually range from 1 to 3 points, with a maximum of 9 points. Scales with a neutral midpoint, such as 1 to 5 or 1 to 7, are generally preferred (Dix et al., 2004). Therefore for this study, it was decided to proceed with the 1 to 5 scale because of its effectiveness.

For the design process, the attitude scale had a combination of positive and negative statements in order to control for any possible acceptance effect from the participants while they were completing the questionnaire. It has been observed that participants in a study may unknowingly try to respond positively to each question. By doing such behaviour, the participant thinks that he/she is doing the

researcher a favour in order to help the researcher with the study. This type of questionnaire format is one of the most common methods used to extract attitudes from users in HCI research (Love, 2005).

4.5.4 Procedure

A consent form and information sheet (see appendix B and C) were given prior to start then the main study. Participants were given a written copy of the questionnaire and asked to start. Participants were asked to return the filled questionnaire sheet to the researcher upon completion.

4.5.5 Main Study Data Analysis

Q4 "*How would you describe your general mobile internet knowledge"*

In this question, the participants were asked to describe their general mobile internet knowledge. Around 42% of participants stated that their knowledge was good, and more than 26% selected very good. They explained their answers by the fact that they are familiar with using mobile handsets and the internet on a daily basis.

9.8% of participants selected poor. They stated that browsing the internet through a mobile handset is a hard task to perform and it requires special skills.

Around 22% of the participants expressed neutrality.

It was observed that both young and old participants shared the same attitude towards this question. Therefore there was no age difference between the age groups.

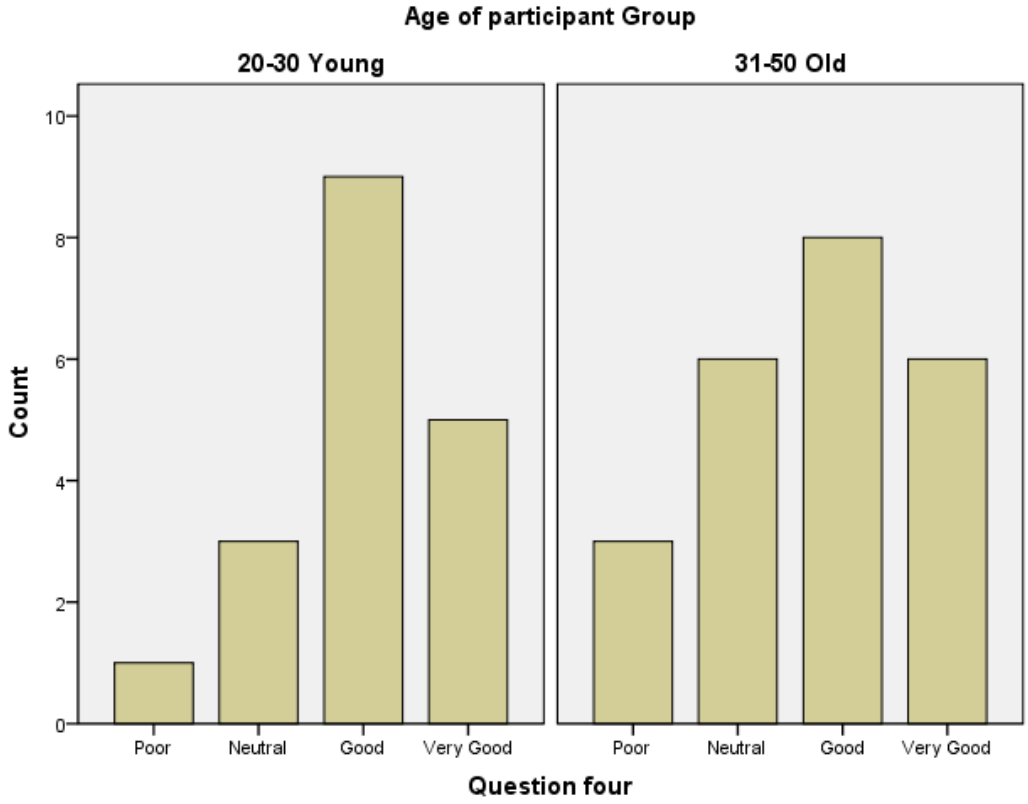

Figure 4.1: How would you describe your general mobile internet knowledge?

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=200.000, p=0.911).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 0.407, P = 0.165)

Q5: "How often do you use the internet on your mobile phone per day?"

Around 50% of the respondents stated that they do not use internet on their mobile handset that often, they explained that they use mobile internet on a weekly and monthly basis. 50% used mobile internet only for work and news.

From the answer obtained for this question, it was clear that there was no age difference between the young and old participants of the study.

Figure4.2: How often do you use the internet on your mobile phone per day?

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=180.000, p=0.512).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 6.079, P = 0.108)

Q6: "What is the main reason for using mobile internet?"

The main reason behind using the mobile internet was to follow up with work (more than 40% of the participants stated this). Nearly 27% of the sample used mobile internet for keeping up with news. Around 17% used it for networking and chatting. The rest of the participants were interested in games and music.

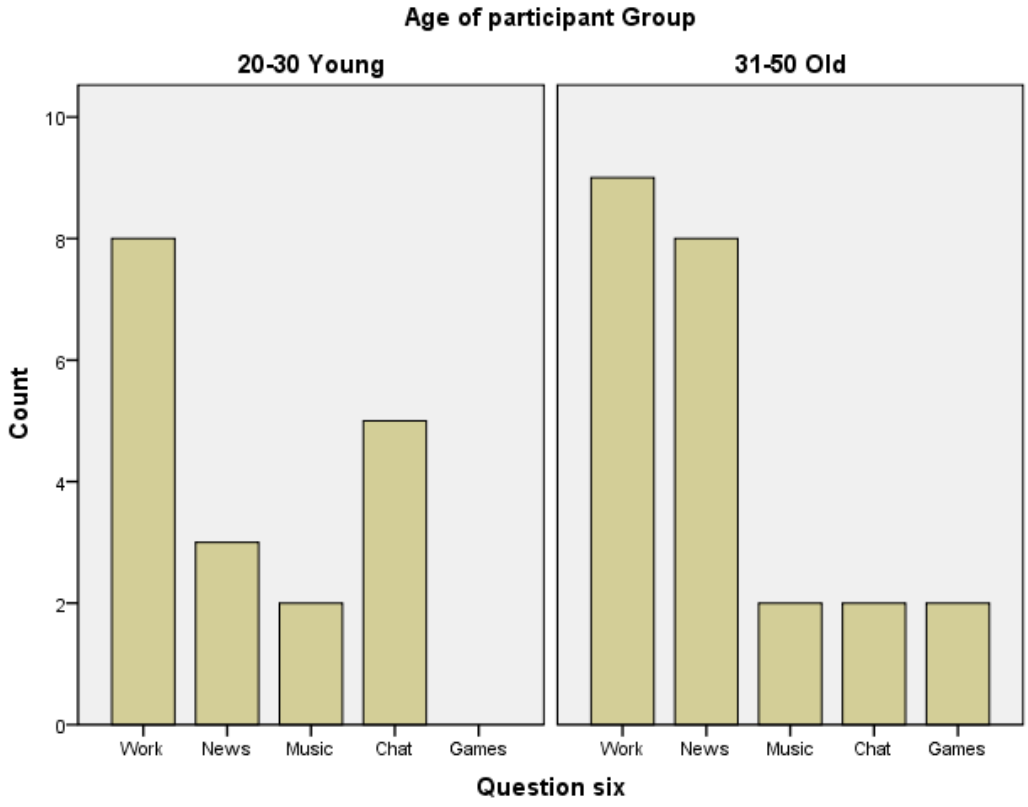

Figure4.3: What is the main reason for using mobile internet?

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=170.500, p=0.351).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.595, P = 0.660).

It was obvious from the answers obtained from both old and young participants that the reasons of using the mobile internet are the same. There is no age difference.

Q7: "*I prefer accessing internet using PC or laptop*"

The seventh question was to investigate whether the participants prefer accessing the internet using ordinary stationary tools such as laptop and desktop computers. More than 48% of the participants strongly preferred using stationary tools for internet browsing because it is easier, more reliable and more secure. Over 30% of the sample agreed for these reasons. Around 17% of participants were neutral about it. This choice of neutral is due to the reason that it depends upon the availability of the stationary tools around them. Only 2.4% of participants disagreed with the statements. both young and old participants answer were similar which in it turn shows that there was no age difference.

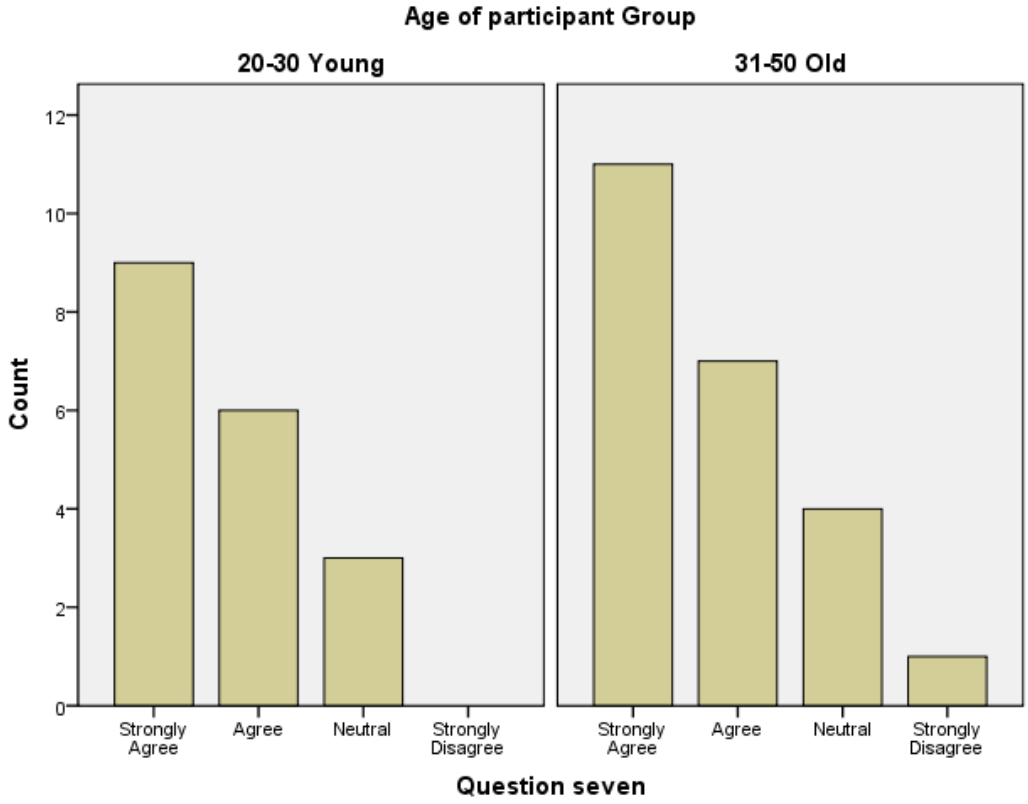

Figure4.4: I prefer accessing internet using PC or laptop

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=195.000, p=0.796).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.485, P = 0.323).

Q: 8 "*I would not like to access the internet using a mobile handset*"

In this question, participants were asked if they would not access the internet using their mobile handset. Remarkably, around 34% of participants gave a neutral response. They explained that there is no significant difference in internet access between stationary tools PC and mobile handset if they need to access the internet for an urgent upcoming reason. These reasons varied between quick requests for work and breaking news.

24% of the sample disagreed. Participants stated that it is possible to use the internet on a mobile handset the same as if they were using normal stationary tools. 14% strongly disagreed; they explained their answer stating that at some times it is crucial and urgent to access the internet from different places, regardless of what tool is available. Accessing the internet should not be only through PC or laptop. Mobile handset capabilities of accessing the internet are improving day by day, which is why it is possible and important to access internet through mobile handsets. Only 4% strongly agreed with the question statement, they believe that mobile handsets are only for making calls. They added that it is not safe to access the internet through mobile handsets.

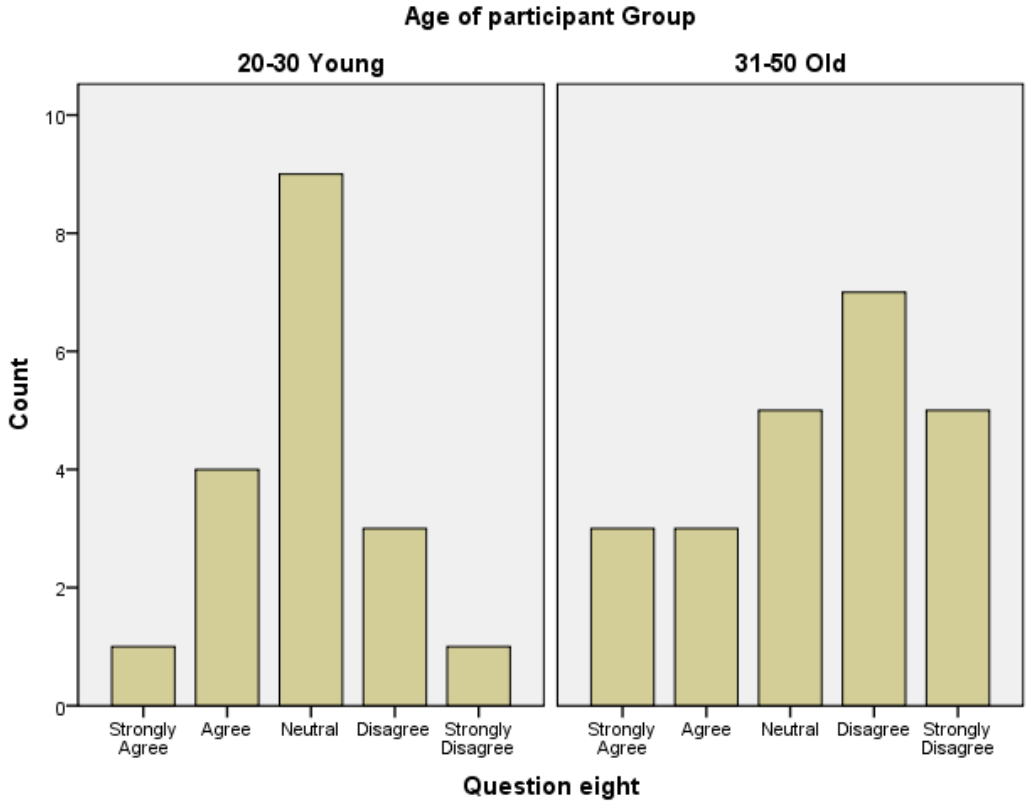

Figure 4.5: I would not like to access the internet using a mobile handset

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=199.000, p=0.891).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.474, P = 0.324).

Both age groups (young and old) showed the same amount of enthusiasm for this question.

Q9: "*I prefer to have a mobile handset with big screen for internet browsing*"
In this question, participants were asked to give their opinion on whether they prefer to have a mobile handset with a big screen for internet browsing. More than 43% strongly agreed, they explained that internet browsing needs a big screen for comfortable viewing of web pages.

Over 29% of the participants agreed, for the same reasons such as the big screen.

Around 17% of the sample where neutral and about 10% disagreed with the statement explaining that if the screen size was bigger which applies that the handset will need more pocket space.

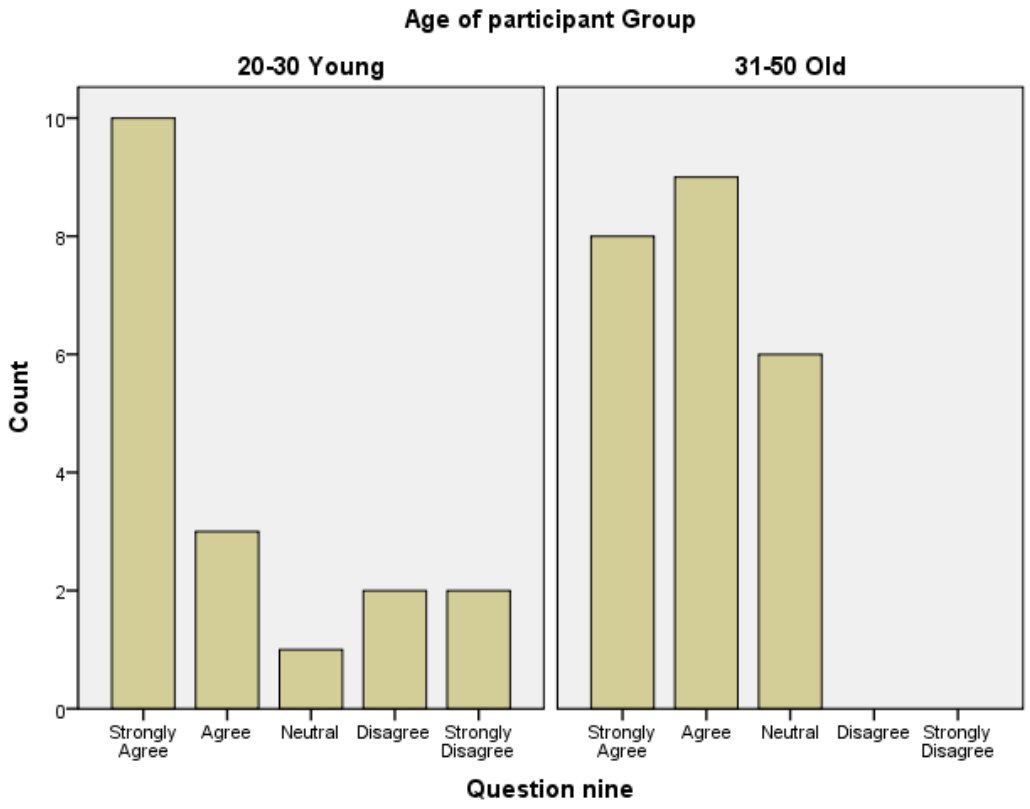

Figure 4.6: I prefer to have a mobile handset with big screen for internet browsing

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=114.000, p=0.112).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.312, P = 0.346).

Q.10: "*I would not like to use a mobile handset with QWERTY input system*"

This question concerned whether the participants do not like to use a mobile handset with QWERTY input system. More than 50% of the participants were neutral regarding this question. Participants stated that they have no problem with QWETRY system on the mobile handset as one of its features.

4% of the participants strongly agreed. They explained their answer by the fact that mobile phones with QWERTY input system are usually much more expensive than other phones, they also added that the size of the QWERTY input system is much bigger than the regular input system size. They prefer the normal size of input system. Around 7% agreed for the same reasons.

On the other hand, more than 17% of the sample strongly disagreed with the statement. They justified their choice by that it is much easier to use the QWERTY system, as they use it regularly on their PC keyboard. Most of them said that it is easier to use such systems especially when sending e-mails and chatting. The same reason was given by 14% of the sample, who agreed on such usage.

Both age groups (young and old) have chosen similar answers to this question which shows that there are no age differences.

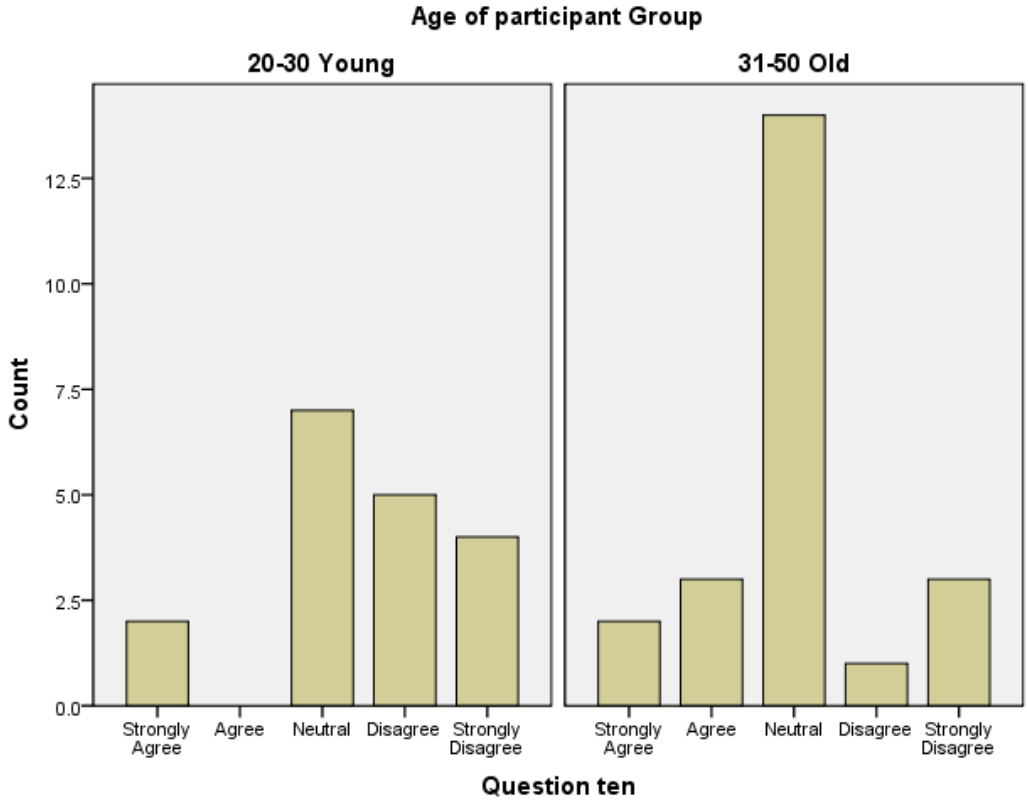

Figure 4.7: I would not like to use a mobile handset with QWERTY input system

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=173.000, p=0.383).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.486, P = 0.685).

Q11: "*I prefer to use a mobile handset with normal keypad input system*"

In this question, participants were asked to decide wither they prefer using a mobile handset with a normal input system or not. Around 39% of the participants

were neutral. 22% of the sample agreed with using such input system because they are used to use it in their mobile handset. They explained further that this input method is similar to sending text messages and browsing contacts in their mobile handset. Additionally, 12% strongly agreed because of the same reasons, and they added that normal input system means that it is a reasonable handset size to fit in their pockets.

On the other hand, more that 14% strongly disagreed; their explanation was that QWERTY system is much easier and faster than the normal input system.

Both young and old age group's answers came to assure that there was no age difference in the obtained answer.

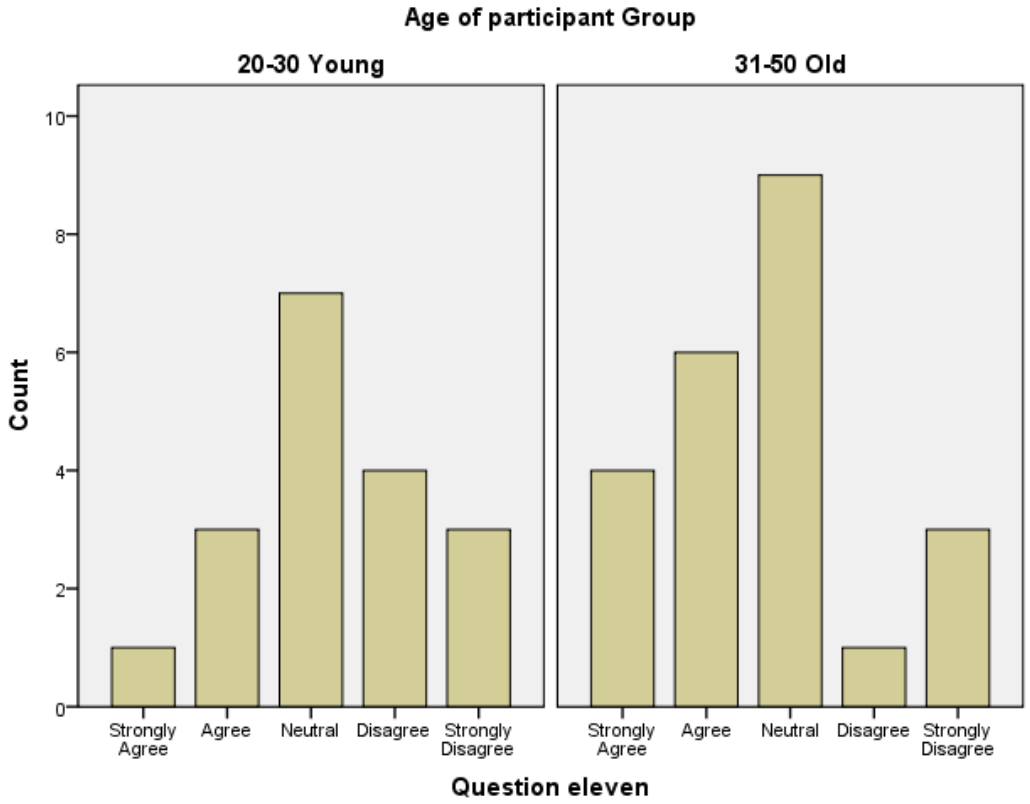

Figure 4.8: I prefer to use a mobile handset with normal keypad input system

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=200.000, p=0.912).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.863, P = 0.277).

Q12: "*The size of a mobile handset is not important*"

In this question, participants were asked to give their opinion on whether the size of the mobile handset is not important. 19% of the sample was neutral in responding to this question. More than 46% strongly disagreed, stating that the mobile handset size is very important at the process of internet surfing. Screen size is a crucial aspect for net browsing, and if the handset size is big it follows that the screen will be big. All of the reasons given by the participants will reflect directly on satisfaction of the net user.

More than 12% of the participants strongly agreed, stating that as long as the handset performs its functions, size is not important. They also added that users should cope with the size of the handset depending on its features being used. The user might use some of the features and discard others. More than 2% of the sample agreed for the same reasons.

Both young and old participants answers came to assure that there was no age difference between the age groups of the study.

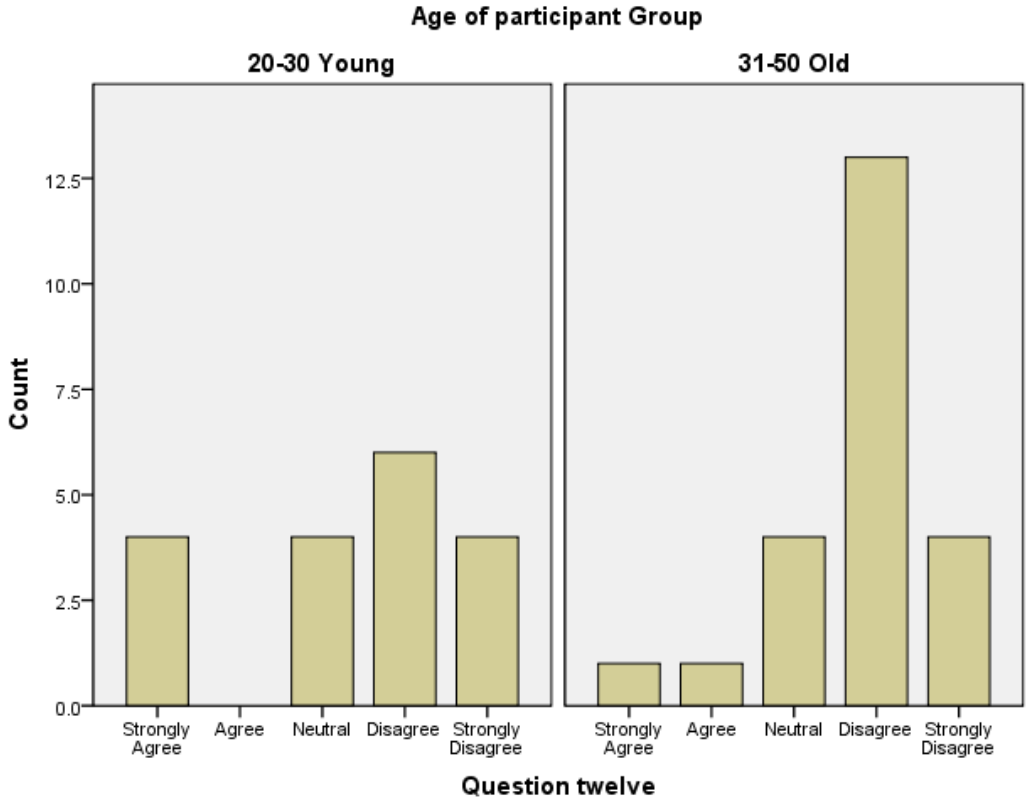

Figure 4.9: The size of a mobile handset is not important

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=183.000, p=0.555).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.399, P = 0.494).

Q13: "*The number of clicks pressed to complete a certain task while using internet via mobile handset is important*"

In this question, participants were asked if the number of clicks pressed to complete a certain task while using internet via the mobile handset is important. Over 40% of participants agreed. They explained that many clicks will result in frustration and time wasting; the less clicks pressed the less effort and time they

spent to accomplish a task. They cared about how many clicks they had to press for each task. The reason behind their concern relies on the fact that with less clicks the more efficient and less timewasting will accrue while browsing internet via mobile handset.

On the other hand, only more than 7% of the participants disagreed, stating that browsing internet needs lots of "clicking", similar to when they use stationary devices. Slightly more than 2% joined the strongly disagreeing participants. Only 9.8% were neutral.

Both young and old participants answers came to assure that there was no age difference between the age groups of the study.

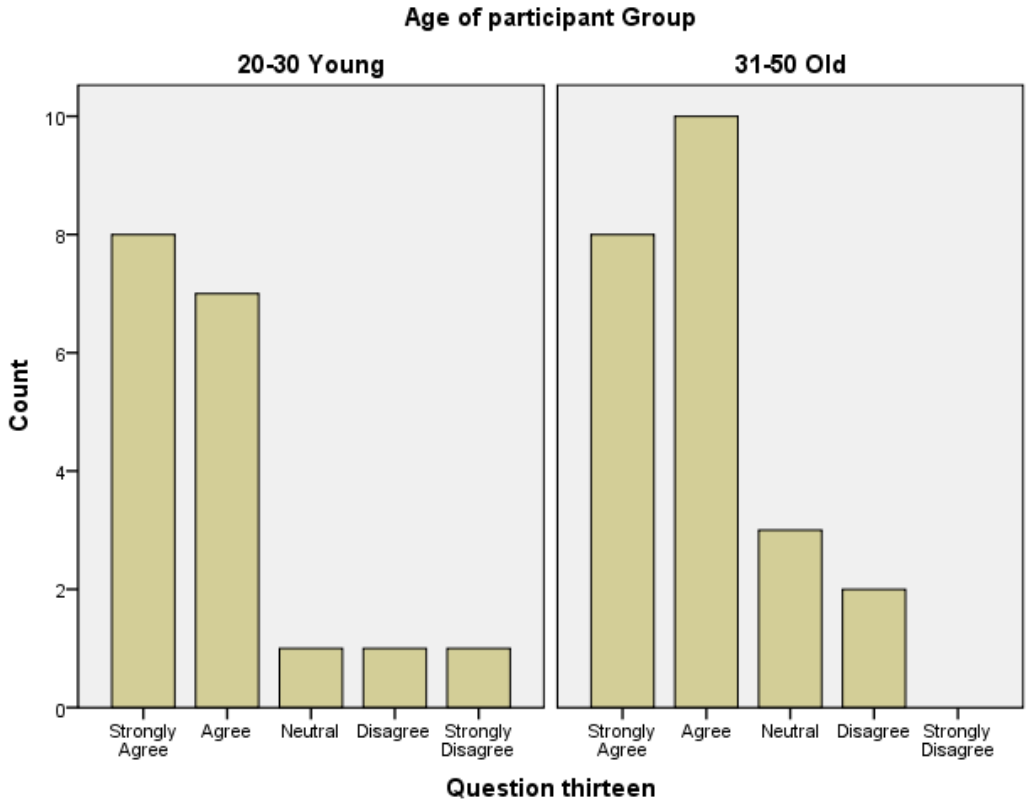

Figure 4.10: The number of clicks pressed to complete a certain task while using internet via mobile handset is important

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=147.000, p=0.109).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.663, P = 0.446).

Q14: *"Battery life is not important factor in using the internet on my mobile handset"*

In this question, the participants were asked if the battery life while using internet on the mobile handset is not an important factor. The sums of participants who agreed and strongly agreed on this question were 82.9%. They explained their answer by saying that it is important to extend the mobile phone battery life rather than running out of power because they have different uses rather than internet browsing. They need to receive and make calls plus send and receive text messages. They totally disagreed that battery life is not important.

More than 7% were neutral and sum of less than 10% disagreed assuming that battery life should last enough to serve the user in many aspect of mobile phone usage. They said that if the user has got good management of mobile handset usage, this will save the battery life for most of the daily tasks besides internet browsing.

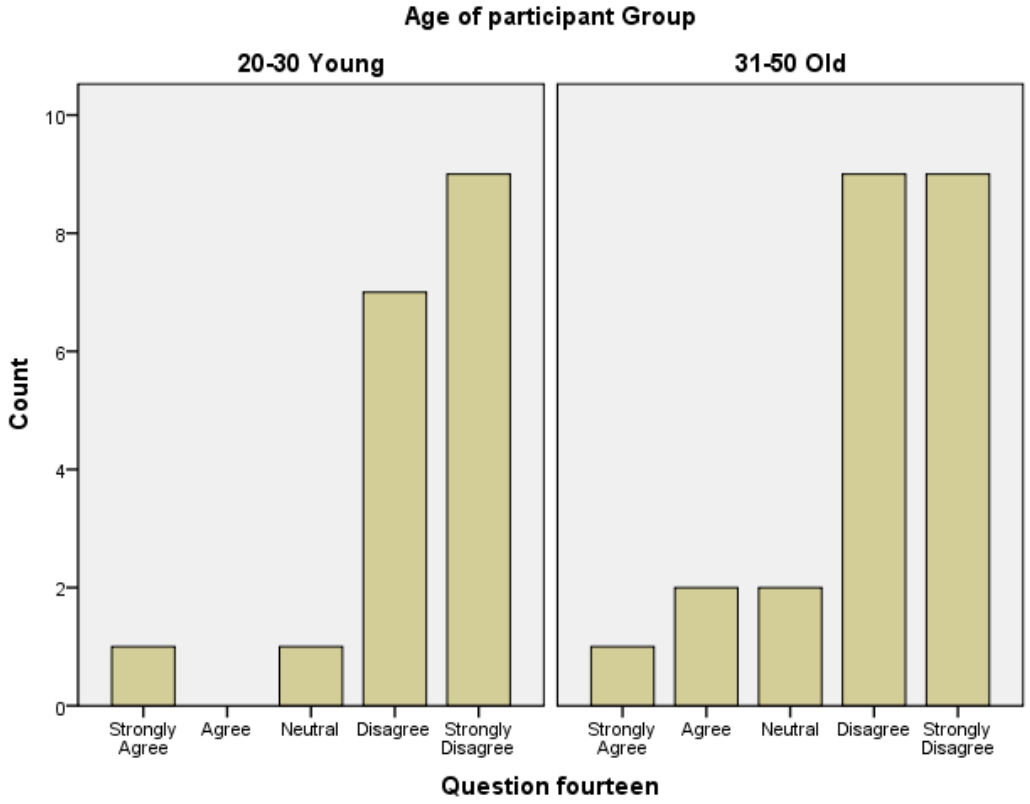

Figure 4.11: Battery life is not important factor in using the internet on my mobile handset"

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=192.000, p=0.731).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.991, P = 0.262).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Q15: "*I pay full attention to security measures while browsing intern with my mobile handset*"

In this question, the participants were asked if they pay full attention to security measures while browsing internet on their mobile handset. 34% of them selected neutral and they explained that because of the news surfing process other social websites, they also added that they do not use internet for any financial or shopping activities. Meanwhile, over 58% of the participants (26.8% strongly agreed and 31.7% agreed) agreed that they pay attention.

They explained that there are lots of fraudulent websites, and hacking was a greater perceived threat. They also reported that some of their personal data might be stolen and used in harmful ways. That was why they needed to carefully choose what and how to browse. In addition, they preferred to equip the handset with an anti-virus system.

On the other hand, few of the participants (4.9%) strongly disagreed, explaining that they do not need to worry about the websites because they browse news websites and they only use the internet in their private time. According to them, these websites are harmless and require no attention. 2.4% of the participants chose disagree.

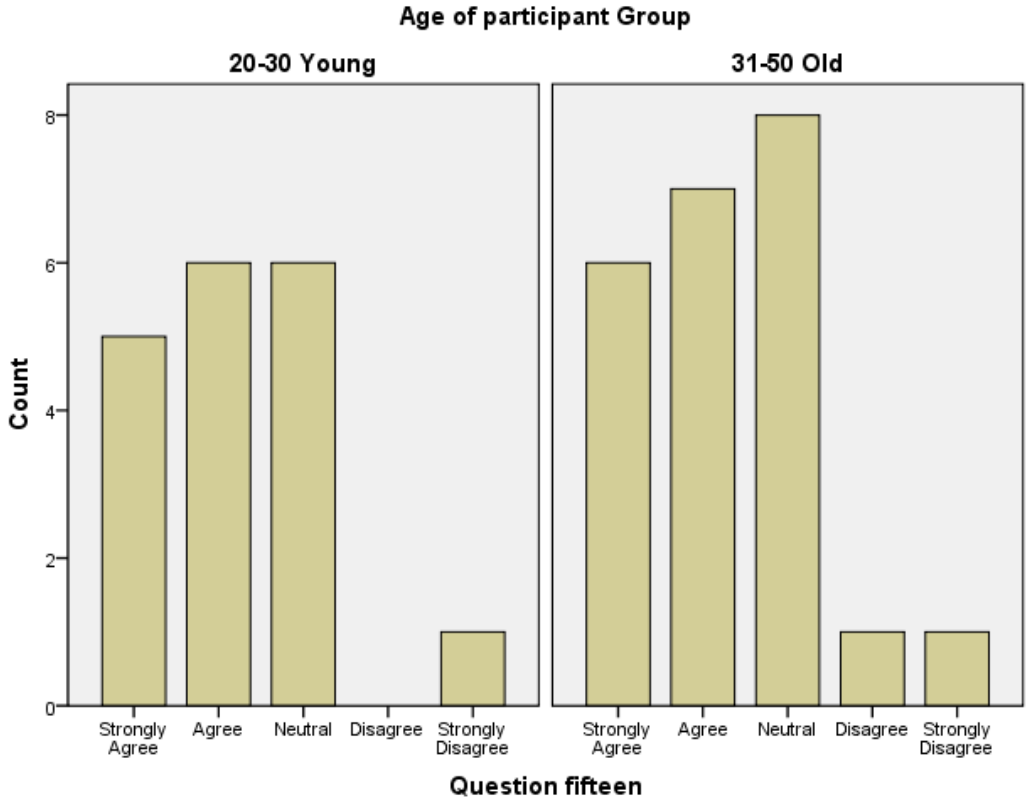

Figure 4.12: I pay full attention to security measures while browsing intern with my mobile handset

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=145.000, p=0.105).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 5.667, P = 0.129).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Q16: "*Displaying internet websites on mobile handset is less enjoyable than on a PC or a laptop*"

In this question, participants were asked if displaying internet websites on mobile handsets is less enjoyable than on stationary devices. Over 43% of the participant's agreed. They explained that the stationary devices' display screens are clearer and brighter than those of mobile handsets. They also added that some web sites contain small details which need to be looked at on larger screens and displays. Some of them stated that their eyesight could possibly suffer from using small screens, and the experience would not be less enjoyable. 39% of the participants agreed for the same reasons.

Only 7.3% of participants disagreed. They explained that they use their mobiles to browse the internet only in urgent cases for work-related issues. 2.4% of them strongly disagreed for the same reason, and they added that they use mobile internet on very rare occasions. Only 7.3% were neutral with no explanation.

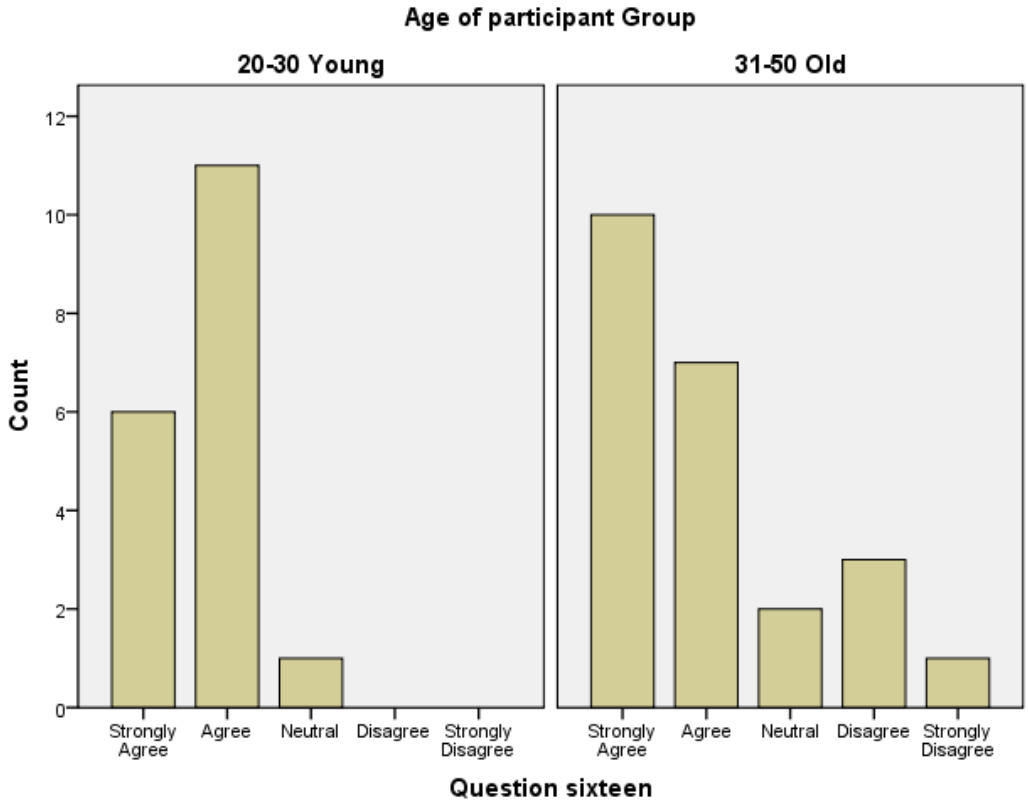

Figure 4.13: Displaying internet websites on mobile handset is less enjoyable than on a PC or a laptop

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=162.000, p=0.230).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.519, P = 0.472).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Q17: "*using internet on my mobile will save me a lot of time*"

In this question, the participants were asked if using the internet on their mobile handset saves time. 29.3% of the sample chose neutral; they reported that the question statement is true only if they used mobile handsets for job-related tasks. Participants added that if usage was for personal or social purposes, then it would not be time saving.

Only 2.4% of the sample strongly disagreed. They stated that the process of logging on to the internet via mobile handset takes a lot of time, specifying that checking e-mail on their handsets takes around three times as long as performing the same task using stationary devices. Around 12.2% of them disagreed for the same reasons.

On the other hand, (around 31.7%) strongly agreed, they explained that keeping up with work issues on their mobile handset will save them additional time. They further explained that accessing the internet via a mobile phone enables them to interact directly for urgent tasks, especially people in the IT field. 24.4% joined them by choosing agree for most of the mentioned reasons above. They added that the availability of the internet through mobile handsets makes it easier to follow world news, especially business and financial activities.

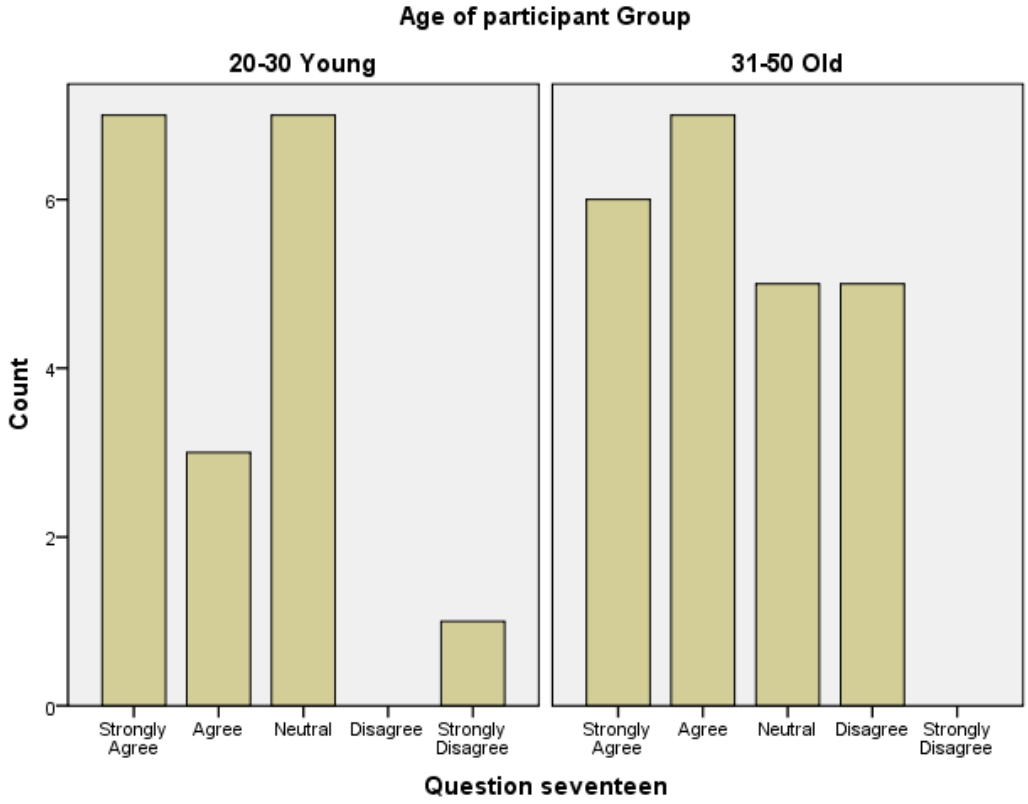

Figure 4.14: using internet on my mobile will save me a lot of time

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=178.000, p=0.475).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 0.986, P = 0.805).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Q18: "*Using internet on my mobile will not improve my work performance*"

In this question, participants were asked if using the internet via mobile handsets would not improve their work performance. 31.7% of them were neutral; they explained that there was no significant difference observed because of following their job via mobile internet.

24.4% of the participants disagreed with the question statement. They explained that the availability of the limitations of stationary device means that mobile internet will possibly enable them to keep an eye on their job. They added that the managerial feedback to them was more positive, because they were perceived as being more motivated. 17.1% of the sample joined them and strongly disagreed because of the same mentioned reasons.

22% of the participants agreed with the question statement, justifying their choice by the fact that they access the internet via mobile handset for fun, chat and news only. They explained that they prefer to deal with work-related issues only by using PC or laptop, and when they are at the premises of their work. Moreover, they gave one crucial reason: that internet via mobile handset is expensive, and they cannot afford it because their employers would not compensate them for such expenses. For the same reasons, 4.9% of the sample had chosen strongly disagrees.

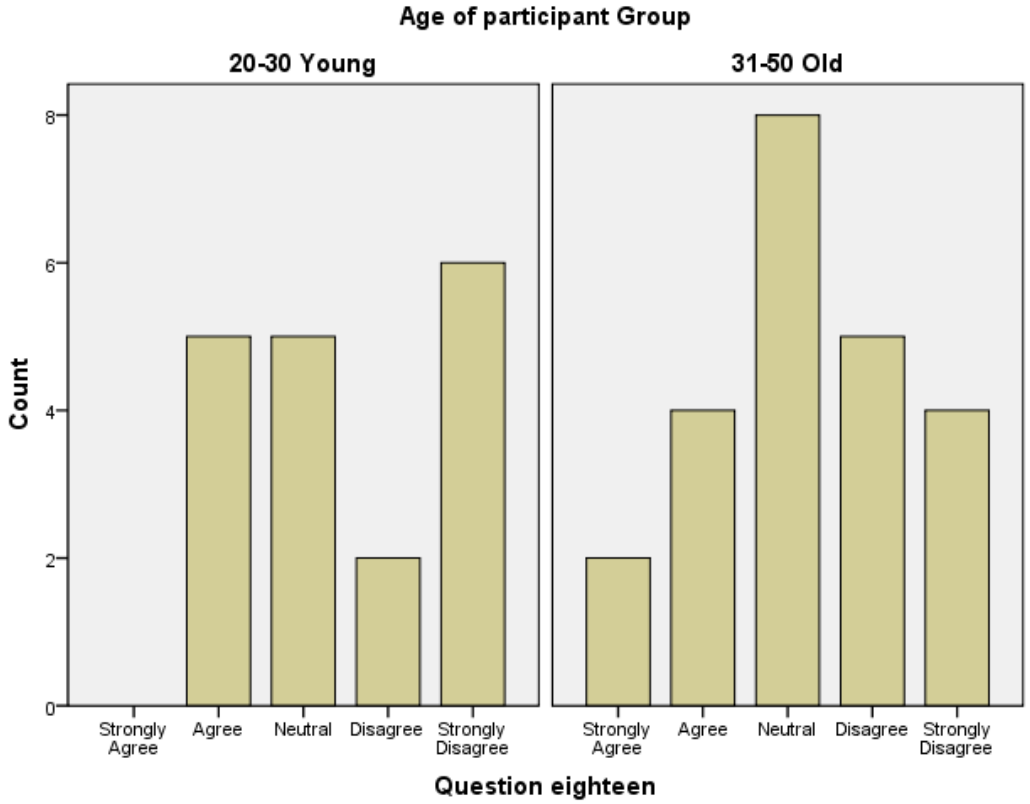

Figure 4.15: Using internet on my mobile will not improve my work performance

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=185.000, p=0.604).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 0.301, P = 0.960).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Q19: "*Using GPS via the mobile internet is useful*"

In this question, the participants were asked if they found that using GPS via the mobile handset was useful.

48.8% of the participants significantly had chosen agree for this question. They explained that it is useful and it guides them anywhere they want within a calculated time, in addition to exact directions. They also added that it makes their journeys enjoyable, without being afraid of getting lost. 19.5% of the sample joined them by picking strongly disagree.

Around 29.3% of participants chose neutral, they explained their choice by the fact that they had never tried it before.

Only 2.4% of the sample (one person) disagreed. He explained his answer by the fact that it is prohibitively expensive. Notably, no participants picked strongly disagree.

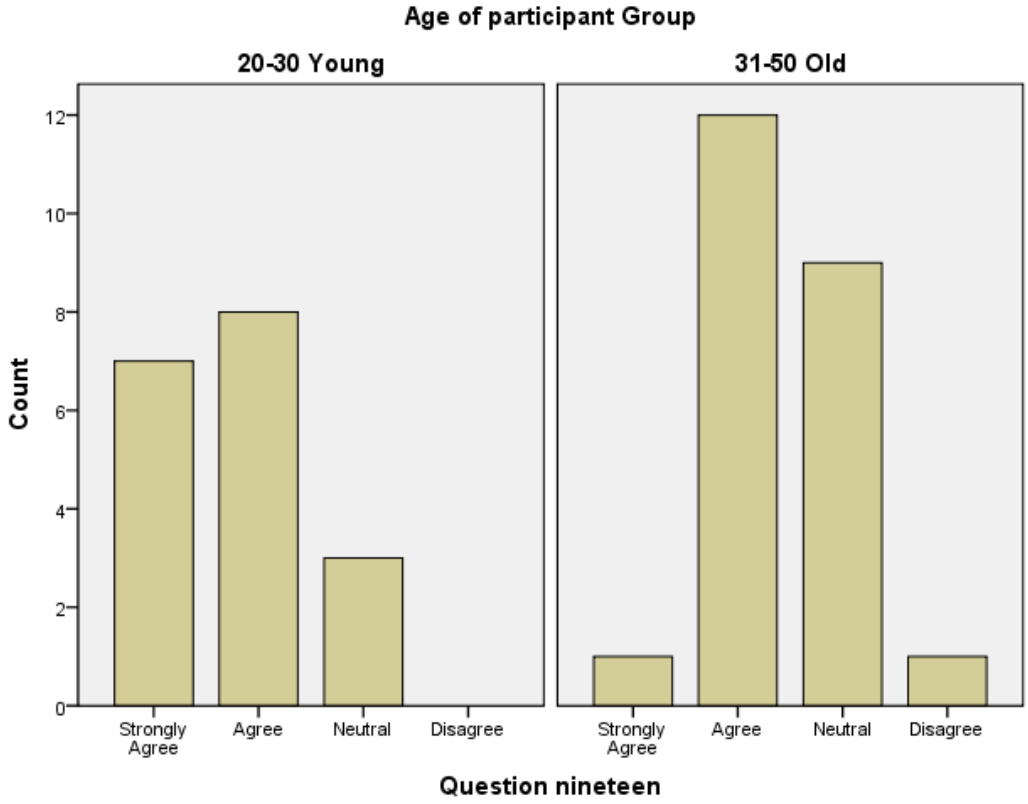

Figure 4.16: Using GPS via the mobile internet is useful

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=171.000, p=0.351).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 4.922, P = 0.178).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Q20: "*Secure net browsing is not important for using internet on my mobile handset*"

In this question, participants were asked whether secure net browsing is not important for using the internet on their mobile handset. 43.9% disagreed, explaining that the private data they might provide while browsing different websites might be targeted by hackers. They added that websites need to have a security certificates to browse safely, as they might need to use their credit card as part of the actions needed by shopping websites. They added that some viruses might damage their machine (PC or mobile) and possibly spread viruses from their machine to other friend's machines; this would be fatal and harmful for most users. More than 34% also had chosen strongly disagree for the same reasons.

Around 12% were neutral. They explained that they do not think that they would use unsafe websites. They considered news and chatting websites safe.

Only 4.9% of participants agreed, and the same amount had chosen disagree. They stated that the websites they browsed by mobile phone were different from those they browsed using the normal stationary tools. They even believed that viruses cannot affect mobile handsets.

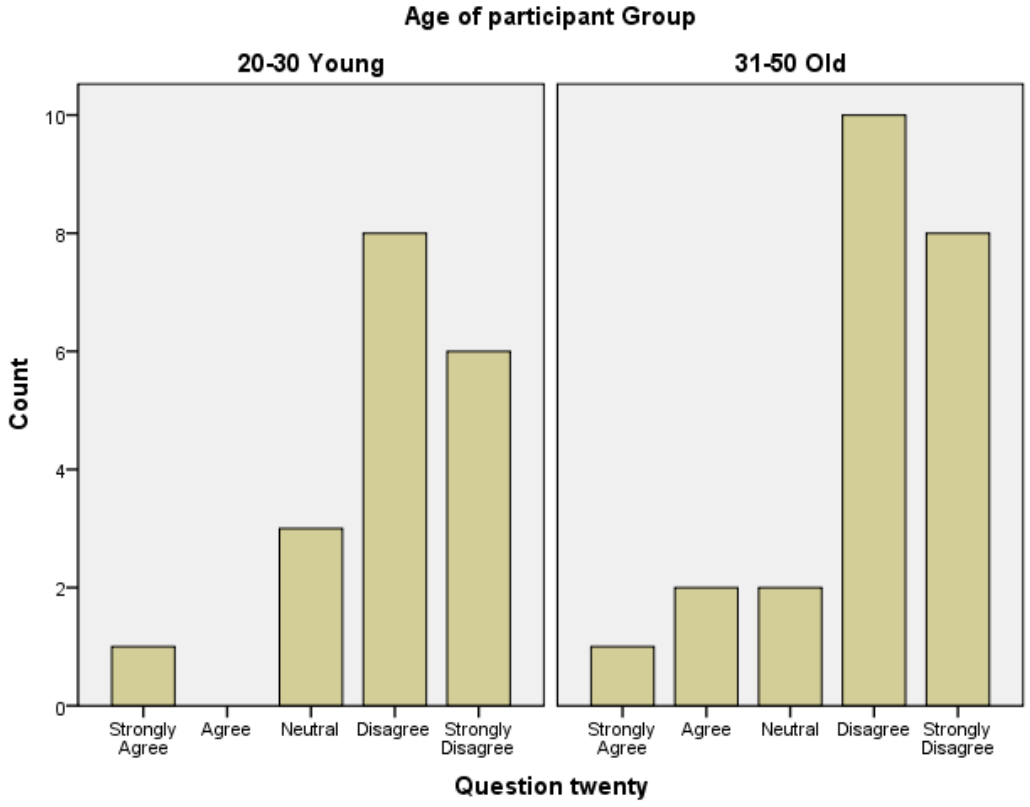

Figure 4.17: Secure net browsing is not important for using internet on my mobile handset

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=148.000, p=0.113).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.583, P = 0.310).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Q21: "*I am happy to provide credit card number details and other personal information while using internet services on my mobile handset*"

In this question, participants were asked if they are happy to provide credit card number details and other personal information while using internet services on their own mobile handsets.

Around 34.1% had chosen disagree. They explained that mobile browsing is not secure enough, and that mobile handsets do not have strong antivirus security systems to protect them while they are browsing different websites. Some of them drew the attention of the researcher to the current status of online buying and selling in Jordan. That was why they would not risk it by disclosing such information. 29.3% of the sample strongly disagreed for the same reasons.

9.8% of the sample agreed, stating that they had previously used such features and they were satisfied with the outcome. They also expressed that they agreed if the website is totally safe and well-recognized for its safety. It was notable that no one choose strongly disagree for this question.

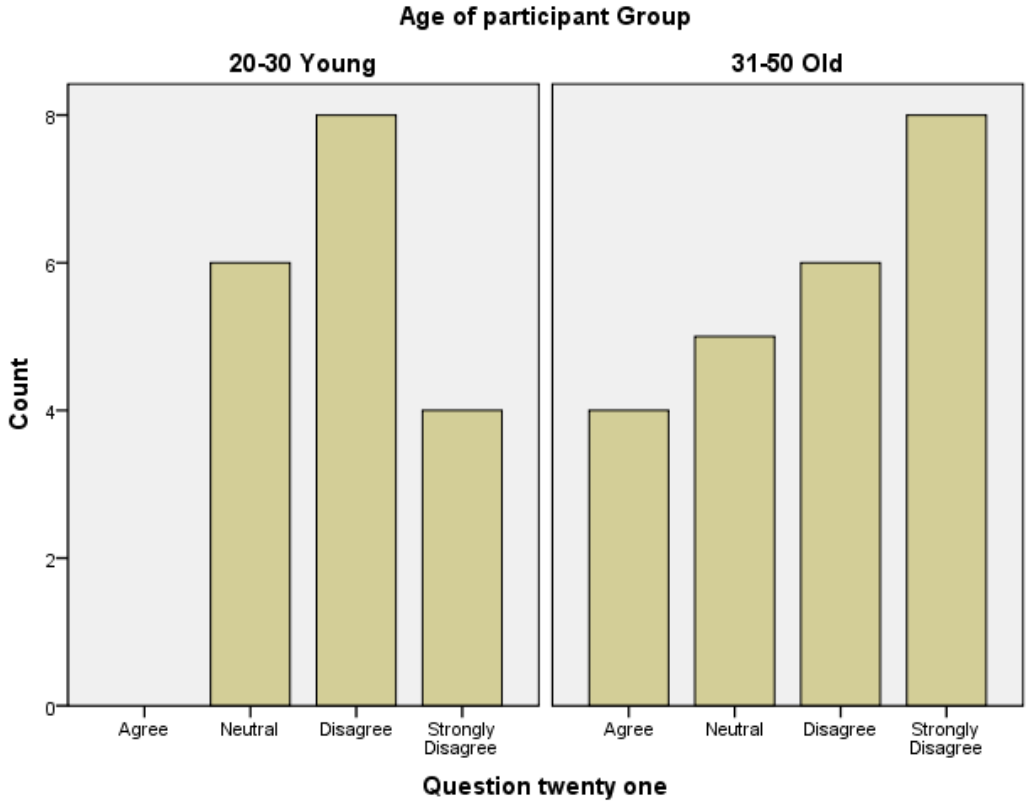

Figure 4.18: I am happy to provide credit card number details and other personal information while using internet services on my mobile handset

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=163.000, p=0.257).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.249, P = 0.741).

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

4.5.6 Ranking question analysis

In this question, participants were asked to list three reasons why they would use the internet on their mobile handsets. The most significant reasons were work, availability and news. For the work internet related browsing, participants explained that they only use their mobile handset for internet related issue only to keep an eye on the work flow. "*I use it only to cover work related tasks. And only because my company affords it to me*". The second issue reported as a reason for using mobile internet was availability. According to the participants, they explained that they may use their mobile internet for important issues if there were no stationary tools around them. This might be for sending or receiving urgent e-mails. "*Some time it is urgent to access my e-mail to send and receive important messages*" " *if I needed to access the internet urgently I would use my mobile in the absence of PC computers* "*I need to keep checking the stock market continually, sometimes I access to internet using my mobile handset to check them*". Finally, users explained that they would use their mobile handsets to access internet to check the news. They explained that since we are surrounded with many "active spots" like Iraq and the Palestinian- Israeli crisis it is very crucial to keep checking the news around us. "*We live in the heart of the Middle East were it is considered to be one of the most active areas politically*" "*the news around us are very important because they affect the whole economy process*"

In the final question, the participants were asked to list three reasons why they would not use the internet on their mobile handsets. The main three reasons were cost, security and hard to complicity of technology usage.

The cost of mobile internet is very expensive in Jordan compared to neighbouring countries, and compared to Europe. The price of 1 GB of data on mobile internet in the UK costs 5 GBP, while it costs around 20 GBP to have the same amount of data for the Jordanian Mobile user.

"*Honestly I can't afford it; I have other issues to take care of*" "*Accessing internet using stationary tools if cheaper than the mobile internet. I won't need it*".

The results made by the Jordanian statistics department (JSD.2012)(which is the only and the official source of statistics in Jordan) indicates that the monthly wage for both male and female Jordanian worker has raised from 350 JD in 2008 to reach 365 JD in 2009. This means that it would be impossible to afford such extra allowance to browse the internet using the mobile handset in Jordan.

Based on a study carried out by the Jordan statistics department in 2010 (JSD, 2012), it was found that the absolute poverty line Jordan is 680 JD per person per year which is equivalent of 56.6 JD a month. Also it has been mentioned by the Jordan Statistics Department that the average of spending per family on the basic food supplies was 36% of the total monthly income.

Aside from cost, the technology itself is complicated enough to be used for many Jordanian mobile users, who are familiar with using the internet through stationary tools. Participants explained that it cost them plenty of time to learn how to use the mobile handset to complete an internet task. "*It would consume very precious time to learn how to access internet using these mobile handset while I can complete any task simply using the PC. It would absolutely save my time.*"

Finally, security issues related to mobile internet still unclear for most Jordanians mobile users, as most people in Jordan have never experience mature online services or shopping. "*I don't trust the mobile internet. I can't guaranty how secure it is*". According to them, viruses are everywhere, and they would not risk ruining their handset or having their personal data compromised by online transactions via mobile internet. *"Internet is full of viruses and spywares, if something happened to my mobile handset, it would harm me and make my personal data in danger as will. I won't trust it"*

Both young and old participant's comments and answers for the ranking questions reflected a common concern beside the fact that there was no age difference between the age groups of the study.

4.5.7 Discussion

This study highlights the context, factors and usability issues which prevent Jordanian mobile users from utilising mobile internet. These relate to issues of function, security, usability and price.

In relation to function, the results of the study indicated three main findings. Firstly, users do not tend to use mobile internet on a daily basis; put simply, they do not use mobile internet often in daily life. Jordanian mobile internet use mainly falls into two categories: work and news. Based on that, mobile users in Jordan enjoy accessing the internet using stationary tools rather than a mobile handset. This is simply because they use mobile handsets on a daily or even hourly basis for making and receiving phone calls, and they do not associate mobile handsets with internet use.

In addition, participants considered security to be a very serious issue. They forcefully emphasized the security factors in using mobile handsets, stating that they refuse to give or use critical details such as credit card information while browsing the internet via mobile handsets. They do not trust these websites and they have never established trust in E-commerce. (Beatty, et al. 2011) (Salamon, S & Robinson S, 2008), (Evelyn and hake, 2003).

Thirdly, mobile handset users in Jordan avoid using mobile internet because of usability issues (Howarth et al. 2009). The screen size is one of the main issues, and a significant reason they prefer to use stationary internet rather than mobile internet is because of screen size. Moreover, they added that the input system might be an obstacle. Additionally, in their experience, mobile internet is slower than regular stationary internet, which would lead to wasting a lot of time. (Lee, and Grice, 2008); (Barnum, 2002)

Finally, the most important reason for which people in Jordan reject using mobile internet is it's prohibitively expense. The price of having an internet service in a mobile handset is (in the view of participants) unjustifiably expensive. The price of using such technology is still very high, and most of the people cannot afford it; to them it is cheaper to browse the internet on regular stationary systems. People with monthly plans, usually provided to them via their companies, ranked as senior employees, might have access to the privilege of mobile internet, and they use it to keep an eye on their work and the general work flow of their teams.

4.5.8 Conclusion:

Mobile internet is enjoyed globally around the world. In the Jordanian context, mobile users hesitate and still afraid to user their mobile handset to perform any internet related tasks. It was revealed that they hesitate to use this service for many reasons such as the cost of the service, and security issues

From this study, it was clear that Jordanian mobile user prefer to access internet using stationary tools. This preference is due to many factors such familiarity and trust.

On the other hand, it was found that the Jordanian user tends to use the mobile internet in case there was no available PC around them. They also use the mobile internet in addition to the availability for work and news. There were no differences in age and gender found in this study.

It was observed from the results of the study that both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

From the results obtained from this study, the focus of the next study will be to investigate and compare the usage of both stationary tools and mobile internet for the next study, by doing such; this will hopefully provide a clearer picture and

better understanding of the needs related to the internet browsing process within the Jordanian context.

Chapter 5: Personal Computers versus mobile handset internet access in Jordan

5.1 Introduction

Many researchers have predicted that in the future most people will access the internet using mobile devices. This will be due to the flexibility they offer people to connect to the internet at any time or anywhere. Based on the findings of the first study, this study will investigate the factors and issues that prevented Jordanian mobile handset users from using mobile phones to access the internet.

5.2 Findings from first study

The results of the first study indicated three main findings in terms of mobile context and usability problems. Firstly, mobile users in Jordan do not use mobile internet on a daily basis. More precisely, they do not use mobile internet as an internet browsing platform. The main usage of mobile internet in Jordan is considered in two purposes: work and news. Based on that, mobile users in Jordan prefer to access the internet using the stationary tools rather than mobile handsets. They use mobile handset on a daily and even hourly basis for making and receiving phone calls, but not usually for other functions.

In addition, participants in the first study considered security as a serious obstacle for mobile internet use. Particularly, trying to avoid the perceived dangers of critical details such as credit card information being shared or hacked while browsing the internet via mobile handset.

Usability issues were the key reason that mobile handset users in Jordan avoid using mobile internet. Screen size was frequently cited as a cause of avoidance.

Participants preferred stationary internet to mobile internet because of the larger screen size of the former. In addition, they added that the input system might be an obstacle during the process of mobile browsing. Furthermore, some participants experienced that mobile internet is slower than regular stationary internet, which causes time loss according to them.

The most fundamental inhibitor of mobile internet use in Jordan was found to be the prohibitive cost of the service. The price of having internet service via mobile handset is very expensive. According to the participants it drives them toward the refusal of such services. In Jordan, the price of using such technology is still very high and most people simply cannot afford it. It is cheaper to browse the internet on regular stationary systems.

Only some mobile users with monthly plans can afford to use mobile internet. Normally this would be provided to them via their companies due to their rank as senior employees.

The motivation behind designing the study was based on the results that Jordanian mobile users prefer the internet access via stationary tools (PC and Laptop). The study will compare both of them in terms of usability. This will provide us with a clearer image of what are main reasons behind the avoidance of using mobile handsets as an internet platform.

5.3 Pilot study

5.3.1 Introduction

The pilot study was conducted to ensure that the research plan was correct and feasible. In addition, it is important to make sure that the questionnaires and the set-up of the study are correct. According to Sanders and Pinhey (1974), a pilot study is defined "A study that is performed to sensitize concepts and work out any bugs in the instruments and procedures". The pilot study for the second study was

also used to detect difficulties that participants faced during completing the questionnaire.

5.3.2 Participants in the pilot study

The small-scale pilot study was conducted with 10 participants prior to conducting Study 2. The majority of Jordanian participants were students in Brunel University. Participants included six males and four females aged 29-44.

5.3.3 Tasks

Participants were asked to complete the following tasks using a PC:

1. Browse your email inbox and check how many new email messages you have.

2. Go to www.jordanweather.jo and check the weather forecast for the next five days.

3. Go to www.xe.com and check the rate of exchange for the British Pound against the Jordanian Dinar.

4. Search for term "HCI" on the Google search engine and write down its definition.

5. Open your Facebook account and check the available posts for today on your wall.

6. Was it easy for you to find the information you were looking for in this task? Please explain your answer…….

The second part set of tasks participants were asked to complete using a mobile phone were as follows:

1. Browse your email inbox and check how many new email messages that you have.

2. Go to www.bbc.co.uk and check the weather forecast for the next five days.

3. Go to www.x-rate.com and check the rate of exchange for the British Pound against the US Dollar.

4. Search for term "TAP" on the Wikipedia web site.

5. Open www.mahjoob.com web site and enjoy the caricature of the day.

6. Was it easy for you to find the information you were looking for in this task? Please explain your
answer……..

To control for order effects, half of the participants completed the tasks using the PC followed by the mobile phone and vice-versa.

After completion Parts A & B, participants were asked three questions about the overall experience they obtained from the study:

1. Did you prefer using the PC or the mobile phone to complete these tasks? Why?

2. What are the benefits of using a mobile handset to access the internet in comparison to a PC?

3. What are the drawbacks of using a mobile handset to access the internet in comparison to a PC?

After the completion of the tasks above, participants were asked to complete a Likert-type questionnaire as the final part of the study.

5.3.4 Questionnaire

To gather data for the work conducted in this study, an 18 statement with Likert scale (see appendix F) was designed.

For the design process, the attitude scale had a combination of positive and negative statements in order to control for any possible acquiescence effect from the participants when they were completing the questionnaire. This type of questionnaire format is one of the most common methods used to extract attitudes from users in HCI research (Love, 2005)

The nature of the questions used in the questionnaire was derived from usability literature relating to mobile handsets and stationary tools. Additionally, findings of the first study were taken into considerations.

Considering previous research (Buchanan et al., 2001; Cui, 2008), it was anticipated that most people would access the internet using mobile devices. However, this had to be investigated further within Jordan. Currently, internet users in Jordan do not frequently browse the internet using mobile handsets. There are many usability issues that control the uptake of such technology in the case of Jordan which need to be studied in depth through questionnaires such as those used in this study. The fundamental focus of this research is to ascertain, using questionnaire method, the factors that prevent internet users in Jordan from using mobile phones to access the internet compared to using normal stationary tools (Yesilada, et al. 2010).

5.3.5 Procedure

The pilot study sample participants were given a written copy of the information sheet (see appendix E). The information sheet explained the nature and procedure for the study. Participants were asked to start after they had read the information sheet. Half of the participants were asked to start with task A before B, and the other half were asked to complete it the other way around (starting with part B).

The main purpose of following such procedure was to control for any possible order effects. Cache memory and browsing history were cleared on both stationary tools and mobile handsets each time before the participants started. The participants were asked to complete the study under the supervision of the researcher in order to calculate the time consumed for each task. After the completion of the study, participants were asked to complete the questionnaire.

5.3.6 Pilot study findings

The first question result obtained from the pilot study indicated that most participants preferred stationary tools over mobile handset. Participants explained this preference by the fact that most of them use stationary tools on a daily basis. They added that accessing internet via mobile handset takes longer than stationary tools, which was also observed in this study. Additionally, participants found the display on the stationary tools to be much clearer and more comprehensible in terms of information display than on the mobile screen.

Participants who preferred to use mobile handset	2 participants
Participants who preferred to use stationary tools	8 Participants

Table 5.1: Participants' preference of internet platform

For the second question, all 10 participants agreed that the main benefit of using mobile internet is availability. They explained that they would use mobile internet when stationary internet tools are missing around them and also when they are away from their offices.

Question three investigated the drawbacks of using mobile internet over stationary tools internet. For some of the participants, mobile internet is more time-consuming than stationary tools. Another reason for preferring stationary tools internet over mobile internet was the pricing of the service. The price of having internet service on the mobile handset is more expensive than for stationary tools.

An additional reason for not preferring mobile internet was the small screen size of mobile handsets. Stationary tools internet provides the user with better display features than mobile displays. Mobile handsets displays are smaller when compared with stationary tools' displays.

Finally, battery life arose as a concern about mobile internet; some of participants expressed their fears of running out of battery while browsing the internet using their mobile handset. They added that they did not have to be worried about battery life when using stationary tools for internet browsing.

Drawbacks of using mobile internet over stationary tools internet	1. Time Consuming
	2. High Price
	3. Screen Size
	4. Battery Life

Table 5.2: Drawbacks of mobile internet

The table below shows all the results for task completion times using the PC and the mobile phone:

Task	Average task completion time for PC (seconds)	Average task completion time for mobile handset (minutes)
1	37 Sec	110 Sec
2	37 Sec	110 Sec
3	40 Sec	121 Sec
4	42 Sec	128 Sec
5	39 Sec	120 Sec

Table 5.3: Time for pilot study task completion

5.3.7 Questionnaire analysis

Few comments were obtained from the pilot respondents regarding the questionnaire. These comments particularly concerned in question 5: "*I prefer to keep using my current mobile handset*". According to some participants, the

question was not clear enough, and they were not sure what was meant by the question. As a result, the question was altered to "I prefer to keep using my current mobile handset because of its features". In spite the fact that all of the participants explained their answers in the specific field, 6 of them showed huge frustration about explaining each answer.

After using the statistical approach to check the content validity, the resultant questionnaire consisted of 20 items. The questions were divided broadly into two sections summarised below:

(1) Mobile handset usability concerns (4, 5, 13, 14, 15, 16, 17, 18, 19, and 20) alpha test.

Because of the negative affect caused by question number 19 on the scale, it was removed from the sample to increase the reliability of the questionnaire. After the question has been removed, Cronbach alpha test results were improved and reached: 0.719.

(2) PC usability concerns (6, 7, 8, 9, 10, 11, and 12) which scored 687 for its Cronbach alpha test.

According to the results obtained from the reliability Cronbach alpha test above, question 11 ("interacting with websites browsed on both screen on mobile handset and PC is the same") had a negative effect on the reliability of the questionnaire. Removing this question raised the reliability of the questionnaire to 758.

5.3.8 Changes to the main study based on the pilot study results

There were a small number of comments obtained from the pilot study respondents regarding the questionnaire. Some of the pilot study participants asked about question five ("I prefer to keep using my current mobile handset").

According to some of the participants, the question was not clear enough and they were not sure what was meant by the question. As a result, the question was rectified to "I prefer to keep using my current mobile handset because of its features".

In spite the fact that all of the participants explained their answers in the specific field, six of them exhibited great frustration with explaining each answer.

Because of the very serious affect caused by question number 19 ("Number of items displayed in each page on mobile handset is not important") on the Cronbach alpha scale, it was removed, where after the Cronbach alpha gave a better result.

According to the results obtained from the reliability Cronbach alpha test of the pilot study, it was shown that question 11 ("interacting with websites browsed on both screen on mobile handset and PC is the same") had a very negative effect on the reliability of the questionnaire. As a result, this question was removed, increasing the reliability of the questionnaire

5.3.9 Pilot Study Summary

After using the statistical methods to check the content validity, the questions were divided into two sections: mobile handset usability concerns and PC usability concerns.

After applying reliability test to the questions of the questionnaire, there was an urgent need to change and delete some of the questions. These changes were made

for the purpose of enhancing the reliability level of the questionnaire. Afterwards, the reliability test results were very positive, which enabled progression to the main study.

There are lots of differences between stationary tools and mobile internet as they are designed and used in different environments. This difference formed the main reason behind the existence of limitations and challenges in both platforms from a usability point of view.

The analysis of the comparison between stationary tools and mobile handset internet browsing which was carried out through this pilot study "study" shows that mobile internet browsing has good potentials. Yet, it does not provide a consistent user experience across stationary tools and mobile handset.

Through completing this study, it was shown that participants who completed the task given to them successfully managed to browse the internet on both stationary tools and mobile handset platforms, although with some concerns about each.

Stationary tools internet browsing is the most used in Jordan. This is due to its ease of use features and because of Jordanian user's familiarity with using stationary tools. They experienced the internet for the first time using this tool, and the use of stationary tools for internet use is ingrained in their habits. In addition, usability issues encountered using stationary tools internet are much easier to handle than those handled by mobile handset.

Mobile handset internet is very useful and manageable, especially when users are away from stationary tools and they need to access internet as a matter of urgency. Also, mobile internet is improving promptly to fit into the internet user's life easily. These improvements are aimed to handle different usability issues which may cause the reason of such common preference for stationary tools over mobile handsets.

Screen size is the most important aspect of usability for both platforms. The significant size difference between both platforms is the most noticeable

difference. Participants in this study strongly preferred stationary tools display screen over the mobile handset one.

Finally, internet speed on both platforms differs. Using mobile handset for internet browsing is slower that stationary tools internet access. This could be a very important aspect in choosing between internet platforms.

5.4 Main Study

Following the pilot study, the main study was conducted to investigate the factors that prevented internet users from using mobile phones to access the internet compared to using normal stationary tools in Jordan.

5.4.1 Participants

50 participants both old and young took part in this study. Participants were deliberately recruited from different backgrounds (industry, universities, etc.) in this study. The researcher went to one of the main universities in Jordan (Applied Science University), and met up with many students explaining the nature of the study and asking for their participation. The researcher also went into several companies in Amman explaining the nature of the study and asking for volunteers to take part in the study.

5.4.2 Demographical data

The first question asked the participants to state their gender. The percentage was 50:50 for both genders.

In the second question, participants were asked to choose the age group to which they belonged. Ages were divided into two groups: young (20-30) and old (31-50)

The majority of the participants of this study held a bachelor's degree (56%). 24% of participants had postgraduate education. Only one participant was at the level of high school and below. 4 participants (8%) were on other education level, such as an honorary doctorate.

5.4.3 Tasks

Three parts where designed to run the study of second study. In the first part, participants were asked to browse and perform different tasks related to the internet using a PC. Part A of the (see appendix E) was as follows:

1. Browse your email inbox and check how many new email messages that you have.
2. Go to www.jordanweather.jo and check the weather forecast for the next five days.
3. Go to www.xe.com and check the rate of exchange for the British Pound against the Jordanian Dinar.
4. Search for term "HCI" on the Google search engine and write down its definition.
5. Open your Facebook account and check the available posts for today on your wall.
6. Was it easy for you to find the information you were looking for in this task? Please explain your answer…….

The second part was to perform another 5 internet related tasks using a mobile handset. The time consumed to complete each task was taken and documented as part of the results. The Part B tasks were:

1. Browse your email inbox and check how many new email messages that you have.

2. Go to www.bbc.co.uk and check the weather forecast for the next five days.
3. Go to www.x-rate.com and check the rate of exchange for the British Pound against the US Dollar.
4. Search for term "TAP" on the Wikipedia web site.
5. Open www.mahjoob.com web site and enjoy the caricature of the day.
6. Was it easy for you to find the information you were looking for in this task? Please explain your answer……..

After completion of Parts A and B, participants were asked three questions about their overall experience of the study:

Did you prefer using the PC or the mobile phone to complete these tasks? Please explain your answer.

What are the benefits of using a mobile handset to access the internet in comparison to a PC?

What are the drawbacks of using a mobile handset to access the internet in comparison to a PC?

After completing both parts, participants were asked to perform task number three and to complete the likert questionnaire.

5.4.4 Procedure

Each participant in the main study was given a written copy of the study sheet (see appendix F). They were asked to start with the study: started with part A then part B.

The other half of the participants were asked to complete the study the other way around by starting with part B. The purpose of this was to control for any possible

order effects. Cache and browsing history were cleared on both stationary tools and mobile handsets each time before the participants started.

The participants were asked to complete the study under the supervision of the researcher in order to calculate the time taken to complete each task. After the completion of the tasks, participants were asked to proceed with filling in the questionnaire (see appendix G) as a final part of the study. Finally, participants were kindly asked afterwards to return the sheet to the researcher when they completed the questionnaire.

5.4.5 Task completion times

The time taken t to complete each task varied between stationary tools and mobile handsets. The table below shows the average time taken to complete each tasks for parts A and B:

Tasks	Average task completion time for PC	Average task completion times for mobile handset
1	48 Sec	270 Sec
2	49 Sec	270 Sec
3	48 Sec	300 Sec
4	48 Sec	280 Sec
5	48Sec	266 Sec
Total Time to complete task	240 Sec	1380 Sec

Table 5.4: Average task completion times for PC and Mobile Handsets in main study

Age group		**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total Time**
	Average time of completion	47 Seconds	49 Seconds	48 Seconds	47 Seconds	48 Seconds	4 minutes
Old (31-50)	Average time of completion	72 Seconds	71 Seconds	71 Seconds	72 Seconds	68 Seconds	6 Minutes

Table 5.5: Average task A completion time for PC

Age of Group		Q1	Q2	Q3	Q4	Q5	Total
Young (20-30)	Average time of completion	254 Seconds	264 Seconds	260 Seconds	250 Seconds	253 Seconds	21.3 Minutes
Old (31-50)	Average time of completion	336 Seconds	324 Seconds	335 Seconds	296 Seconds	277 Seconds	26 Minutes

Table 5.6: Average task B completion time for PC

5.4.6 Questionnaire analysis

Q4. "*I found it difficult to use an internet enabled mobile handset"*.

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=289.500, p=0.826).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.342, P = 0.505).

Less than 30% of the participants agreed with the question statement. They explained that it is not easy to use new mobile handsets because some knowledge has to be gained before usage. In other words, they felt more comfortable using their ordinary mobile handsets.

On the other hand, more than 40% of the participants disagreed with the statement. They explained that using new mobile handsets is necessary to achieve up to date knowledge with latest technologies available. They added that even if they are not browsing the internet via mobile handsets, it is important to know and use different mobile handsets regardless of what features they have.

Less than 30% of the sample were neutral, explainig that they do not care about the internet if it was enabled or not on their mobile handset.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

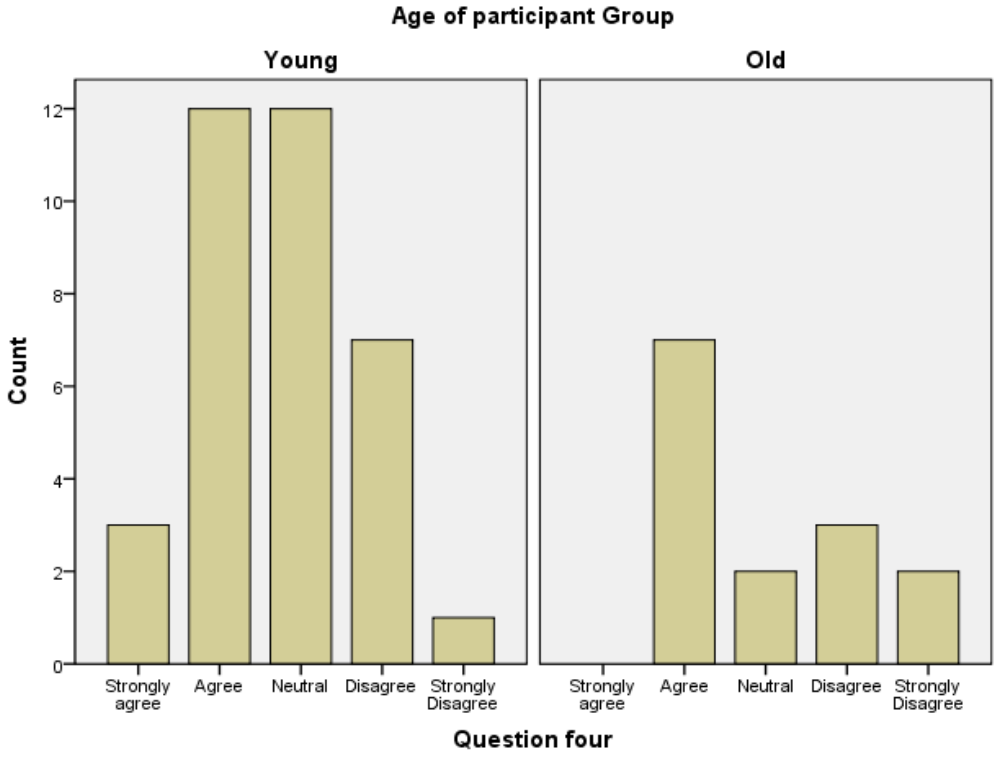

Figure 5.1 I found it difficult to use an internet enabled mobile handset

Q5. *"I prefer to keep using my current mobile handset"*.

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=300.500, p=0.803).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.412, P = 0.332).

Around 50% of the sample agreed and strongly agreed with the question statement; they explained that their current phone is suitable for them and they enjoy its features. This feeling is formed based on their familiarity with the device, which they prefer not to change it with new one.

Moreover, some of them explained that to have a new phone that means loss of some of the data from the old device (e.g. contacts and sms messages), which they need to keep on the device rather than losing them.

Furthermore, some of the participants explained that they need to learn how to use the new mobile handset; this process will cost them time and effort.

Less than 20% disagreed and strongly disagreed with the question statement. They explained their refusal by the fact that users need to familiarise themselves with new technologies and new handsets. Failure to do so (they explained) would create some sort of isolation from experiencing very important features such as internet browsing. They further explained that old handsets might not be suitable to perform such activities on.

Some participants expressed that when their handsets get old enough, they will think of owning new technologies to keep up with other friends and people around them

More than 30% of the sample was neutral. They explained that having a new handset might not be difficult, but currently they are happy with the mobile handset they have.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

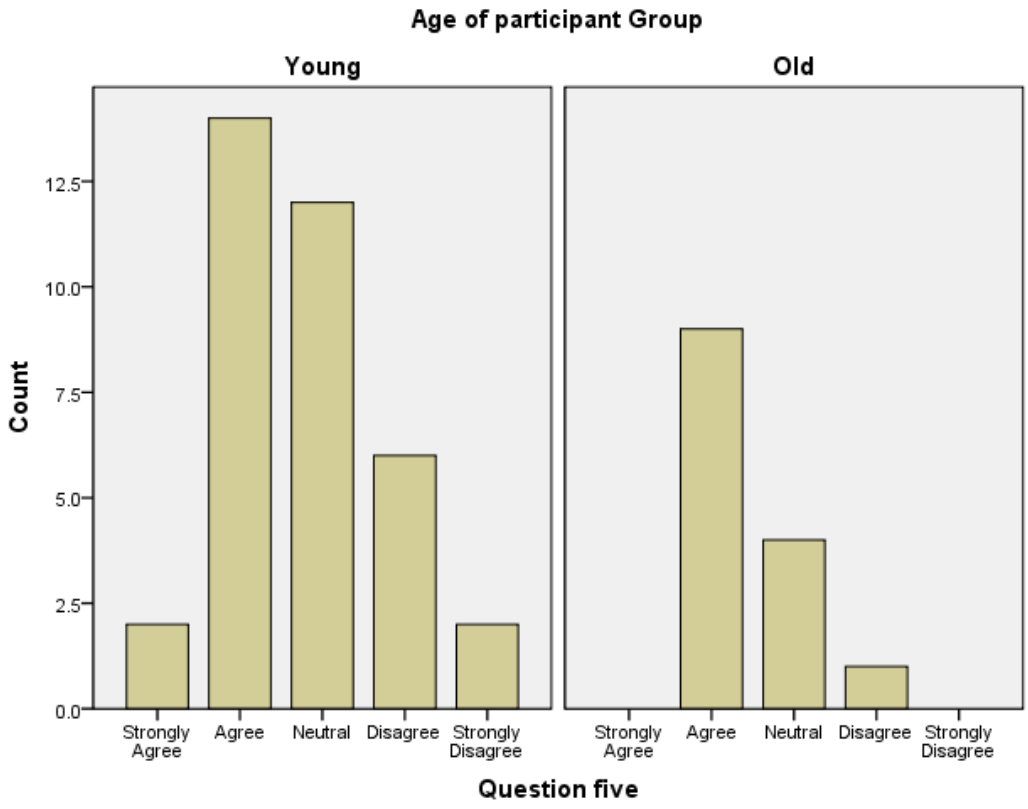

Figure 5.2 I prefer to keep using my current mobile handset

Q6. "*Browsing websites on a pc is easier than using a mobile handset".*

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=258.000, p=0.257).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.357, P = 0.949).

More than 75% of the sample agreed and strongly agreed with the question statement. They explained that the keyboard and the screen size on the stationary tools makes internet browsing more enjoyable and easier than browsing internet through mobile handset.

Furthermore, the availability of the mouse pointing device adds a plus to the stationary tools. In addition to their explanation, browsing internet via stationary tools is faster than on mobile handset. Some ADSL speeds reach up to 10 Mbps, while on the mobile handsets the maximum speed experienced was 2 Mbps.

75% of the sample agreed that using stationary tool internet is easier than mobile internet. This is due to the familiarity of using internet via stationary tools, as discussed above.

22% were neutral. They explained that browsing the internet using a mobile handset might be suitable for them if the prices were lower.

One participant (2%) strongly disagreed. He explained that mobile internet is always available, and it could be used any time any place without boundaries.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

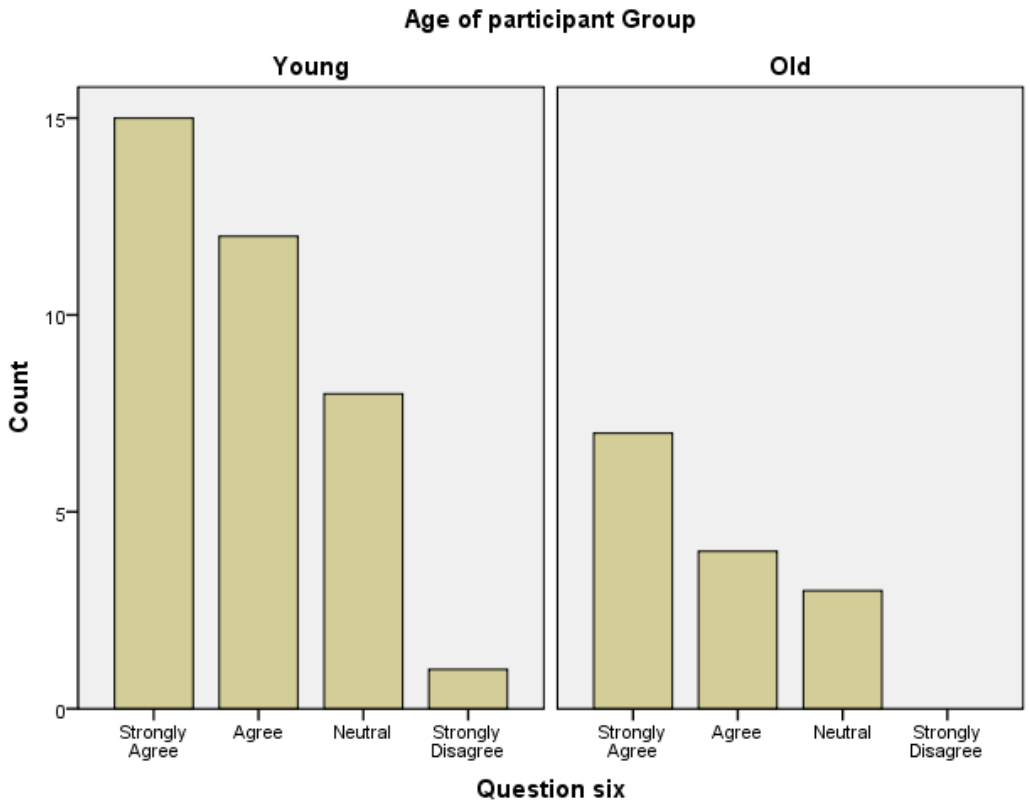

Figure 5.3: Browsing websites on a pc is easier than using a mobile handset

Q7. "*Websites browsed on mobile handset are not the same with the one browsed on a PC".*

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=297.500, p=0.758).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.130, P = 0.546).

Answers to this statement were generally positive; around 66% of the sample agreed and strongly agreed. Most of the websites browsed in the study were Jordanian. However, the web developers did not consider that some users might browse these websites using their mobile handset, which led to dissatisfactory

experiences in some cases. This could also be referred to the way information were displayed

In addition, some of the mobile handsets did not have the technology that enables them to browse websites. This was due to that these mobile handsets are not designed with internet browsing in mind. Additionally, some of the websites were designed to be browsed using web 2.0 activity, while the browser on the mobile handset mainly supported older technology.

Besides the web design technical issues, the time consumed to complete tasks using internet via mobile handset was another source of criticism from users. It took users around three times longer to use mobile internet to complete each task, which was inconvenient to some of them.

On the other hand, around 26% of the sample disagreed and strongly disagreed with the question statement. They explained that it does not matter what platform they are using as long as it completes the job.

Also, it was observed that most of the users who disagreed and strongly disagreed with the question statement had previous experience in mobile web browsing, which made it much easier for them than for the other users.

8% of the sample was neutral, explaining that they did not observe much difference between the platforms, and they were able to complete the task successfully on both.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

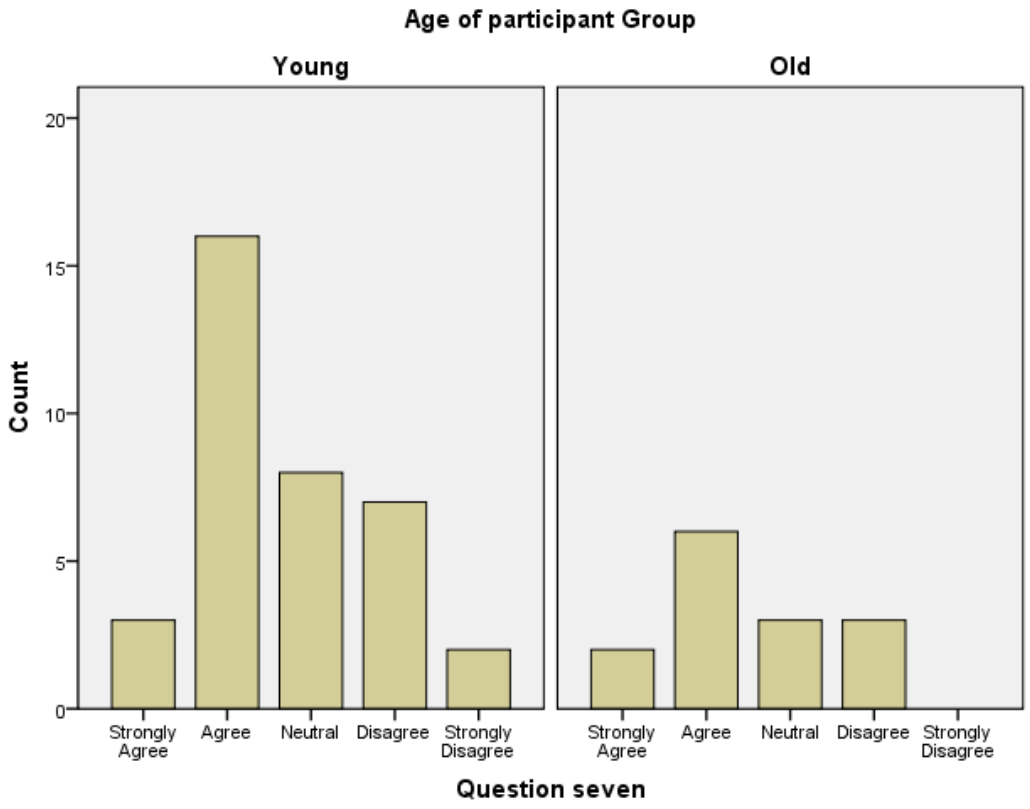

Figure 5.4: Websites browsed on mobile handset are not the same with the one browsed on a PC

Q8. "*It is quicker to browse on a PC than mobile handset".*

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=221.000, p=0.055).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.375, P = 0.498).

More than 80% of the sample agreed with this statement by choosing agree and strongly agree mainly, due to more familiarity with the stationary tools as internet browsing machines.

They also added that completing tasks via stationary tools is faster than the mobile handset internet. There are varied reasons that stationary tools being faster than mobile handset internet. Reasons such as the infrastructure of mobile internet in Jordan are slower than for stationary tool.

Another reason is that browsing the internet via stationary tools has some additional aids to support the process of browsing, namely keyboard and mouse. It is technically impossible to use stationary tools without the mentioned aids, which lends extra comfortable using the stationary tools for users accustomed to them.

Finally, the familiarity of using stationary tools proved to support participants' opinions. Most of users explained that they experienced internet for the first time using the stationary tools, which plays major role in their preferences. Additionally, the cost of using mobile internet technology is significantly higher than stationary tools in Jordan, so there is a financial boundary to using such technology.

One person strongly disagreed with the statement, he explained that he faced no problem with using the internet via mobile handset, because it is very simple, he added that he got used to it very quickly as a part of his daily job to keep logged into the internet.

16% of the sample was neutral; they explained that they managed to browse the internet on both platforms with no problems.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

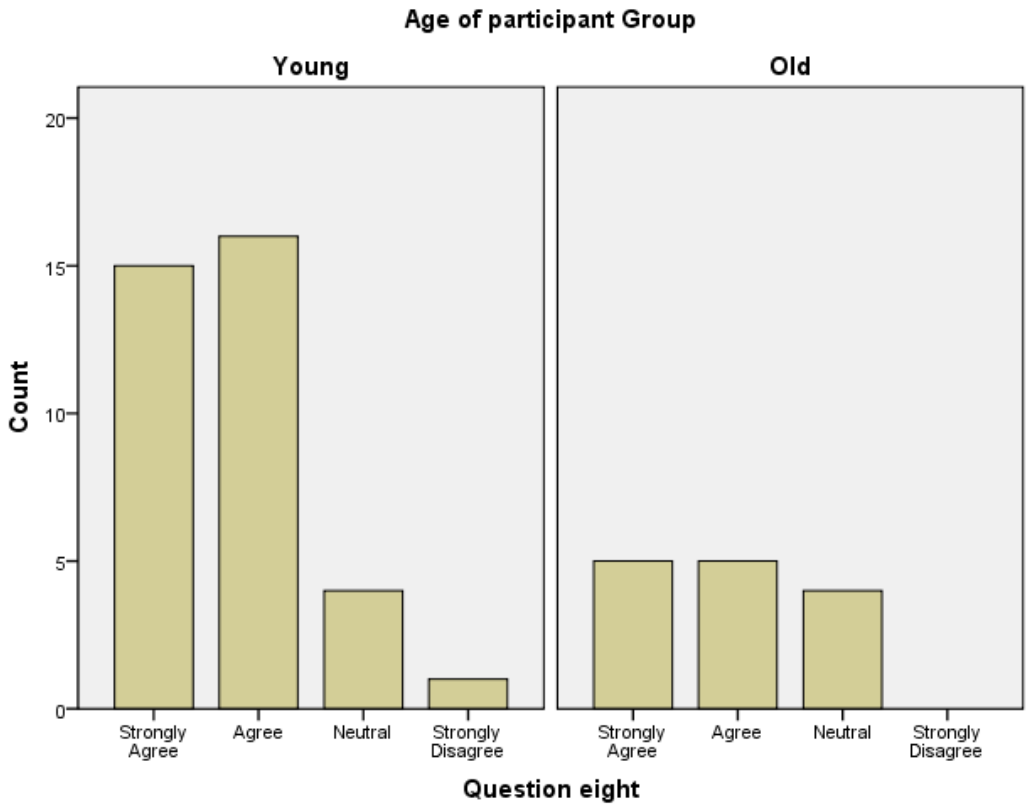

Figure 5.5: It is quicker to browse on a PC than mobile handset

Q9. *"I prefer using a PC keyboard for the internet browsing than a keypad on a mobile phone."*

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=291.500, p=0.664).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 6.867, P = 0.076).

For this statement, 48% of the sample agreed and strongly agreed. Their explanation was that they are more familiar with using the stationary tool keyboard than the mobile handset input tool.

The letters on the stationary tool keyboard are bigger and clearer. Also, stationary tools' keyboards are faster (i.e. it is easier for users to enter the desired letters). In some mobile devices, participants expressed that they had to press the key pad three times to get the letter c, while on the stationary keyboard they only needed to press the button c, which is more than satisfactory .

On the other hand, 32% of the sample disagreed with the question statement. They explained that each platform has its own entry method and it is suitable to use a keyboard with the stationary tools, while the usage of the keypad for the mobile handset.

20% of the sample was neutral. They explained that both platforms are manageable to use and they faced no hassle to complete the tasks given to them.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

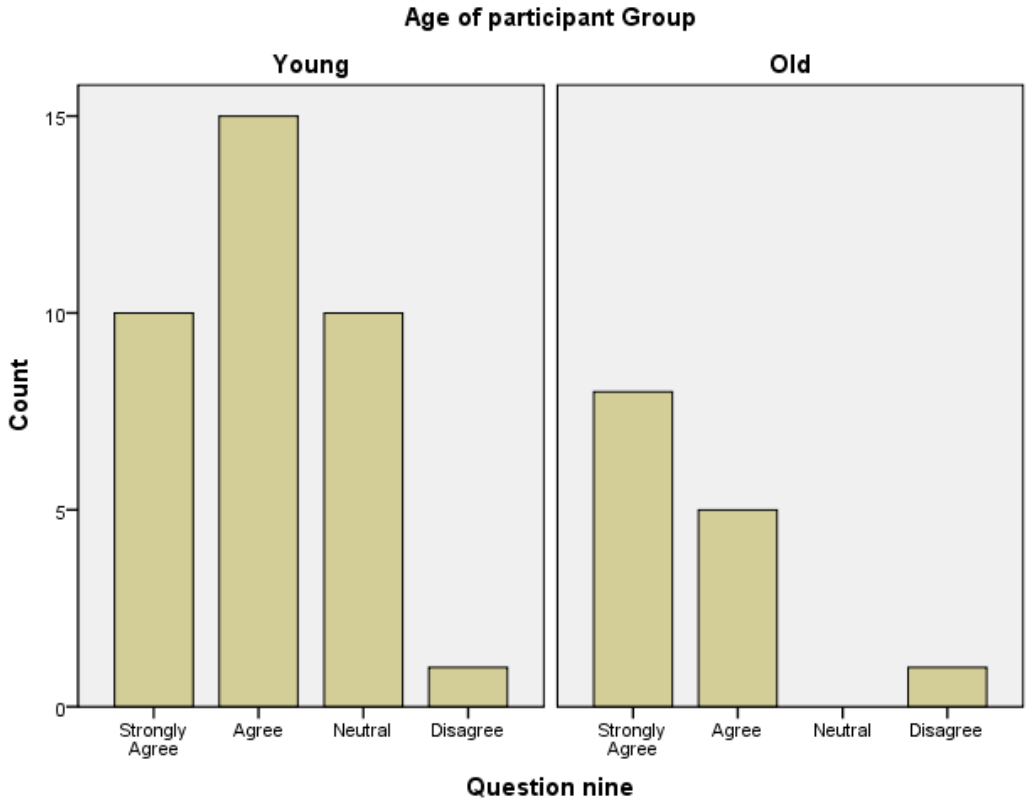

Figure 5.6: I prefer using a PC keyboard for the internet browsing than a keypad on a mobile phone.

Q10. *"Using mouse while browsing internet is good way to complete tasks".*

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=262.500, p=0.295).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.492 P = 0.684).

Over 90% of the sample agreed and strongly agreed with the statement. They explained that using the mouse while browsing the internet makes the experience easier and faster.

Participants can move the cursor more easily, smoothly and quickly than the arrows on the mobile handset. Some of them even reported that the mouse is more responsive than the mobile handset pointing device. Apparently, the mouse has a very strong bond with the users' familiarity of the tool, because they knew how to use it. For some of the participants it was hard to use a different tool than the mouse. Only 8% of the sample chose neutral. They explained that it is not necessary to complete the internet browsing task with the mouse.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

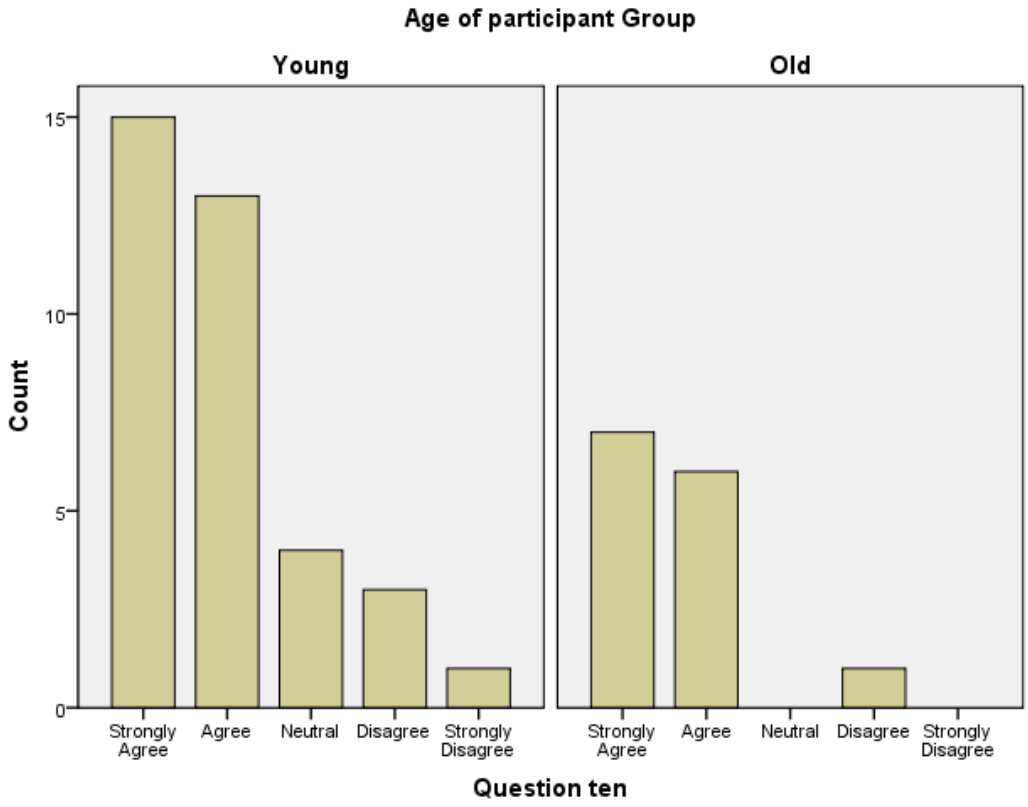

Figure 5.7: Using mouse while browsing internet is good way to complete tasks

Q11. *"I prefer a large computer screen to browse the internet rather than the mobile handset screens."*

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=271.000, p=0.388).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.950, P = 0.583).

Around 56% of the answers for this statement were agreeing and strongly agree. Explanations varied; one prominent comment was that the display screen on the mobile handset is small and some details cannot be seen properly when compared with the stationary tools display screen.

To some of the participants, using the mobile display screen can increase sight irritation, because it is not comfortable at all, and they need to pay more effort to observe and read. Also, some of the websites need high resolutions for enjoyable browsing. Reading from a small display is hard, and participants had some fears that it would be detrimental to their eyesight to use mobile handsets for internet browsing of text-filled web pages. They explained that font size differs between the platforms. They added that playing games on the mobile handset is not as enjoyable as on stationary tools. The graphics and the sound are more rich and interactive in the latter.

On the other hand, 32% of the sample disagreed and strongly disagreed with the question statement. The explanation for this was that each platform has its own characteristics, such as compact display and mobility, in addition to the availability of the mobile handset. In the case that stationary tool was available all the time then it would be more reliable to use it, but in fact it is not (the raison d'être for mobile technologies).

12% of the sample was neutral. They explained that browsing the internet via a mobile handset is acceptable for a short period of time. Moreover, they said that mobile internet is good for a web site that doesn't consist of small details with no small details.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

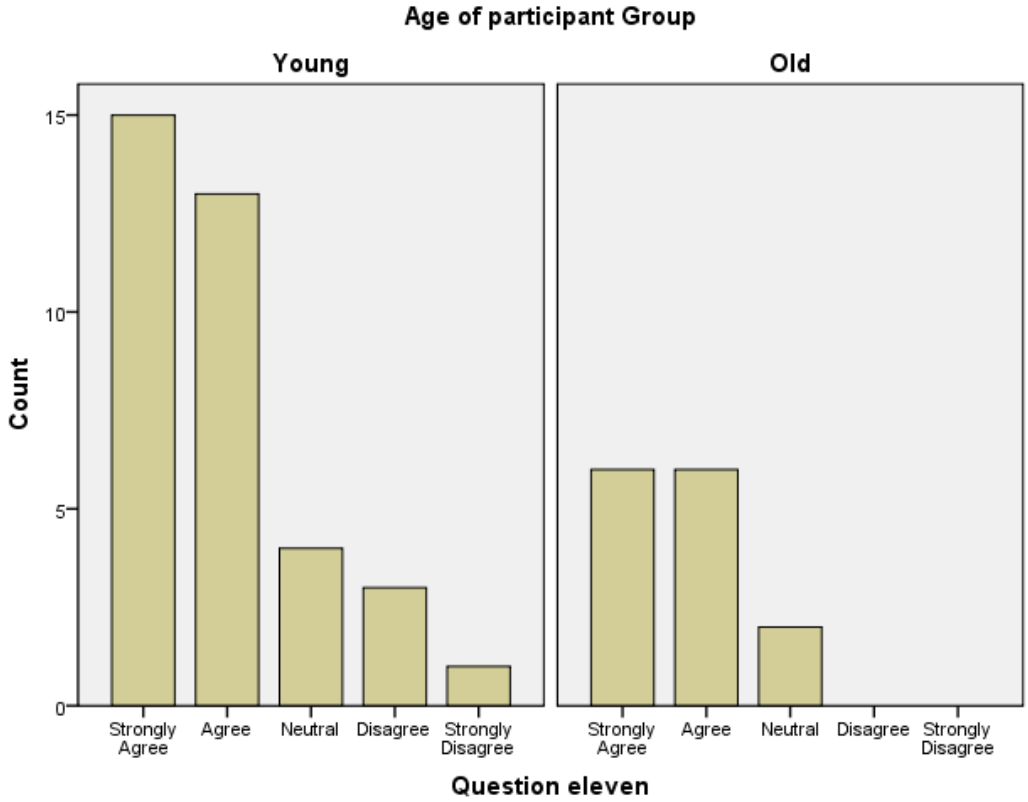

Figure 5.8: I prefer a large computer screen to browse the internet rather than the mobile handset screen

Q12. *"I would use the mobile internet to do internet shopping"*

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=255.500, p=0.251).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.441, P = 0.932).

The answers to this statement varied. 60% of the sample chose disagree and strongly disagree as a response to this statement. They explained their answer by stating that internet shopping via mobile handset is not safe enough.

In addition, usually e-shopping requires concentration and attention to details, which is harder due to the small screen of the mobile handset (discussed above). Another fundamental reason behind the refusal was that most of the participants explained that it is not safe to give their credit card details online because it might get stolen and used by hackers.

Some of the users expressed that the time spent on shopping via mobile handset can complement conventional shopping (i.e. they thought it was useful to browse for products that they would later buy in a physical outlet).

Finally, one of the participants drew attention to the fact that the Jordanian market is not available online. Lots of the shopping websites are abroad, requiring expensive shipments, and most sellers do not ship to Jordan.

On the other hand, over 20% of the sample supported the statement by choosing agrees and strongly agrees. The explained that e-shopping is easier than the normal shopping and they would not mind using their credit card details via mobile internet. One participant commented: "*E-shopping is considered to be a faster way and easier especially when I used to be in the UK*". 18% of the sample was neutral about the statement.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

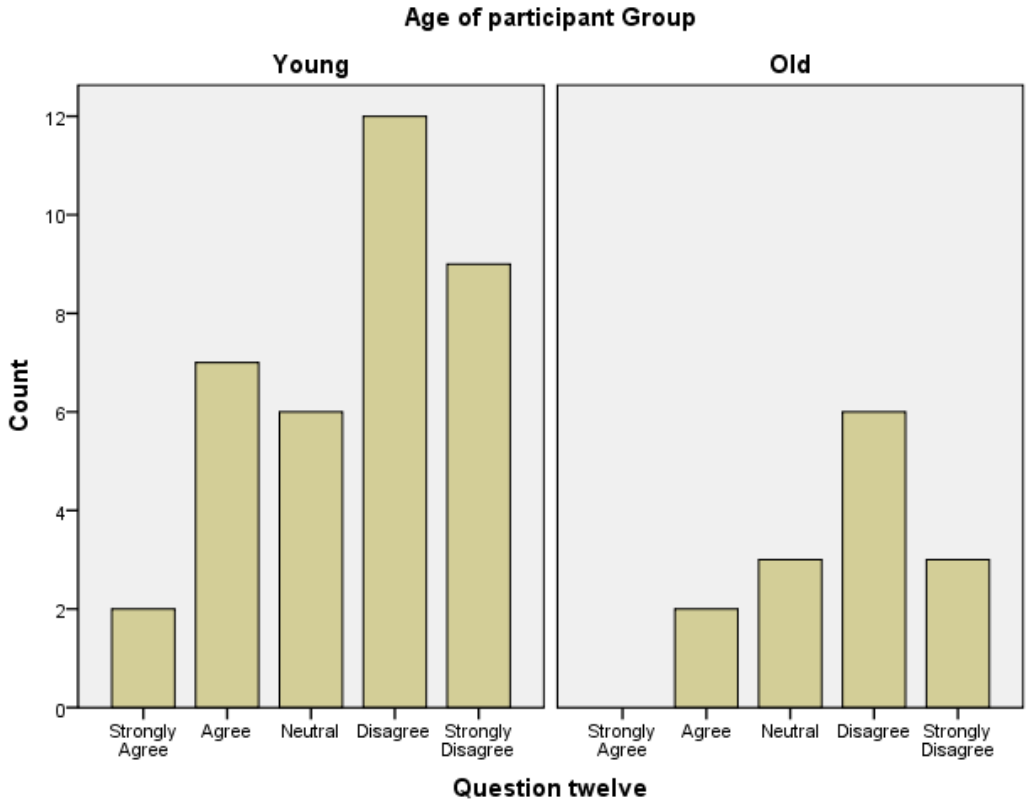

Figure 5.9: I would use the mobile internet to do internet shopping

Q13. "*The number of items displayed on each page of mobile handset is important*"

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=288.500, p=0.625).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.667, P = 0.881).

74% of the sample agreed and strongly agreed with the statement. They explained that it would be better to increase items display on the mobile handset screen.

They explained further that when reading from a website flipping pages to continue reading is annoying. Moreover, participants explained that adding more items to the display screen will save time while browsing.

On the other hand, only 6% of the sample disagreed and strongly disagreed with the question statement. They explained that: "Lots of details in the screen can get confusing" and that they need to pay extra attention about the information they are reading via their mobile phone in order to understand the whole picture.

20% of the sample was neutral; some of them said that it does not matter and they need to cope with their mobile handset capabilities and limitations.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

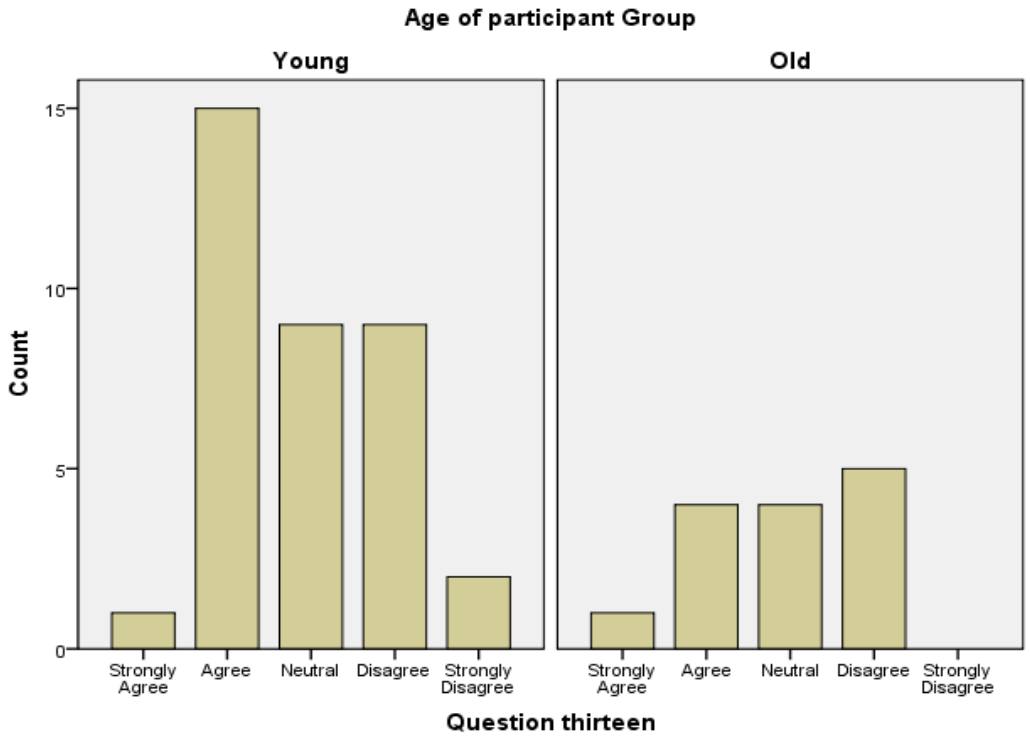

Figure 5.10: The number of items displayed on each page of a mobile handset is important

Q14. "*Menu item colour is important on mobile and PC*".

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=296.000, p=0.741).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.319, P = 0.345).

Over 45% of the sample agreed and strongly agreed with the statement. They explained that the colours of the display screen are very important, because it helps them when, reading or gaming.

It is also one of the most important usability issues and a user interaction cornerstone during the decision-making process concerning buying new mobile

handset. Participants explained further that the details and type of screen is very important, such as TFT or the recent HD on stationary tools or Amoled screens on the latest mobile handsets.

In addition, participants expressed that both mobile handset and stationary tools displays differ. The items in the mobile handset menu tend to be smaller and sometimes unclear. They also reported that some items do not express the purpose of symbols correctly. While using stationary tools they did not encounter such problems.

34% of the sample disagreed and strongly disagreed with the question statement, explaining that it is not important to them. They can use any colour as long as the browsing does the job.

20% of the sample was neutral; they explained that this was not a fundamental issue for them; the features of the handset are more important.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

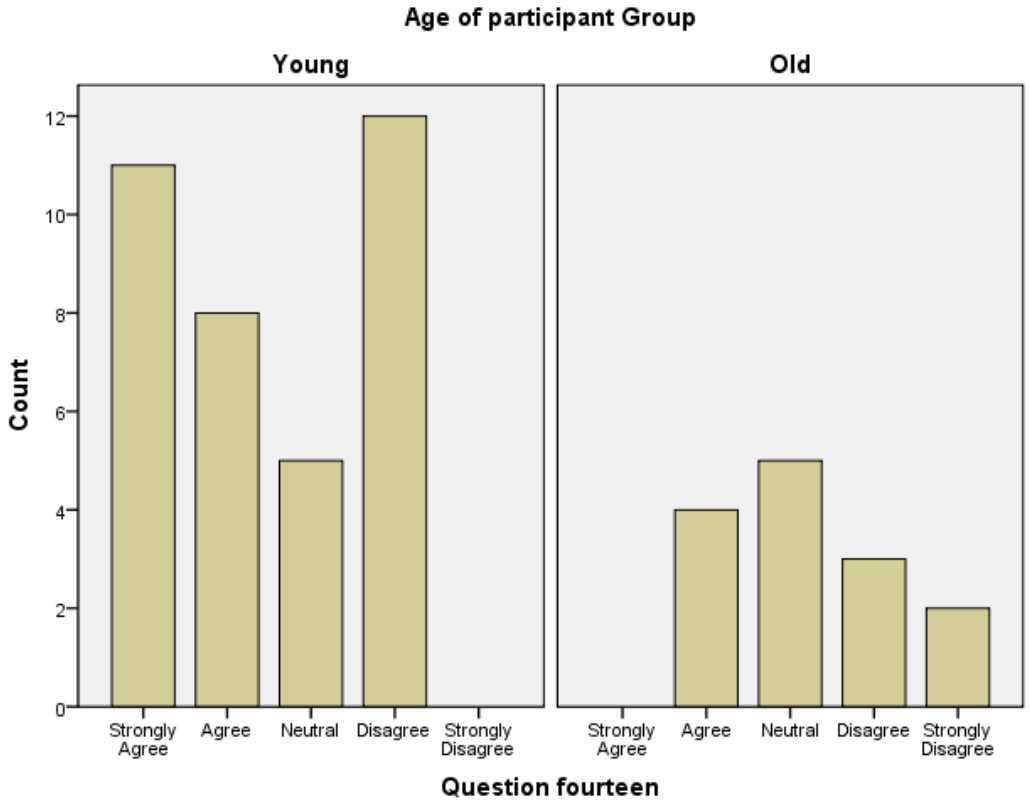

Figure 5.11: Menu item colour is important on mobile and PC

Q15. "*Adding different applications to my mobile handset is not important*"

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=288.000, p=0.621).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.399, P = 0.706).

54% of the sample disagreed and strongly disagreed. They explained that different mobile applications are very important since they make life easier. For example, many participants said that they use the global converter application in their daily life.

In addition, some participants said that they need to check the money rates on a daily basis because of financial issues. They reported that they use the metric exchange application. Moreover, some might need to find the meaning of a word which could easily be done by using a dictionary application on the mobile phone.

Only 16% agreed and strongly agreed with the question statement, explaining that these applications need a lot of time to learn how to use them, and also they were frequently charged for such services. They also added that they would use the mobile phone for telephony, not to use applications, and they could find anything (e.g. money exchange rates, length and width conversion) using the internet.

Finally, 30% of the sample was neutral because they did not know how to use the applications and their handsets did not support the downloading of applications.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

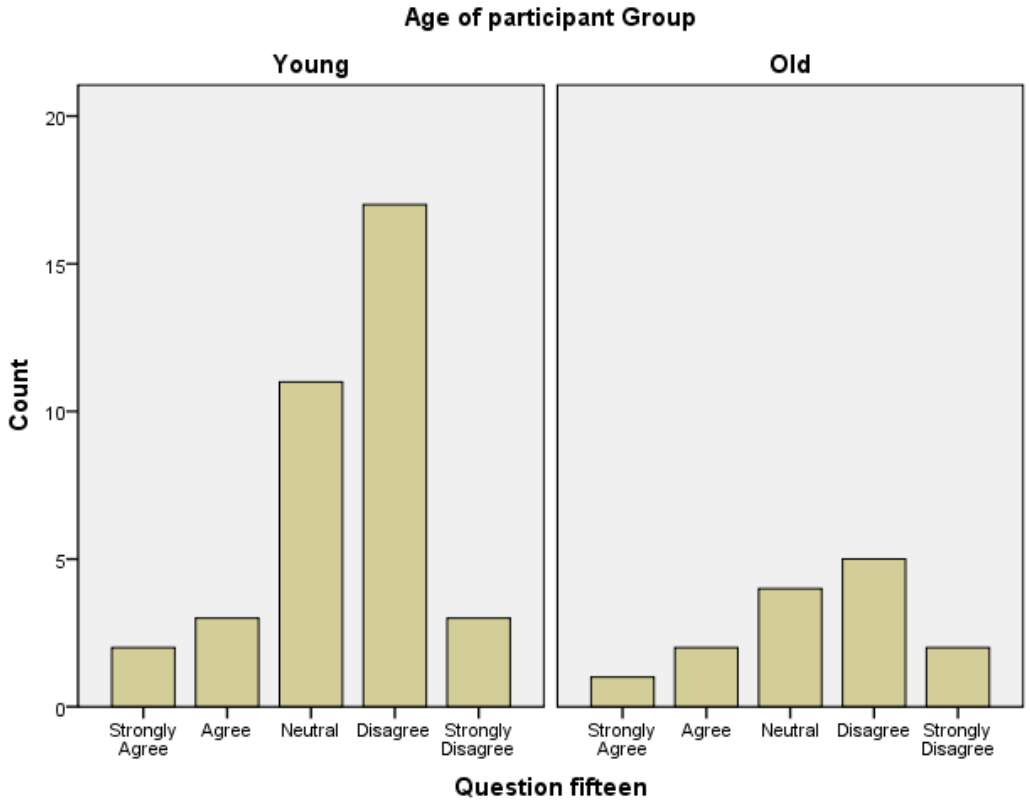

Figure 5.12: Adding different applications to my mobile handset is not important

Q16. *"Displaying lots of information's on the mobile handset screen is useful*".

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=286.000, p=0.593).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 6.387, P = 0.094).

For this statement, more than 45% of the sample had chosen agree and strongly agree as their responses. Participants explained their answer by the perception that

for any displayed content on mobile display screen, the more information of the content is displayed on the screen and the clearer the content will be. They also added that they need more information, especially when reading specific details from a website, such as a daily newspaper and financial stocks.

On the other hand, around 24% of the sample choice disagree and strongly disagree. The explanation for this was that "adding more details to a small display screen will make us more confused and lost at some point"; they added that adding more information to the screen would make the spaces in the screen narrow which makes it in its turn difficult to read from.

Finally, 30% of the sample was neutral; they explained that it does not really bother them to have a filled display mobile screen. They explained that if they had a proper mobile device or a PDA then more information would be suitable for them. Participants explained further that if they used a small-screen mobile handset, they would need to go through many pages to complete a single task such as reading news.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

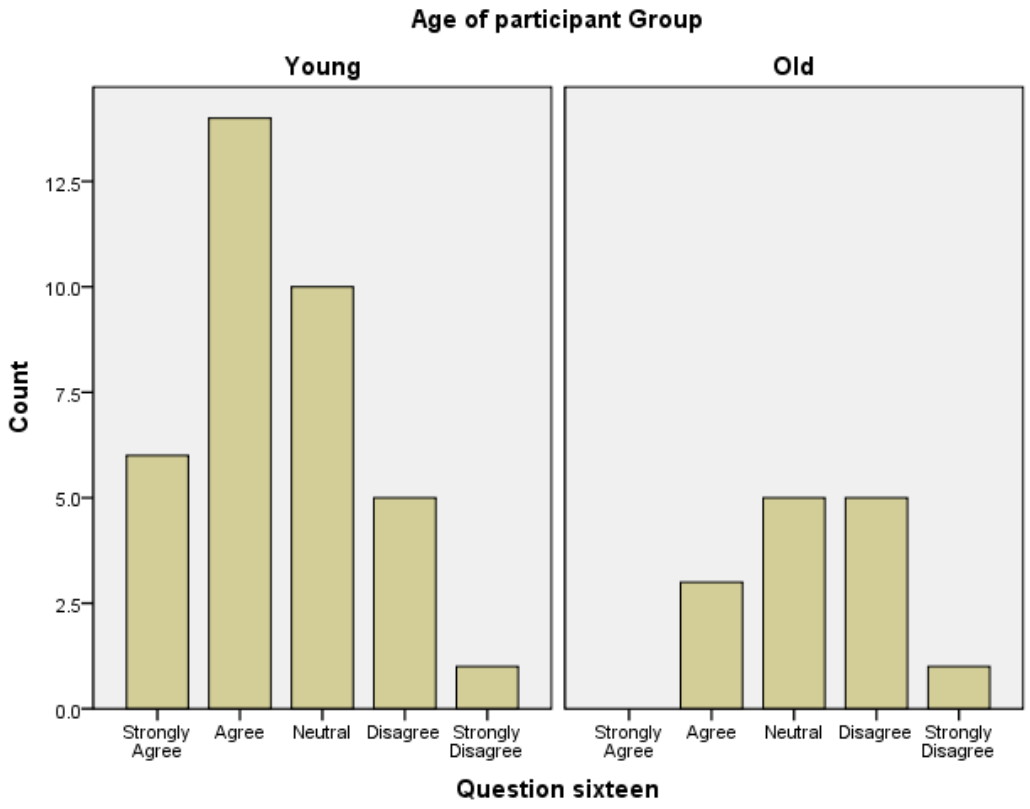

Figure5.13: Displaying lots of information's on the mobile handset screen is useful

Q17. "*Mobile handset keypads with multi functions are difficult to use*"

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=276.000, p=0.465).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.188, P = 0.534).

44% agreed and strongly agreed with the question statement. They explained that the functionality of the keypad was a bit difficult to use. They also added that sometimes it is confusing to use the key pad because they know and are familiar with the normal stationary tool PC.

On the other hand, 44% of the sample disagreed and strongly disagreed with the statement. They explained that using such keypads was easy once they were accustomed to it. Also, they expressed that they could use it in different cases, such as while in a queue or eating.

12% of the sample was neutral. They explained that they managed to handle many kinds of keypads but they did not prefer it keenly.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

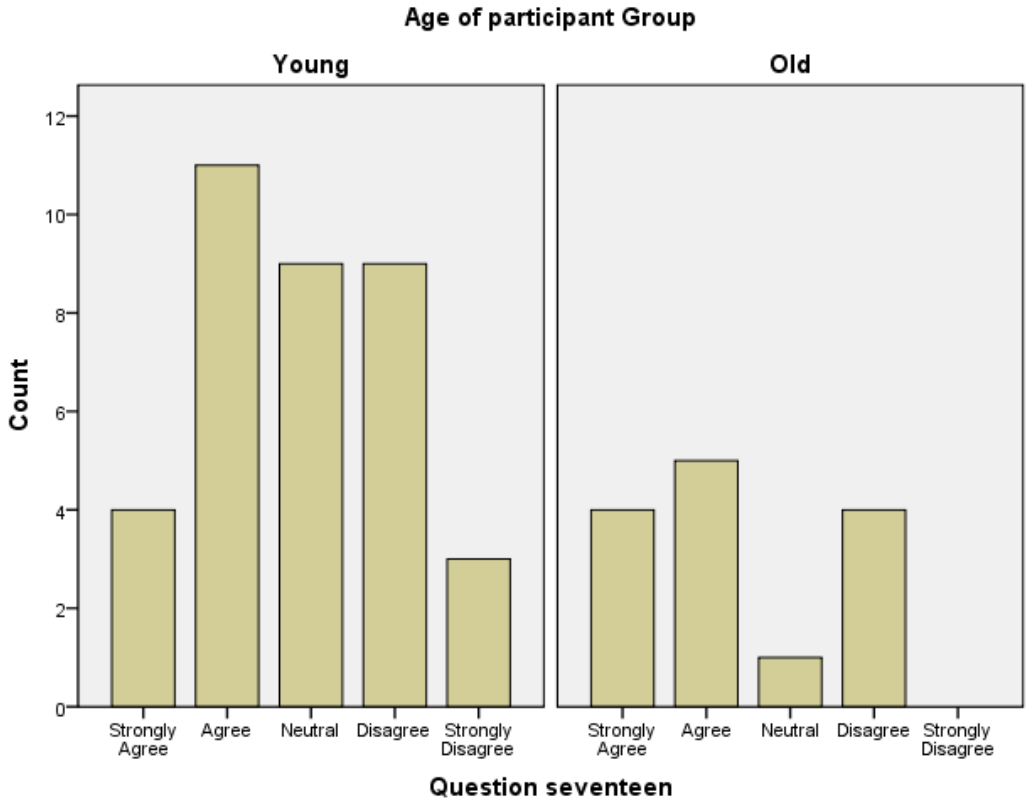

Figure 5.14: Mobile handset keypads with multi functions are difficult to us

Q18. "*My mobile handset font is too small in comparison to my PC font size*".

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=306.000, p=0.894).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.118, P = 0.773).

74% of the sample agreed and strongly agreed. They explained their answer by the fact that the larger the size of the letter, the more comfortable it was for their eyes.

They added that at a certain point and because of the font size, some of them prefer to stop reading rather than continue because of confusion and irritation.

Only 10% disagreed and strongly disagreed. They simply explained that normally the stationary tools' screen size is bigger than the mobile handset screen.

16% of the participants had chosen neutral. It was mentioned that the size of the platform determined the suitability of fonts (the bigger the display is, the bigger the font will be).

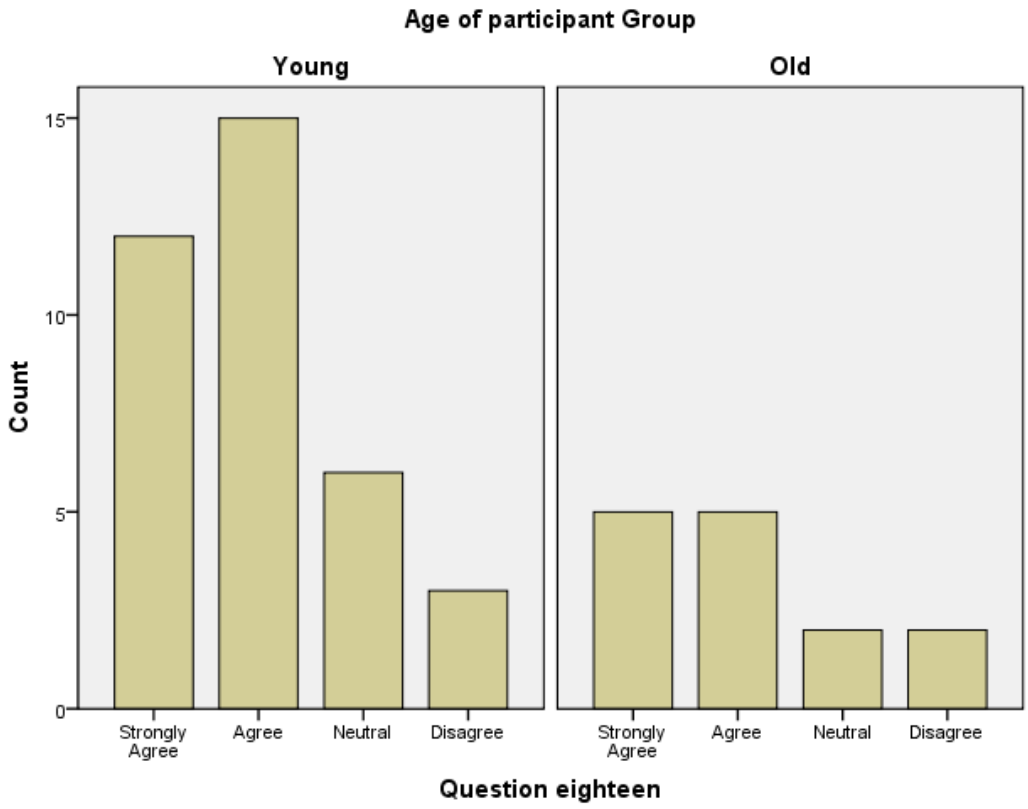

Figure 5.16: My mobile handset font is too small in comparison to my PC font size

5.4.7 Overall experience they obtained from the study

After completing the study, participants were asked three questions about the overall experience they obtained from it; the table below summaries their responses:

Question	Percentages	Reasons
Q1: Did you prefer using PC or the mobile phone to complete these tasks? Please explain your answer	Over 95% of the participants preferred stationary tools internet over mobile handset internet	PC is used on a daily basis. Familiarity with PC. Internet via mobile handset is hard to use.
Q2: What are the benefits of using mobile handset to access the internet in comparison to a PC?	89% of the participants stated the availability of the handset is the significant benefit	Availability. Easy to find around. Lighter weight that the laptop and PC.
Q3: What are the drawbacks of using mobile handset to access the internet in comparison to PC?	90% gave different reasons the drawbacks of access internet via mobile handset	Mobile internet is time consuming. Screen size. Price of the service is higher than PC.

Table 5.6: Study overall results

5.4.8 Open-ended question analysis

After completion of parts A and B at the beginning of the study, participants were asked three question about the overall experience they obtained from the study.

Most of the answers for the first part of the study indicated that participants preferred stationary tools over mobile handsets "*PC internet is better than mobile internet*" "*it is clear what you can do with mobile internet, but I still prefer the PC internet to complete my surf*". Participants explained this by the fact that most of them use stationary tools on a daily basis. They also added that they are familiar with how to access the internet via the stationary tools from the moment of launching the internet browser until the very end of clicking the red "X" on the upper right corner to finish their session. "*I am an expert with PC internet and I can complete many tasks with less time than consumed using the mobile handset*" "*I have been using PC internet for more than 10 years, I know it very well."*

Participants stated that accessing the internet via mobile handset takes longer than stationary tools. This was proven through the completion time of the tasks in the study. "*Mobile internet is very slow. I prefer PC internet*" "*It had taken me 3 time of time to check my e-mail. I didn't like it because it wasted my time*". Besides that, the display on the stationary tool devices is much clearer and easier to understand than on mobile screens. "*I liked the PC screen because it is bigger. The mobile one is okay for urgent issues only*"

For the second question, the availability of the handset was agreed among the majority of participants as a main benefit of using mobile internet over stationary tools internet. "*What is good about mobile internet is that it is available nearly everywhere*". They can use the mobile internet when they cannot find stationary tools around, and also when they are away from their home and offices. "*Sometime it is urgent to browse the internet while im at the shopping mall and there is not PC around. I'll surly use the mobile handset* ".These results follow with the findings of previous studies (Buchanan et al., 2001; Cui, 2008). They

reported accept using their mobiles as an internet accessing platform. This usage will offer them the flexibility of anytime and anywhere access.

Question three answers revealed the drawbacks of using mobile internet over stationary tools internet. For some of the participants, mobile internet is time consuming. Mobile internet consumes additional time in order to complete an internet task when compared with stationary tools. "*Mobile internet is very slow. I prefer PC internet" "It had taken me 3 times of time to check my e-mail. I didn't like it because it wasted my time*". An additional reason for preferring stationary internet over mobile internet was the pricing of the service. In Jordan, the price of having internet service on the mobile handset is more expensive than having it on stationary tools. "*Mobile internet is really expensive. I can afford it*" "*I am on a limited budget and I will avoid using mobile internet because of its price*"

One more drawback was the screen size of the mobile handset. Stationary tools internet display has more features than the mobile display, which is small when compared with stationary tools displays. Battery life was again expressed as a concern amongst participants. "*Battery life is important, using it for telephony is more important than internet*".

5.4.9 Discussion

The results of this study address and spotlight the usability issues that lead users to favour using standard methods and techniques over mobiles for internet activities in Jordan.

Using new mobile technology is a growing feature of life throughout the world. People's need to keep up to date with new technologies available in the market is a core aspect of participation in the global world.

Participants found that browsing websites on the PC platform was easier than on the mobile handset. Around 75% of the sample preferred stationary internet access because of their familiarity with the process. Familiarity is defined as the understanding, often based on previous interactions, experiences, and learning of

what, why, where and when others do what they do (Beatty et al., 2011). Participants experienced internet for the first time using stationary tools, and habitually used them for many years, so it is normal to establish some sort of trust and familiarity with the PC. Participants even mentioned that the (same) websites browsed on the mobile handset were different from those browsed using the PC computers. Once again this is because the participants tend to trust the PC machine more than the mobile handset. Familiarity handles the understanding of the current actions of other people or of objects, while trust deals with opinions about the future actions of other people (Flink and Schreiterer, 2010).

In addition, for the same reason of familiarity, participants found that browsing the internet on the PC is quicker than the mobile handset. They are expert in browsing the internet via PC rather than the mobile handset because of greater familiarity with the former.

Howarth et al. (2009) defined "usability" as the effectiveness, efficiency, and satisfaction with which users of a certain application or tool are capable of achieving precise goals (ISO, 1998) (Howarth et al., 2009). Participants from all age groups agreed that using the mouse to browse the internet was a good way to complete tasks for the same reasons.

A common theme revealed by the results of the study was that participants preferred the large screens of stationary devices to browse the internet rather than mobile handset screens. Participants preferred PC screens because they are more "usable": they are bigger and achieve the purpose in a more satisfactory way to the users. In addition to the size of the screen, the number of items displayed in the screen was important to them. This is again one of the important aspects of usability. The better the details displayed on the screen, the less time participants spend completing their tasks. This concurs with their observations on displaying lots of information on the screen of mobile handsets.

Finally, regarding internet shopping via mobile handsets, the majority of participants indicated that they would not participate in this activity, for a number

of reasons. Apparently, participants did not develop any sort of e-commerce awareness. More precisely, they do not trust online shopping. According to Beatty et al. (2011), "trust" is the confidence an individual has in his/her favourable expectations of what other people will act with or do, based on previous interactions.

People in Jordan still do not trust e-commerce. One of the reasons for this is that the market is not mature enough (although this is also an outcome of their reluctance to use online shopping). In addition, they apply "uncertainty avoidance" (Hofstede, 2001). Uncertainty avoidance is defined as "the extent to which the members of a culture feel threatened by uncertainty and ambiguity along with their eagerness to avoid such situations".

People in high uncertainty avoidance cultures view uncertainty as dangerous and show a low acceptance for risk. They tend to avoid uncertain or uncertain situations by believing in absolute truths and knowledge. These beliefs are manifest in seeking stability and by rejecting unusual ideas and behaviours. Conversely, people in low uncertainty-avoidance cultures deal well with ambiguity and can be classified as risk takers.

5.4.10 Conclusion

The analysis of the comparison between stationary tools and mobile handset internet browsing which was carried out through this study experiment shows that mobile internet browsing has good potential although it does not provide a consistent user experience across stationary tools and mobile handset.

Through completing this study, participants managed to browse the internet on both platforms, with some concerns about each.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

These fears and lack of acceptance of new technology represent uncertainty avoidance (Hofstede, 2001). Uncertainty avoidance possibly has a significant effect on behaviour regarding the use of mobile data services. Users from Jordan's culture tend toward uncertainty avoidance, and are more likely to avoid using mobile services when the quality of service is uncertain or uneven compared to that of traditional internet services (Hofstede, 2001).

Battery life was a major concern of some participants. They expressed their fears of running out of battery power while in the process of browsing the internet using their mobile handset. They explained that they did not need to worry about the battery life when using stationary tools for internet browsing. These thoughts again represent uncertainty avoidance.

Stationary tools internet browsing is the most popular method of internet access in Jordan because of its familiarity and ease of use features. In Jordan, users of the internet have been accustomed to using stationary tools for a long period of time. In addition, they experienced internet for the first time using this tool. We can conclude that internet users in Jordan did not obtain and uptake the mobile internet technology significantly up to the present. Venkatesh et al. (2003) explained that "it is well known that the process of adopting new technologies has obstacles and problems to overcome before it reaches a stable point in terms of uptake and usage" (Venkatesh et al. 2003, p.441).In addition, this leads us to the fact that they - internet users in Jordan - apply uncertainty avoidance directly in their life. However, apart from the stationary tools internet browsing, it was found that mobile internet is very useful and manageable, especially when users are away from stationary tools computers. This benefit was shown when the users needed to access internet as a matter of urgency.

In both platforms, it was found that screen size is the most important aspect of usability. The size of both stationary tools and mobile handset screen when compared to each other is significantly different. This difference pulled many users towards stationary tools rather than using mobile handset internet. This is in accordance with the findings of previous studies (Heo et al., 2009; Weiss, 2002),

which explained that participants had problems accessing the internet using their mobile handsets compared to normal stationary tools. They explained further that such problems are categorised in terms of ease of use and usability issues such as the size of the mobile phone screen size.

Internet speed on both platforms differs. It was clear that using mobile handset for internet browsing is slower than stationary tools. According to the results obtained from this study, stationary tools internet browsing tasks were completed within seconds, while the fastest internet task on a mobile handset took two minutes.

Finally, familiarity with the tools used to complete the internet browsing task is very important (Beatty, et al. 2011). Most of the answers to the explanation parts in the questionnaires confirmed that familiarity with stationary tools is the main cause of preferring those tools over mobile handsets (Flink and Schreiterer, 2010). In fact, familiarity with the tool used to browse the internet was the most recurrent finding of this study.

Based on the findings of this study, the aim of the next study will be on getting Jordanian users to design and evaluate their own mobile phone application. The application will focus one of the most important issues in each Jordanian mobile user daily life: the car violation payment system.

Chapter 6: Car Violation Application

6.1 Introduction

From the second study, it was found that Internet browsing on stationary tools remains the most preferred method of internet access in Jordan. This preference is due to many reasons, such as familiarity and usability issues. In Jordan, users of the internet have been familiarized to using stationary tools for a long period of time which made them experts with using such tools.

It was found that people found the mobile internet very useful and manageable only when users are away from stationary tools. In both platforms, it was found that screen size is the most important aspect of usability. The screen sizes of stationary tools and mobile handsets are significantly different. This difference pulls many users towards stationary tools rather than mobile handset internet use.

These findings led to the realization that mobile users in Jordan require proof to convince them of the possibility and utility of browsing the internet via mobile devices.

Therefore, the aim of the study reported in this chapter was to design and evaluate an application to perform a task that handles a common activity among internet users in Jordan (car violation check); to convince them that mobile handset can be efficacious.

6.1.1 Sketching:

Sketching is well known as one of the HCD techniques that can be used to investigate design ideas (Preece et al., 1994) Sketching is generally used by

software designers to help them thinking of an organising metaphor for an application (Landy and Myers, 2001; Howell, 2004; Roland et al., 2012).

The use of visual representations to discover creative solutions has been proposed as an essential mechanism of scientific discovery as well as in other areas (Qin and Simon 1995; Nersessian, 1995; Gooding 1996).

The strength of sketching lies in the fact that it has been shown to be a valid method to represent mental models. As a result, sketching technique might enable participants to provide a visual representation of their mental model of the structure of items within a mobile phone application (Billinghurst and Weghorst, 1995).

On the other hand, a potential disadvantage might accrue during the sketching process when users might have poor drawing skills. Of course the researcher could overcome such problems by asking the participants to give further clarifications of any unclear details drawn (Howell, 2004).

6.1.2 Sketching a mobile car violation application

For this task, 14 participants of were divided into 3 groups. All three groups agreed that the mobile application should not have more than 4 screens. For the first group, the participants drew the opening screen of the application with an empty box to enter the plate number of the vehicle. Underneath, a start button was located to launch the application. On the same screen there is a check box to tick if the user wishes to save the vehicle number for future use. It is aimed by that to save the plate number so that the user does not need to enter the same plate number again.

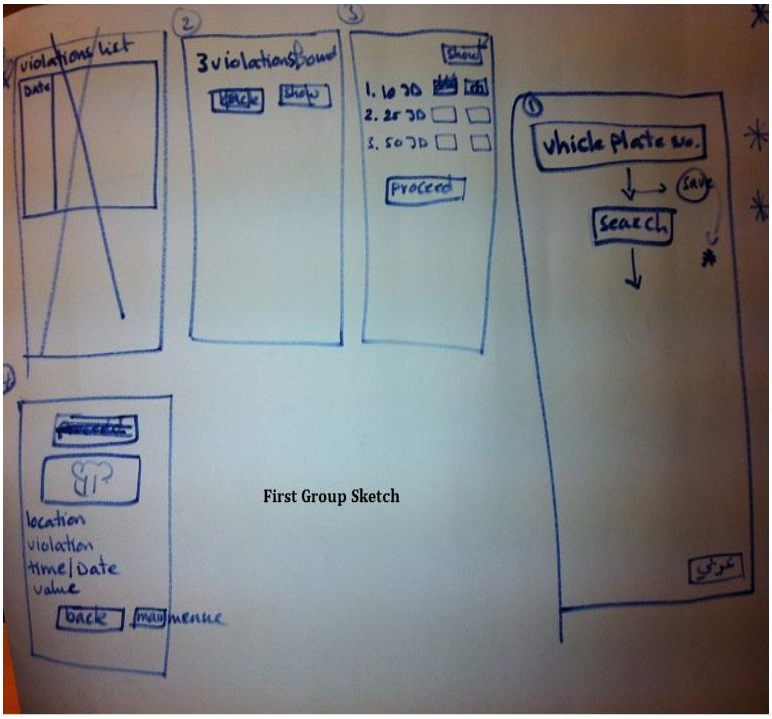

Figure 6.1: First group sketch

The second screen of the application presented the information of the violations found for the searched plate number. At that point, the user needs to push the show button, located under the message shown on the screen, or they can press cancel.

Once the users pressed show, the application will move to screen number 3. In this screen, the application will show a list of the violations and their prices (traffic violations in Jordan are divided into price categories, the least of which incurs a fine of 10 Jordanian Dinars and the maximum of which incurs a penalty of 100 Jordanian Dinars).

When the user chooses one of the listed violations, the application will move to the next screen displaying the violation details such as date, time and location of the violation. At that screen, the user might have finished browsing and using the application. If not, in the case of the picture availability of any violations, there will be a picture symbol beside the violation description. By pressing this button,

the application will move into screen number 5, displaying the picture of the violation.

For the second group sketch, the group focused on the issue of how many screens the application should have to generate information. They emphasised the fact that the application should consist of no more than 2 screens up to the point that the information process is complete.

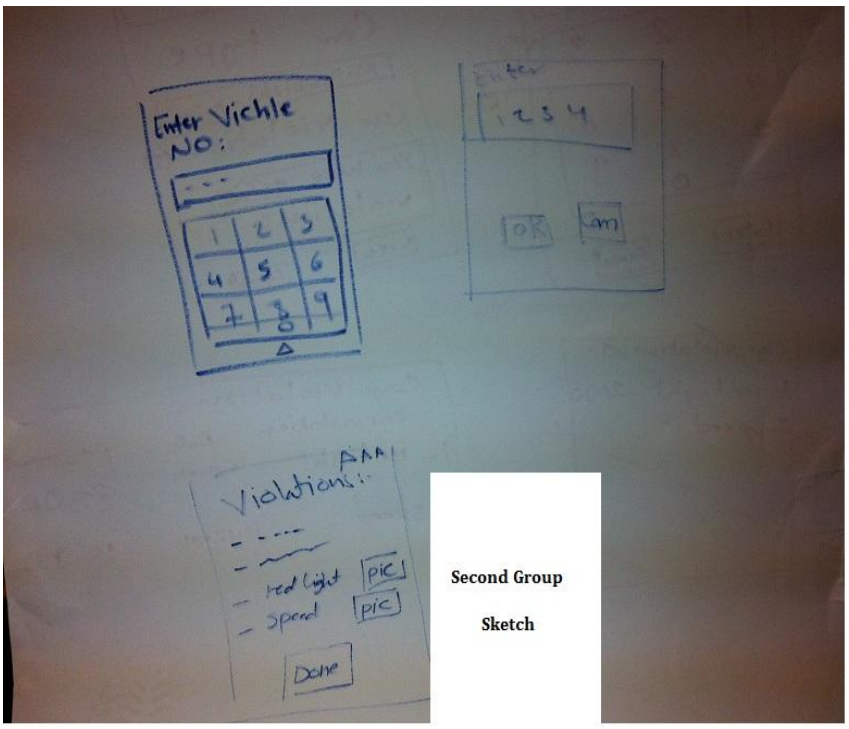

Figure 6.2: Second group sketch

At the first half of the first screen of their sketch, they enabled the user to enter the vehicle plate number into a search box through the mobile dial pad. On the second half of the screen there are two buttons located for the process of sending the request or cancelling it.

After pressing the button send, the application will show all the results of vehicle violations in details on the next screen.

Finally, the third group's sketch design was straight to the point. Their design of the application contained 3 screens. At the first screen, the user needs to enter the

vehicle plate number he/she wish to find violations for. Under the plate number field, the user can press the "Enter Ok" button or cancel, the latter of which emptied the box above.

As soon as the user hits the "Enter OK" button, the application moves to the second screen of the application. On that screen, the application will display the car plate number for more accuracy; the number will be displayed beside the vehicle type to assure the efficacy of the application. Afterwards, the display shows all the available information on the vehicle violations in numbers.

Figure 6.3: Third group sketch

The user then needs to press the view button to display such violations. By doing so, the application will move to the third and final screen displaying the violation details such as day, time date and the type of violation, for example exceeding the speed limit, and the price of the violation will be added as well.

6.1.3 Conclusions from the sketching study

Sketching is well known as one of the HCD techniques that can be used to investigate design ideas. Sketching is generally used by software designers to help them thinking of an organising metaphor for a system.

Through completing the study, it was shown that participants completed the sketching task assigned them successfully. Participants managed to give sketches of what they would imagine to be a mobile application to explore their vehicle violations instead of using PC internet.

The process of sketching went through many phases. At the beginning, the participants discussed the need for such an application, explaining that it is very important to keep an eye on violations to avoid any additional costs or "unpleasant surprises" at the end of the month.

Afterwards, the users started thinking of what was available around them in terms of mobile devices. They mentioned lots of manufacturers such as Apple, HTC and Samsung. They agreed that such mobile phones would be good for such applications for many reasons, such as wide screens, touch input systems and the high screen resolution.

Finally, the participants started to think of what is needed from such applications. At the beginning, they agreed that they needed something fast and easy to use. Their chief objection to using a mobile handset for this type of task was that it would take a lot of time to use compared to using a PC.

It was clear from the ideas above and sketches given by each group that they wanted a "hassle-free" application which addresses their needs quickly and efficiently. They also felt that it was important that the application should also work on smart phones currently available. In addition, the application should not require them to go through more than three screens to complete the task, and use of the application should be free of charge as it was a government service.

Through the design of the application process, Screen size was the most important aspect of usability taken care of. The size on both PC and mobile handset screens is significantly different, this different in its turn will pull some audience towards using this application.

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6.2 Pilot study

A pilot study was conducted to ensure that the research plan was correct and feasible. It was also aimed to ensure that the questionnaire and the set-up of the study were on the correct path. The pilot study for the third study was also used to detect difficulties that participants may face during completing the study.

A small-scale pilot study with 15 participants (9 male and 6 female), aged between 18-50 years, was carried out prior to conducting the third study. According to Sanders and Pinhey (1974), a pilot study is defined as "A study that is performed to sensitize concepts and work out any bugs in the instruments and procedures".

6.2.1 Participants

The pilot study was distributed to a total of 15 Jordanian participants (9 males and 6 females) in December 2011 at Brunel University, London. The age of the participants varied between 18-50.

6.2.2 Application development

From the sketching task described in section 6.1.3 above, it was obvious that participants agreed to have a simple application that would not exceed four screens. The application functions they proposed were simple and straightforward. Participants proposed steps for the application starting from the process of entering the car plate's numbers, up until showing the violations, with pictures if

available. It was decided to add the payment option within the design, to increase the efficiency of the application.

Eclipse Classic Version 3.5.1 was used to create the prototype used in this study. The importance of Eclipse lies in the fact that it is used by millions of developers around the globe. In addition, it was built by hundreds of expert developers to accommodate most of the difficulties facing the developers at the time being, especially when Android became one of the most powerful platforms. The most important thing from the researcher's point of view is that Eclipse is one of the most well-known open source Java development tools that support Android operating system.

The application was designed using Eclipse platform using a Windows operating system platform. As soon as the development tool was downloaded along with its Android plugins and SDK, the development process started (it took five weeks to complete). The application was downloaded on an Android phone selected specially for the purpose of this study.

The mobile handset chosen for the study was HTC Wildfire. This mobile has the Android 2.2 (Froyo) operating system, which is considered to be one of the most stable versions of Android.

6.2.3 Task

The task was designed to get people to explore their car violations, with the ability to pay them if they wished, using a mobile handset.

At the beginning, the user taps on the application icon located at the home screen on the Android smart phone provided. The first screen will appear to the user as below:

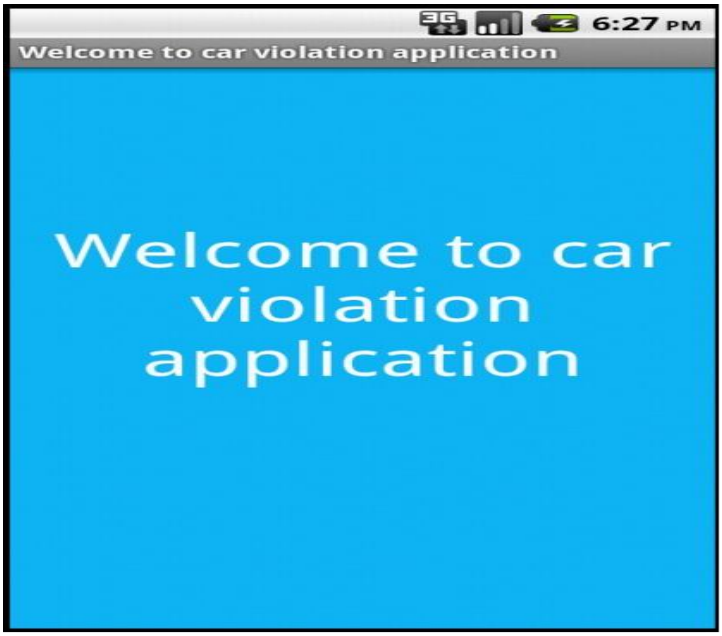

Figure 6.4: Opening screen of the violation application

On the second screen of the application, the application will ask the user to enter the car plate number and then press Start to get the car violations.

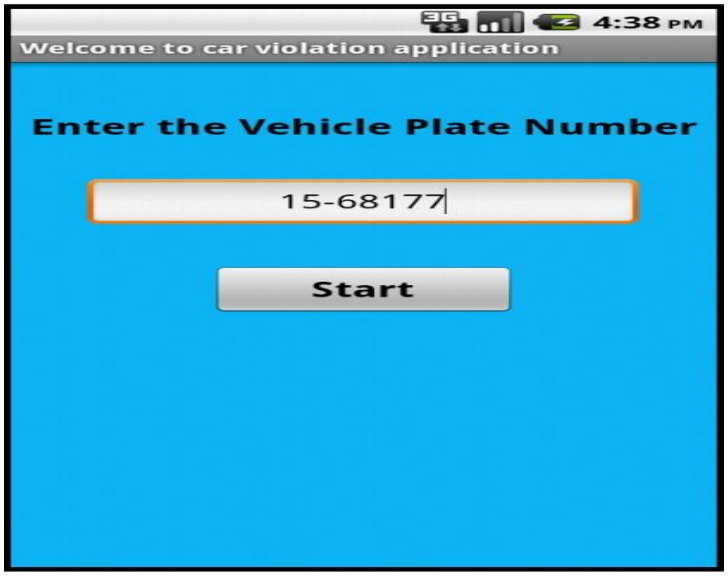

Figure 6.5: Enter the vehicle plate number

After pressing Start on the previous screen, the information for the inserted plate number will appear on the third screen of the application showing the car number, car type and the car violations available. At the bottom of the screen there are two buttons: view and cancel.

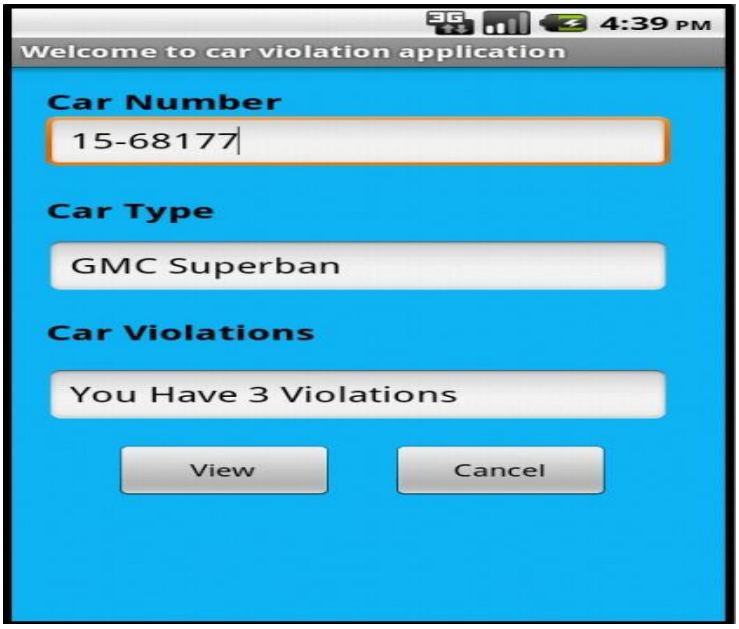

Figure 6.6: Car information

The fourth screen illustrates the car violations prices after the user presses View. At the bottom, the Proceed button is located:

Figure 6.7: Violation information

By pressing the Proceed button, the application will move to the fourth screen showing the violation, date and time, location and picture of the violation (if available). The bottom of the screen presents three buttons: Pay, Back and Main Menu.

Figure 6.8: Violation information with picture

If the user presses Back, the application will move the user to the previous screen, showing the prices of the violations. If the user presses main menu, the application goes to the first screen of the application, where the user will be able to enter the car plate number again. If the user presses Pay, then the application will move the user to the sixth screen of the application, where he/she will be able to insert their credit card details:

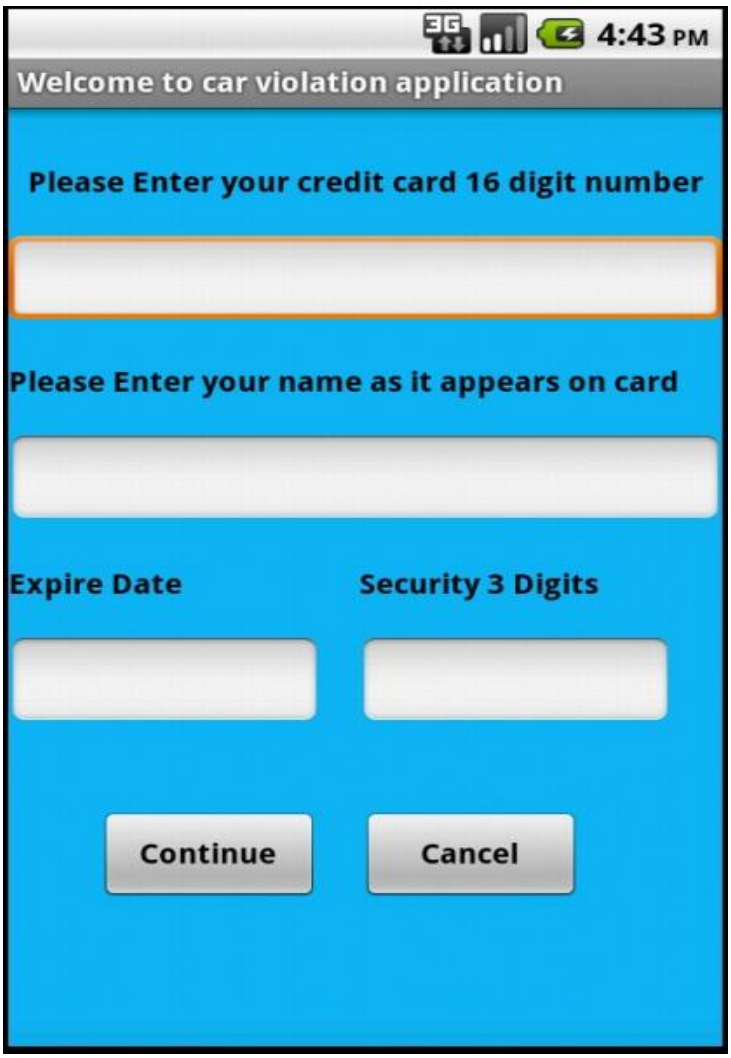

Figure 6.9: Enter the credit card information

After filling the field with the correct information, the user has two buttons at the bottom of the screen; Cancel, to terminate the process, or Continue, to proceed with the payment option. After pressing Continue, the application will move to the next screen:

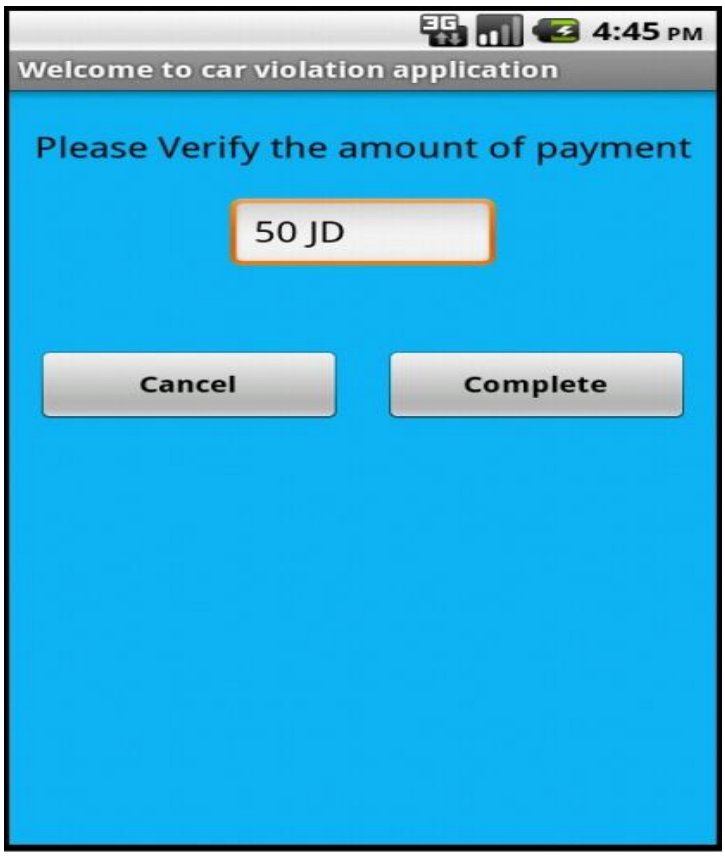

Figure 6.10: Verifying payment amount

At the seventh screen of the application, the application will show the amount of the payment due for violation, and asks the user to verify it. At the bottom of the screen the user has two buttons to click: Cancel or Complete. If the user presses cancel, then the system will terminate the process and take the user to the previous screen. If the user presses Complete, the system will take the user to the eighth and final screen of the application.

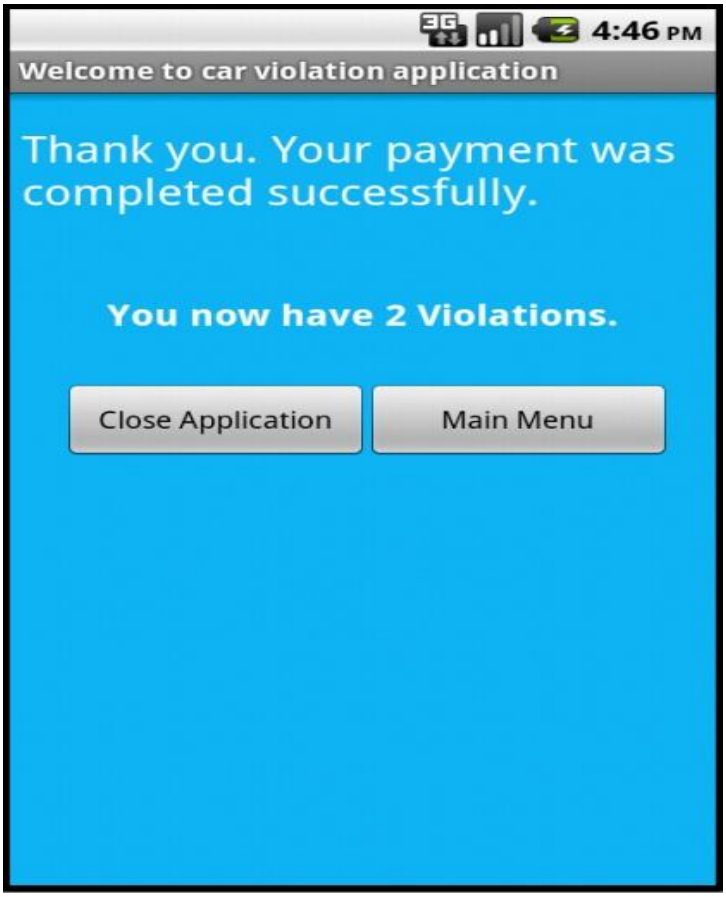

Figure 6.11: Payment confirmation

The eighth and final screen of the application shows a message that says "Thank you. Your payment was completed successfully" and the screen will also show how many violations the user still has. At the bottom of the screen there are two buttons, the first of which gives the option of closing the application, and the second of which send the user back to the main menu.

After completing the usage of the application, the participants were handed a copy of the questionnaire to fill in and submit to the researcher.

6.2.4 Procedure

The pilot study sample participants were given a written copy of the information sheet which explains the nature of the study (see appendix H). Afterwards, participants were handled the questionnaire sheet (see appendix I) and asked to start after they completed the first task on the mobile handset. After the completion of the study by filling the questionnaire, participants were asked to return the sheet to the researcher. The time to complete the questionnaire varied from 30-40 minutes. It is worth mentioning that both tasks were done by the same participants.

6.2.5 Pilot study

A total of 13 questions were developed in the form of Likert scale questions. The scale was then tested for content validity, which can be defined as the extent to which a test actually measures what it is supposed to measure (Rust and Golombok, 1989).

After using the statistical approach to check the content validity, the resultant questionnaire consisted of 13 items. The questions were divided broadly into two sections, summarised below:

(1) Ease of Use and overall experience (3, 4, 5, 6, 10, 12, and 13)

(2) Design of the Application (7, 8, 9, 11)

The pilot questionnaire was distributed to a total of 15 participants during December 2011. A total of 15 replies were received within the specified time limit.

The four developed questions were:

(1) Is the length of the questionnaire appropriate?

(2) Are the questions used in the questionnaire understandable?

(3) Is the layout of the questionnaire acceptable?

(4) How long did it take to complete the questionnaire?

Question	Frequency		Percentage	
	Yes	No	Yes	No
Is the length of the questionnaire appropriate?	15	0	100	0
Are the questions understandable?	15	0	100	0
Is the layout of the questionnaire acceptable?	15	0	100	0

Table 6.1: Respondents' perceptions of questionnaire instrument (N=15)

The pilot questionnaire was distributed to a total of 15 participants during December 2011. A total of 15 replies were received within the specified time limit.

6.2.6 Pilot study findings

There was a negative effect of question eleven on the reliability scale of the questionnaire; it was consequently mandatory to remove it in order to increase the questionnaire's reliability

Most of the participants were eager to complete the task. They were highly convinced with the idea of the application. They also added that it would definitely add to their experience by trying a new application like that in the study.

After analysing the findings of the pilot study using the usability test Cronbach alpha test which scored 518.

6.2.7 Changes from pilot study results

As mentioned above, there was a negative effect of question eleven "The lay out of the information provided by the car violation application is well organised" on

the reliability scale of the questionnaire, it was mandatory to remove it in order to increase the questionnaire's reliability.

As a result, question eleven was taken away from the questionnaire because of its negative affect on the reliability scale. After it was removed, the Cronbach alpha score increased from .518 to .727 which supports the reliability of the questionnaire.

6.2.8 Pilot study result

After using the statistical approach to check the content validity, the questions were divided broadly into two sections: Ease of Use and Overall Experience (3, 4, 5, 6, 10, 12, and 13) and Design of the Application (7, 8, 9, and 11).

After applying reliability test to the questions of the questionnaire, it proved necessary to change and delete some of the questions. These changes were made for the purpose of enhancing the reliability level of the questionnaire. Afterwards, the reliability test results were very positive. These results enabled the researcher to proceed to the main study.

Pilot study Participants did found the application useful and easy to use. They explained that normally when using a new mobile application it would take time to understand how it works. However, in the car violation application this issue were very minor because they received a full explanation of how to use the application in details.

6.3 Main study

Following the pilot study, the main study aimed to investigate user's attitude towards using the mobile car violation payment service.

6.3.1 Participants

55 participants took part in the study. Participants were both male and female. Age of participant's range of 18-48 years was divided into two groups: young (20-30) and old (31-48). Jordanian participants from different backgrounds (industry, universities etc.) were specifically recruited for this study.

Age group	Gender	Age Group
Young	29 m & 21 f	1
Old	3 m & 2 f	2

Table 6.2: Participants in main study

6.3.2 Demographical data

The first question in the questionnaire was to ask the participants to choose their gender. The percentage was 60% male and 40% female.

		Frequency	Percent	Valid Percent
Valid	Male	33	60	60.0
	Female	22	40	40.0
	Total	55	100.0	100.0

Table 6.3: Gender of participants in main study

On the second question, participants were asked to choose the age group to which they belonged.

Around 89.7% of participants in this study were from the 1st group (aged between 21 and 30 years old). Age group 2, which varied between 31 and 40, had less than

7% (the second largest cohort). Group 3 had the smallest cohort, with only 2 participants (3.4%).

Finally, the third part asked the participants to determine their level of education.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	1	1.8	1.8	1.8
	bachelor	49	89.1	89.1	90.9
	Higher Education	5	9.1	9.1	100.0
	Total	55	100.0	100.0	

Table 6.4: Education level for study participants

The majority of the participants in this study hold a Bachelor's degree. This fact was documented by 89.1% of the sample.

Afterwards, around 9.1% of the participant's education level was on a higher rank with MSc and PhD holders. Only one participant (1.8%) was within the Diploma level.

6.3.3 Task

The task was designed to get participants to use the mobile car violation application to find out about their car violations and pay them.

Each participant was handed an information sheet (see appendix H) prior to the start of the study. The information sheet explained how the application works, to facilitate the quick and easy completion of the task by participants.

Initially, the user taps on the application icon on the home screen on the Android smart phone provided. On the second screen of the application, the user is asked to enter the car plate number and then press Start to access the car violations data.

After pressing Start on the previous screen, the information for the inserted plate number will appear on the third screen of the application showing the car number, car type and the car violations available from the system. At the bottom of the screen there are two buttons: View and Cancel.

The fourth screen illustrates the car violations and its prices after the user presses View. At the bottom of the screen there is a Proceed button.

By pressing the Proceed button, the application moves to the fifth screen, showing the violation, date and time, location and a picture of the violation if available. The bottom of the screen has 3 buttons: Pay, Back and Main Menu.

If the user presses Back, the application will move to the previous screen. If the user presses main menu, then the application will move to the first screen of the application, where the user will be able to enter the car plate numbers again. If the user presses Pay, then the application will move the user to the sixth screen of the application, where they can insert their card details to proceed to payment.

After filling the field with the correct information, the user has two buttons at the bottom of the screen; cancel which will terminate the process, and continue which will proceeds to the payment option. After pressing continue, the application moves to the next screen. At the seventh screen of the application, the application shows the amount of payment due for the violation and asks the user to verify this information. At the bottom of the screen the user has two buttons: cancel or complete. If the user presses the former, then the system will terminate the process and move the user to the previous screen; if they select the latter, the system will move the user to the eighth and final screen of the application.

Finally at the eighth screen of the application, the screen will shows a message that says “Thank you. Your payment was completed successfully”. The screen will also show how many unpaid violations remain. At the bottom of the screen the user is presented with two buttons, the first of which gives the option of closing the application and the second of which returns the user to the main menu.

6.3.4 Procedure:

The main study sample participants were given a written copy of the questionnaire sheet (see appendix I) and asked to start after they completed the first task on the mobile handset. After the completion of the second part of the study, participants were asked to return the questionnaire sheet to the researcher.

6.3.5 questionnaire analysis

Question 3: ***I found it difficult to use the car violation application on the mobile handset***

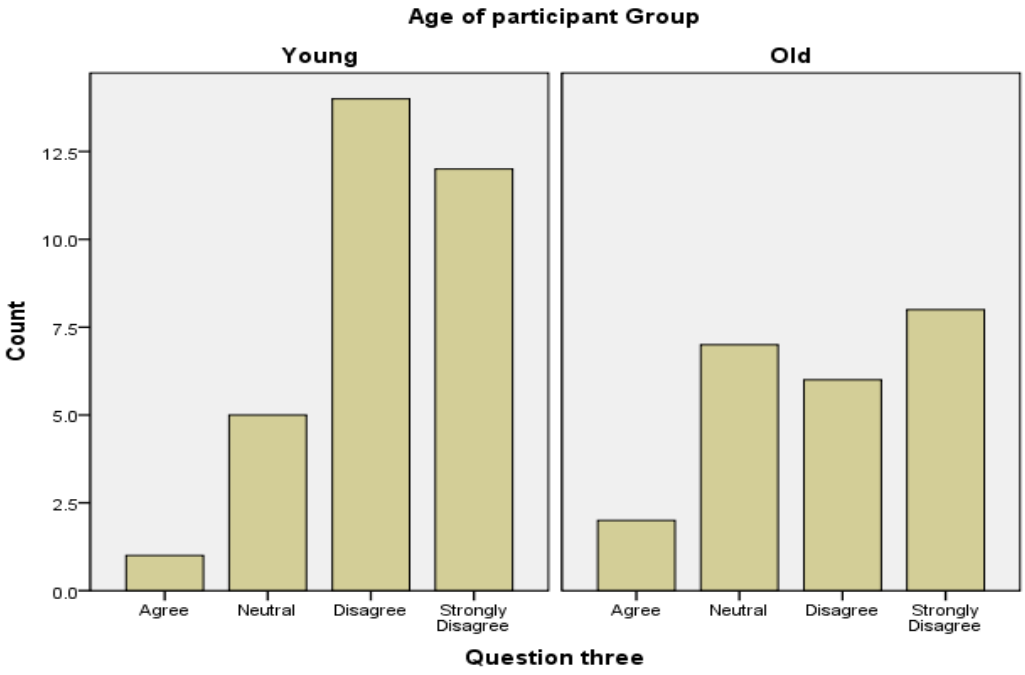

Figure 6.12: I found it difficult to use the car violation application on the mobile handset

To measure any gender differences, a Mann Whitney test was carried out for this question, and the results showed statically that there were no significant differences between males and females (U=313.000, p=0.132).

Further statistical tests were carried out to measure any differences between age groups (a Kruskal Wallis K-test), and the results show that there was no statistically significant difference between the age groups' responses to this question (H (2) = 0.159, P = 0.924).

Most of the answers were negative with regard to the statement. 74% of the sample chose disagree or strongly disagree. This indicates how easy and flexible the application was. This was due to following Nielsen's (1994) design heuristics such as visibility of system status, match between systems and the real world and flexibility and efficiency. Most of the participants explained that the application was very easy to use. Participants were surprised; because it was the first time they had used such an application.

They explained further that the application was easy to interact with, and it explains itself easily, especially when the participants started entering the data of their car and payment issue. They also added that the payment option was very unique and it would add to their internet experience.

On the other hand, 10.4% of the participants disliked the application. They had chosen agree and strongly agree. Participants expressed that the customary paper violation processes was more convenient for them than using the mobile application, because the mobile application takes time, especially at the beginning.

It was observed that some female participants were undecided about using the application. They consumed more time than male participants. The main fact behind such behaviour is that Jordan is a masculine community and it applies high power distance.

In Jordanian society, females traditionally rely on male guidance in regards to new issues. Females often consult them about most things they seek to accomplish. It was obvious during the completion of the first task (browsing violations on the mobile handset) that females were seeking guidance and support from male participants. Females kept checking whether they were doing the correct thing in terms of entering the information in the mobile application.

Such behaviour was discussed by Hofstede (2001), who stated that women's role in traditional societies is to assist men in their daily responsibilities, not to lead them. Moreover, he explained that men in such communities lead woman in their choices, in order to avoid any uncertain decision. He also added that people obey the higher authority represented in certain figures such as boss, parent, religious figures and other members of the community that might address people with language that is filled with power and authority. Men typically fill such roles; father, brother, husband, cousin and other male relatives such as uncles and in-laws are always at the centre of women's decision-making process in traditional cultures.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 4: ***It was easy to use the car violation application to check my car violations***.

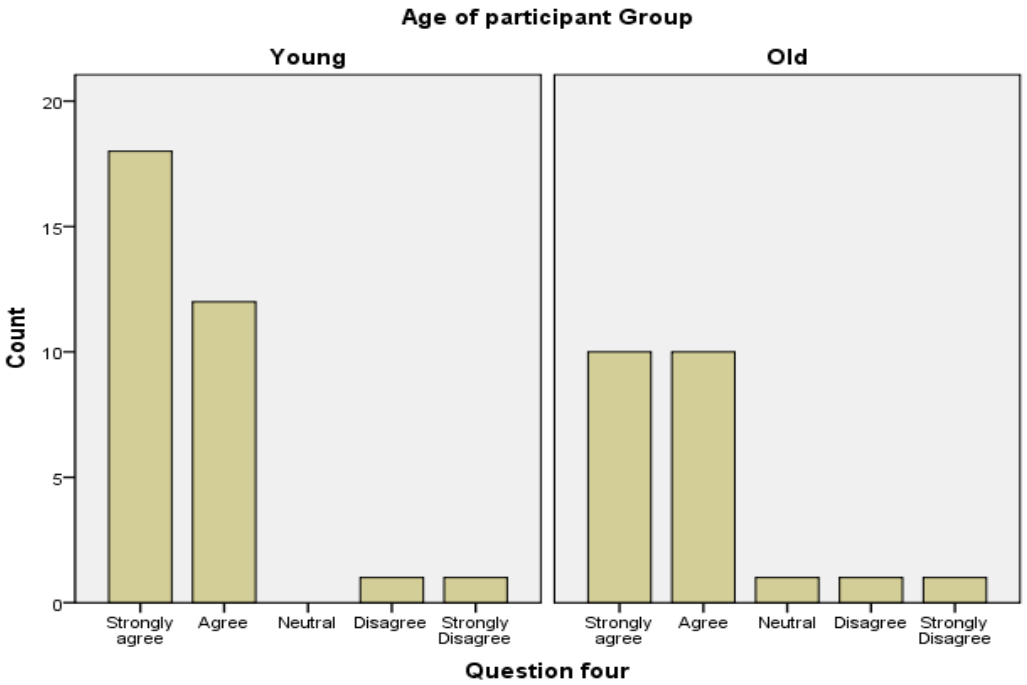

Figure 6.13: It was easy to use the car violation application to check my car violations

To measure any gender differences, a Mann Whitney test was carried out for this question, the results of which showed that there were no statistically significant differences between males and females (U=351.000, p=0.360).

A Kruskal Wallis H-test was carried out to measure any differences between age groups, and the results showed that there was no statistically significant difference between age cohorts in this question: (H (2) = 4.891, P = 0.087).

The majority of the participants agreed strongly with this statement. 91.4% explained their answer reporting that the application is useful and simple to understand. Participants also added that the description in the application fields is clear to read and clear to understand. Participants also reported that the application is very precise, and that it gives full information such as the car make and type, which leaves no doubts about the violation (i.e. it was perceived to be error-free). This could be due to Nielsen's (1994) heuristic of match between system and the real world; this heuristic simplified the tasks in order to match the application function with the real world.

Participants elaborated upon their explanation by stating that there are few fields and buttons, this made the application less confusing to use and more efficient. Some of the participants expressed their wishes to have such applications on different mobile phones that run old operating systems, such as Symbian. Some of them also added that it would be better if there was more security attributes, since they would use the payment option if adequate security were provided for them.

Some participants added that the application would make their life easier by avoiding long queues at the Traffic Department to pay the violations. Finally, the participants enjoyed using the application because of it accessibility everywhere anytime. On the contrary of PC which will fix them in a specified place?

Only four participants (6.8%) found the application hard to use, and they strongly disagreed with the question statement.

It was observed from the comments that both men and women were uncertain about whether they found it easy to use or not. They explained that this was the first time they had tried such technology. They added that they were worried that something bad would happen if they entered their credit card number. This is justified by the fact that Jordanian internet users do not trust e-commerce activities yet. Moreover, females in the Jordanian community rely on men to take the decision to use potentially risky new technology (e.g. credit usage on the application).

These observations relate to Trompenaar's (1993) dimension of Individualism versus Communitarianism. The Jordanian community is communitarian (originally tribal). Such communities rely on the fact that a person reports back to the group about an issue, and then the group approves the final decision about it.

In this scenario, the researcher is the person who reported back to the group (male and female) about mobile internet, and it is up to them to decide whether it is good or not.

Communitarians believe and practise that they have the ability to achieve more if they work together as a group. This is typically what the Jordanian people exhibit. If they are to refuse or agree on something they will do so together. That is why people (male and female) rarely express differences in such communities.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 5: ***The steps taken to complete the violation check were very complicated.***

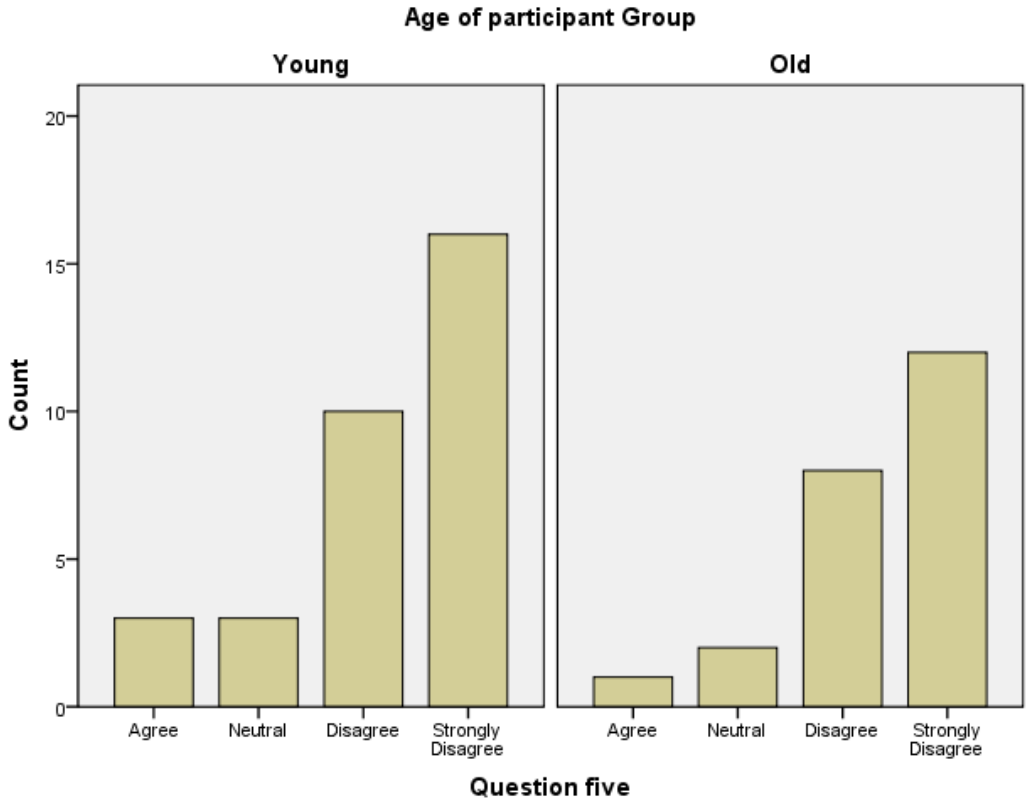

Figure 6.14: The steps taken to complete the violation check were very complicated

To measure any gender differences, a Mann Whitney test was carried out for this question, the results of which showed that there were no statistical significant differences between males and females (U=279.000, p=0.231).

Furthermore, a Kruskal Wallis H-test was carried out to measure any differences between age groups, the results of which showed that there were no statistically significant differences between the age groups in this question: (H (2) = 0.087, P = 0.957).

The majority of the participants (84.5%) strongly disagreed and disagreed to this statement. Again, this could be related to Nielsen's (1994) Visibility of the system status heuristic.

Both men and women attributed this to the fact that the steps were very easy and straightforward. They faced no difficulties at any stage in following the steps provided to them, and found them to be very clear.

Moreover, participants observed that the 3 steps taken to find the violations listed for their vehicle was simple for them. The information sheet played a very important role in simplifying the process for participants.

Some participants (8.6%) were neutral on this point; they explained that it was neither hard nor easy to follow the steps. Some participants explained that it needs more focus and they need a deeper understanding of the process, which will reflect on the time taken to complete the task.

Some participants (15.5%) agreed and strongly agreed. they reported that they found the process to be time-consuming. They also added that there was no option to pay all the violations simultaneously.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 6: ***During the use of the violation application it was not easy to recover from mistakes.***

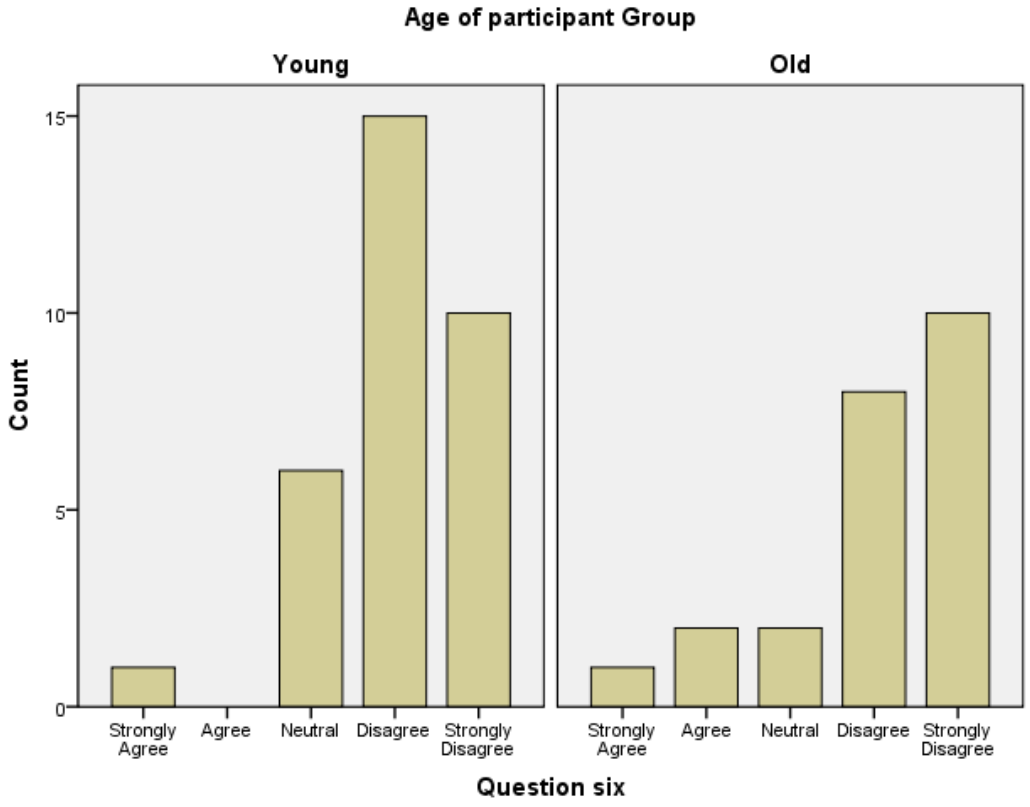

Figure 6.15: During the use of the violation application it was not easy to recover from mistakes

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=322.50, p=0.173).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.732, P = 0.255).

Most of the participants (79.3%) disagreed and strongly disagreed with the statement. They explained their answer by the fact that the cancel and back button is available on nearly every page. They also added that the keyboard available on

the application typically works like a PC keyboard, which has the back space feature, which enables the participants to delete or correct their entries.

This result could be explained by the use of Error prevention heuristic reported Nielsen (1994). This heuristic indicates that the user must be able to recover easily from errors with no hassle. Only 4 participants (6.8%) agreed and strongly agreed with the statement; they explained that after completing the payment there no cancel button to cancel the process.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question7: ***There was enough information displayed in the car violation application to help me to complete what I wanted to do.***

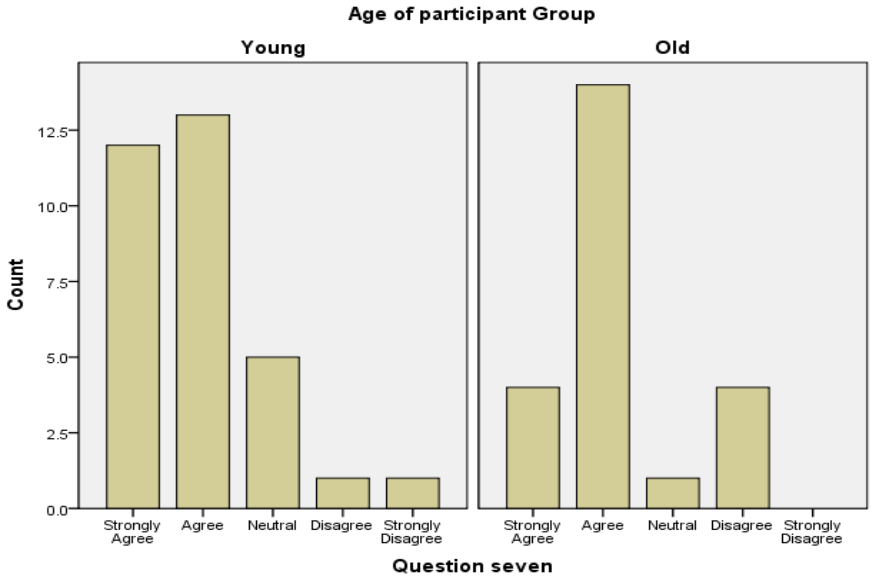

Figure 6.16: There was enough information displayed in the car violation application to help me to complete what I wanted to do

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=321.000, p=0.161).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 0.3606, P = 0.165).

The majority of the participants (79.3%) agreed and strongly agreed with the statement. They justified their positive attitude towards the statement with the fact that with all the available information, such as car plate number, car type and information and finally the car picture (if available) was more than enough to complete the check easily.

This result could be explained by use of visibility of the system status heuristic by Nielsen (1994), which emphasised the fact that the system must always keep the user updated with what is happening.

Some participants added that the layout of information and colours in addition to the well balanced design of the application. They all convinced them to try the payment option in the future. Notably, some participants explained that if there was more information it would be very crowded and "dull" to use the application.

Some participants chose disagree or strongly disagree (10.3%). They stated that they would like to have more security features to protect their ID and personal information. The security feature they suggested was including the last 3 digits on the car ID card, to ensure that no unauthorized person viewed their information.

It was observed from the answers that both male and female answered equally to this statement, which could offer support to the theories of Individualism vs. Collectivism of Hofstede (2001) dimension and Trompenaar (1993) Individualism vs. Communitarianism dimension.

According to Hofstede (2001), collectivism is realised for its well established and tight social boundaries and frameworks were people take care of each other and their welfare and especially that personal goals comes on the second place to those of the group. While Communitarianism is defined by Trompenaar as the level of which the individual doesn't prioritise him/her self over and ahead of the group needs. In communitarian cultures, people believe that the will achieve more when they are a group.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 8: ***I would use the payment option provided by the car violation application.***

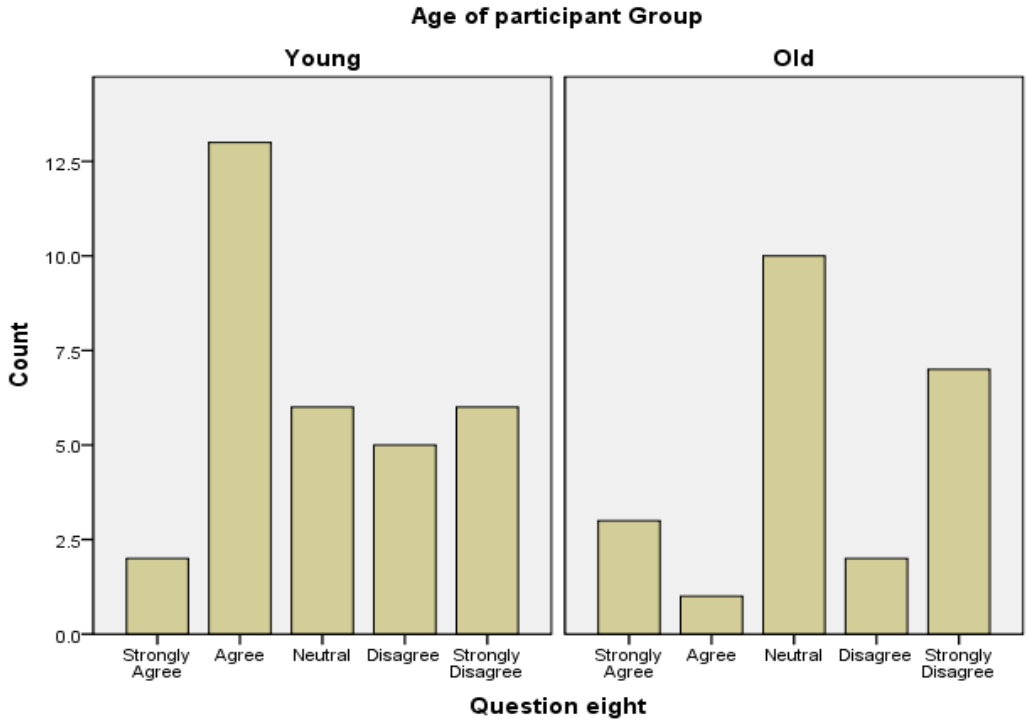

Figure 6.17: I would use the payment option provided by the car violation application

To measure any gender differences, a Mann Whitney test was carried out for this question, and the results showed that there were no statistically significant differences between males and females (U=342.000, p=0.318).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.880, P = 0.237).

The number of participants who liked and disliked the idea of paying their car violations via mobile application was similar. Participants who liked the payment idea had chosen agree or strongly agree (36.2%). They explained their positive attitude by the fact that paying via a mobile application would reduce "wasted

time" by avoiding long queues at the Traffic Department. They also added that the steps needed to complete the process are simple and straightforward.

Around 30% of the sample expressed a neutral opinion, explaining that they had never experienced online payment before and they were fearful of using it on a mobile handset. They also suggested that it would be better to pay by the mobile top-up bill. They also expressed their worries about the level of security used in the application.

Around 34.5% of the participants rejected the idea of the mobile payment, choosing strongly disagrees and disagree. They explained their fears by the fact that they never had used an online payment option before. They also explained that they would not risk using something they never used before. This refusal is typically because of their culture, which supports the cultural dimension of "uncertainty avoidance" (Hofstede, 2001).

65% of the participants appear to conform to Hofstede (2001) concepts of uncertainty avoidance and power distance. The proof of this is that female participants did not give a clear answer and chose the neutral option because they were waiting for the male answers to guide them through their own decision making process.

They needed to know whether or not men will agree to use such method to make a payment. Females in Jordan rely on males in financial issues. For example, the wife in any working family in Jordan gives most of their salaries (60-70 %) to their husband because he is the house manager and all the important decisions should be taken by him.

It is also men's duty to take important decisions in the Jordanian community. They must make sure that whatever steps they are taking the right decision (uncertainty avoidance) by asking around other men if they had tried this or not. Based on other experiences, they will take the decision of whether or not to use the new proposed technology (i.e. paying violation via mobile phone using credit

card). This also suggests a lack of trust in e-commerce (Hoffman et al., 1999; Salam et al., 2005).

Participants also added that they would need proof of payment to be sent as an e-mail to their account to make sure that the payment was made successfully. Some of the participants refused the idea simply because they do not have a credit card.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 9: ***The payment option provided by the car violation application is easy to use.***

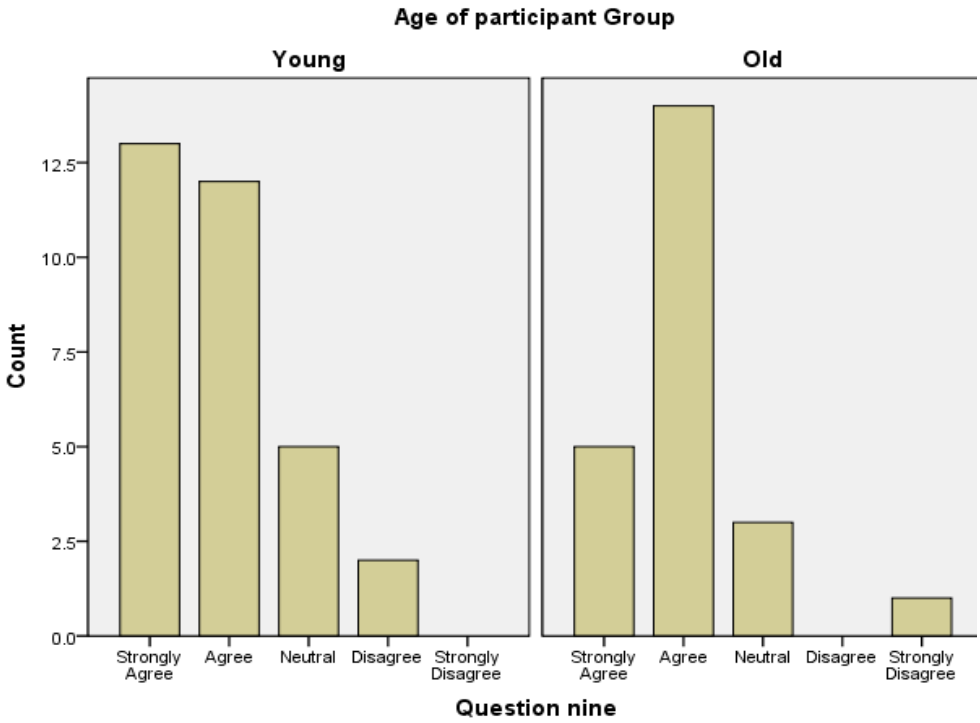

Figure 6.18: The payment option provided by the car violation application is easy to use

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=312.000, p=0.122).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 3.139, P = 0.208).

The majority of the participants (81.1%) agreed or strongly agreed with this statement. They explained that although the application was easy to use, it is not guaranteed to be secure. They found it easy as all the steps were clear and easy to follow, but they expressed their fears of using such options in the real world.

This satisfaction is the outcome of using the ideas and heuristics of Jacob Nielsen (1994) used in this statement such as Visibility of system status, Match between system and the real world, Error prevention and Aesthetic and minimalist design.

Some of the participants also added that the payment would be more secure if they were able to pay using PayPal. PayPal accounts are considered to be one of the safest payment options around the globe.

Some of the participants had chosen neutral; they explained that they do not trust mobile payment systems yet.

On the other hand, 4 (5.1%) participants choose to disagree and strongly disagree. They explained their responses by stating that they do not have credit cards. In Jordan, the process of obtaining a credit card is not an easy thing to acquire and there are many procedures before a Jordanian bank client can obtain one.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 10: I did not like the colours used in the car violation application.

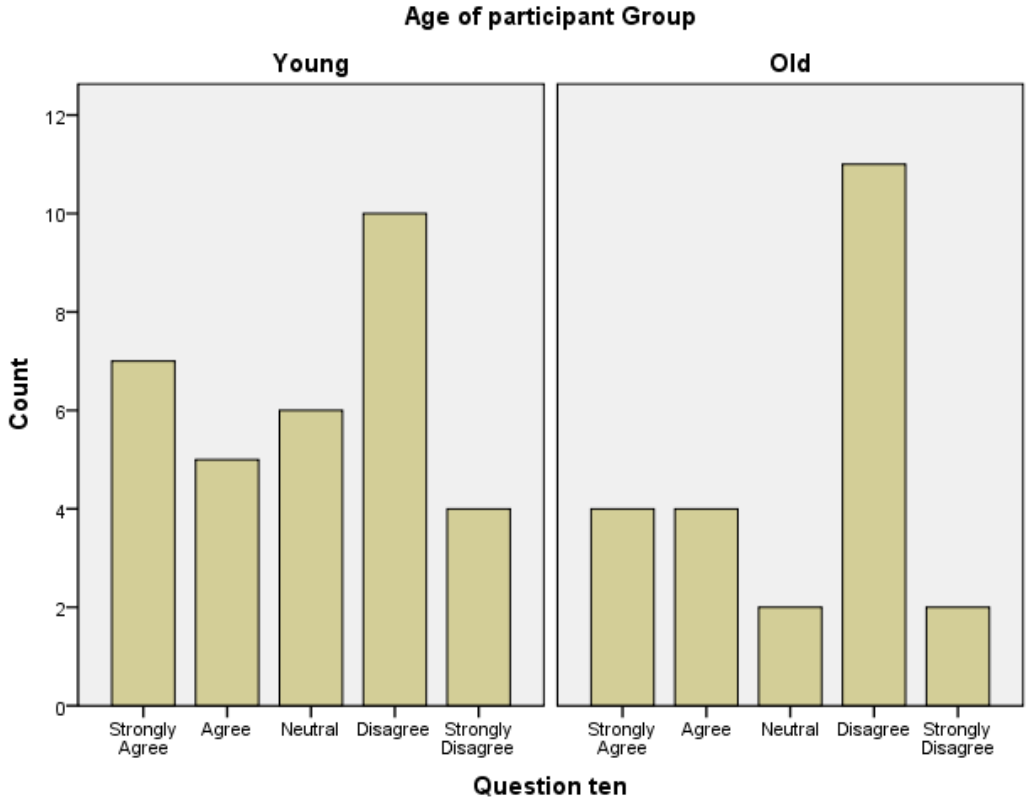

Figure 6.19: I did not like the colours used in the car violation application

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there was a statistically significant differences between males and females (U=373.000, p=0.030)

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 2.192, P = 0.334).

Opinions on this statement varied. Nearly half of the participants (45%), most of whom were men, did not like the colour chosen in the design. They chose agree or strongly agree, explaining that the bright colour was not suitable. They suggested that darker colours such as navy blue, grey and (the majority choice) black would be more appropriate. Some of them went on to suggest that users should be given

the freedom to personalize the colours by choosing the background colours themselves.

They also added that it would be better if there was a Traffic Department logo at the start of the application. They also mentioned that it would be better if the buttons were transparent. Some of the users were neutral (15.5%), expressing that it might be better if darker colours were used in the design of the application.

On the other hand, 40% of the sample chose disagree or strongly disagree as a response to this statement. They explained that the colour used in the design is neutral and easy on the eye. They also added that the design of the application and the colours were compatible to each other.

Once again these findings have a strong connection with Hofstede (2001) dimension of masculinity versus femininity. It is widely known that brighter colours are popularly associated with femininity, and darker colours with masculinity. That is why the majority of those who refused and did not like the colour of the application were men. This is because colours were bright, while the majority who agreed to the statement and liked the colour proposed in the design were females. According to (Jadva et al. 2010), it was found in a study reported by (Pennel, 1994), he reported that girls tends to prefer colours in pastel shades especially pink and lavender while boys tends to prefer intensive colours such as Black, Red and navy blue. In another study reported by Picariello (1990), he asked 3-7 years old children to choose their most favourable colours from a set of stereotypical masculine colours (Navy Blue, Brown, Maroon) and stereotypical feminine colours such as (Light pink, bright pink, lavender) and found that they were likely to choose the colours with accordance to their sex stereotype. In another study completed by (Iigima et al.2001), it was found that there is gender differences in children's use of colours in drawing.

Girls or females tend to use more warm colours such as pink more than boys while boys use more cold or serious colours such as grey and navy blue. Finally, another study was completed by (Hulbert and Ling, 2007) examining the colour

preference of adults using forced choice of colours picking task and found that females do prefer red-purple and male prefer blue-green.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 11: ***I would not recommend the car violation application to my friends and colleagues.***

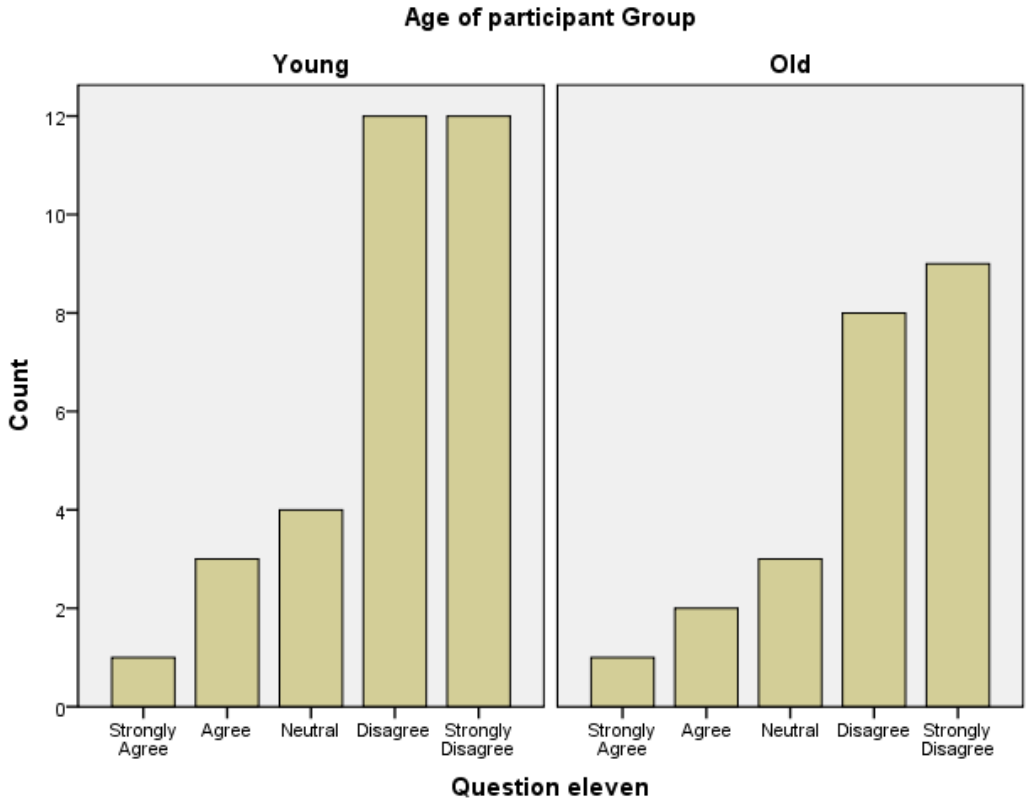

Figure 6.20: I would not recommend the car violation application to my friends and colleagues

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=351.000, p=0.360).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 1.235, P = 0.539).

The majority of participants disagreed and strongly disagreed with this statement (76%). They explained their answer by the fact that the instructions of how to use the application made it easy to use. They added that checking on car violations using this method would be easier than the traditional way as it would save those lots of time.

Such answers reflect that Jordanian culture applies communitarianism (Trompenaar, 1993) and collectivism (Hofstede, 2001). The participants of the study found that the application was very useful and they felt that it was their duty and moral obligation to let other members of the community to know about it. This is typical collectivism. In addition, they (the study participants) felt that they would achieve more goals and avoid spending extra money for car violations if they could monitor their violations in one online place (again, reflecting communitarianism).

Some of the participants (12%) agreed with the statement. They explained their answer by mentioning that the application is not secure, especially when it comes to the payment option. They further explained that the application needs a lot of work in order to improve the security features.

These participants wished to avoid any uncertain decisions that might involve uncertain procedures, and they fundamentally mistrust e-commerce (Hoffman, et al., 1999; Salam et al., 2005), and thus would not recommend it to anyone. In this they are performing uncertainty avoidance (Hofstede, 2001) in a direct way.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

Question 12: ***Overall, I'm pleased with the car violation application.***

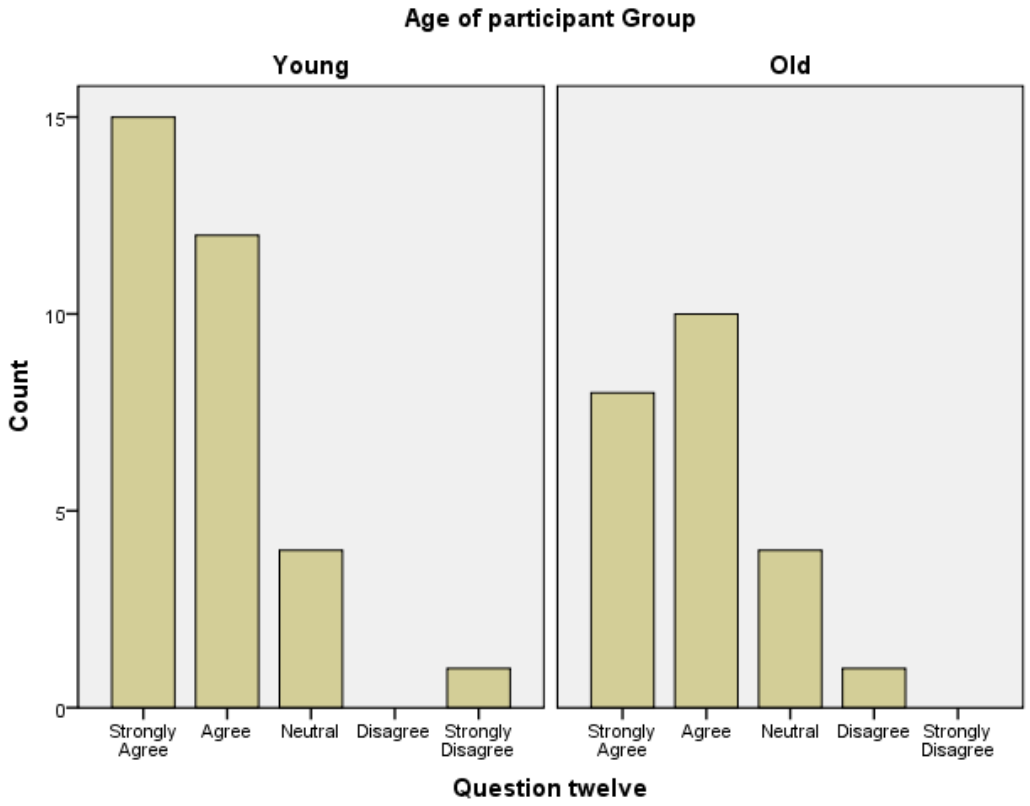

Figure 6.21: Overall, I'm pleased with the car violation application

To measure any gender differences, a Mann Whitney test was carried out for this question and the results showed that there were no statistically significant differences between males and females (U=394.000, p=0.884).

A Kruskal Wallis H-test was conducted and the results showed that there was no statistically significant difference between the age groups in this question (H (2) = 5.132, P = 0.770).

Nearly all of the participants (83%) agreed or strongly agreed with the statement. They explained that the application is a new idea in Jordan and it is very easy to use. They mentioned that it was easy to interact with it in order to complete different tasks. Participants also added that the application would save lots of time because of avoiding long queues at the Traffic Department.

Nielsen's (1994) heuristics such as: help users recognize, diagnose, and recover from errors; flexibility and efficiency of use; error prevention; match between system and the real world; and visibility of system status contributed widely to overall user satisfaction with the application.

A few participants chose neutral (13.8%) as an answer to this statement, stating that the application would not be very useful in Jordan (again, echoing Hofstede uncertainty avoidance dimension).

They assumed that such applications would not succeed and achieve their aims because people would hesitate to use new technology with unknown risks. This opinion might be supported by the fact that e-payments are not widely used in Jordan. Finally, only 2 (3.4%) chose strongly disagree or disagree as a response to this statement. They did not offer any explanation for their answer.

Both young and old participant's answers came to confirm that there was no age difference between the age groups of the study.

6.3.6 Open-ended questions analysis

After completing the questionnaire, participants were asked 3 open-ended questions about the overall experience they obtained from the study:

1. What do you think about the car violation application? Was it easy to use it?
2. What are the benefits of using the car violation application?
3. Is there any negative issue related to the application? How can we improve it?

Answers for the first question were very positive. Responses were mainly concerned with how easy the application was to use. Participants mentioned that the information provided on how to use the application were easy and clear: "*The application is easy to interact with. I really like it.*"

Participants also added that the idea is very new, and it will encourage them to use their mobile more often if the applications related to internet were as simple as the

car violation application: "*the idea is new and very fresh, I don't think I tried any application like this before*"; "*Mobile handset is becoming handier*."

For the second question, all of the participants agreed that the key benefit of this application is that it enhances the image of mobile internet in their minds. It convinced them that mobile internet could be used for something useful. They added that such application is very useful and time-saving, especially as it would enable them to avoid long queues at the Traffic Department: "*This is a great application, if this becomes real, I will save huge time*"; "*I hate standing in queues. They are just time wasting. This application will help me avoiding them.*"

Finally, for the last question, most of the participants stated that they would not trust using their credit card on a mobile application. "*I heard a lot about stolen credit cards. I won't risk it and use mine*" "*if my credit card being stolen, then I won't be able to pay bills and it would be really exhausting. That's why I won't consider such payment option*."

Some of the participants also added that they do not have credit cards because of the process of obtaining them, which effectively renders them barred from e-commerce. They also added that they had never used e-payment for Jordanian websites and online payments (in Jordan).

6.3.7 Discussion

The results of this study address two aspects; mobile application design and culture influences.

For the application design, the term interaction design is defined as "The design of interactive products to support people in their everyday lives" (Preece et al., 2002). The process of designing the mobile application was the most important in this study.

According to Jones and Marsden (2006), the interaction design is distinguished in two ways. Firstly, in terms of the coverage of its vision: the design process is not

only about technology or users who ultimately use designed applications; it is about building infrastructure that will improve the way the users are living and their life experience of that tool. Secondly, focus on real life aspects. That means that designers must be guided by an understanding of the impact of design choices on the people who will end up using the application.

In this study, it was found that the majority of the participants found the application easy to use; participants found it easy to interact with the application. It was easy and flexible to handle the application due to following Nielsen's (1994) design heuristics, such as: visibility of system status; match between systems and the real world; and flexibility and efficiency. Most of the answers explained that the application was very easy to use, which they found surprising; it was the first time they used applications that had real functionality.

It was also found that the application is useful and easily understandable. Participants in the study also added that the descriptions of the application fields are easy to read and clear to understand. Participants also reported that the application is very exact in that it can give full information, such as the car make and type, which will leave no doubts about the violation, reassuring them that the system is error-free. It was simple to use, with few fields and buttons, which made the users' interaction with the application more enjoyable.

The main focus in the process of the application development was on Nielsen's (1994) heuristic of match between system and the real world, which simplified the tasks in order to match the application function with the real world. Also, the Symbian UIQ (user interface platform for Symbian devices) guide explained by Jones and Marsden (2006) was taken into consideration through the design phases of the application.

The majority of the participants of the study found that the steps taken to complete the tasks were very easy, which was due to the successful deployment of Nielsen's (1994) visibility of system status heuristic. Participants in the study

faced no difficulties at any stage in following the steps provided to them and found them very clear.

Participants in the study said that it had taken them 3 steps to find out the violations listed for their vehicle, which was simple for them to do. Recovery from mistakes was easy for users of the application. Some of the participants' made a mistake of typing in the wrong car plate number. For that, the backspace button was enough to rectify the error. It was further explained that the input method of the application works in exactly the same way as PC and laptop computers, which makes the system easier to interact with from a user perspective.

In addition, the information provided and displayed in the application was sufficient. Most participants explained that with all the information available it would not be hard to complete the task. This aspect of the design was achieved by following the visibility of system status heuristic of Nielsen (1994), which emphasises the fact that the system must always keep the user updated with what is happening. Also, this was indicated through the Symbian UIQ by Jones and Marsden (2006).

The payment option of the application was a point of argument. Some of the participants agreed to use the payment option because paying by the mobile application would reduce the time spent waiting in the long queues at the Traffic Department. Others refused to use it, stating that that online payment were totally new and involves risk for them. This refusal is referred to the lack of trust in e-commerce (Hoffman et al., 1999; Salam et al., 2005).

It was found that the payment option provided in the application is easy to use. It was explained by the majority of the participants that although it was easy to use, it was not guaranteed to be secure. The easiness of the function was derived from Symbian UIQ design guide presented by Jones and Marsden (2006) in addition to of Nielsen's (1994) heuristic of the visibility of system status; match between system and the real world; error prevention; and aesthetic and minimalist design.

As a result of the well-structured nature of the application, most participants were pleased with it. This was due to the fact that the idea is new and unique in Jordan. In addition, the application is easy to use and to interact with. They would benefit from the application by avoiding long queues at the Traffic Department.

Nielsen's (1994) ideas, such as help users recognize, diagnose, and recover from errors; flexibility and efficiency of use; error prevention; match between system and the real world; and visibility of system status helped to achieve overall satisfaction, in addition to the Symbian UIQ design guide presented by Jones and Marsden (2006). For the cultural aspect, Jordan is a masculine community and it applies high power distance.

In addition, both males and females were uncertain whether they found it easy or not. It was explained that this was the first time that the participants dealt with such technology, and they were afraid that something wrong would happen if they entered their credit card number.

This is justified by the fact that Jordanian internet users do not trust e-commerce activities yet (Hoffman et al., 1999; Salam et al., 2005). On top of that, females in the Jordanian community trust that men will take decisions about whether this issue (credit card usage on the application) involves risk or not. They rely completely on men to make such decisions, as explained above.

These observations link directly to Trompenaar's (1993) dimension of individualism versus communitarianism. The Jordanian community is communitarian. This community rely on the fact that a person reports back to the group about an issue and then the group approves the final decision about the issue. Communitarians believe and practise that they have the ability to achieve more if they stick together as a group. This is typical of the way Jordanian people behave when it comes to the decision making process.

If they are to refuse or agree on something they will certainly acts toward it as a group. That is why both females and males nearly have no differences in opinion in such communities.

Participants of the study also added that they need proof of payment to be sent by e-mail to their account, to make sure that the payment was made successfully.

The participants in the study found the application useful, and they felt it was their duty and moral obligation to let other members of the community to know about it. This is a typical collectivist attitude. Also (participants of the study) felt that they would achieve more goals and avoid spending extra money on car violations if they could see their violation information in one online place; this is typical communitarianism.

They also added that the design is quite well thought out and they would recommend it to the others because they did not have any difficulties using it, regardless of their experience of using mobile handset/internet technology.

There was a payment issue for some participants. Obviously, the online transaction requires the consumer to reveal a large amount of personal information to the vendor or merchandiser. This in its turn will place them at major risk (Beatty et al., 2011).Once again; this decision was taken because these participants are trying their best to avoid any uncertain decision that might involve uncertain procedure. And they lack trust in e-commerce (Hoffman et al., 1999; Salam et al., 2005), and they lack trust and confidence with such payment methods, so they would not recommend it to anyone. By following this approach they are performing uncertainty avoidance (Hofstede, 2001) in a direct way.

6.3.8 Conclusion

This chapter presented the results of a study conducted to find out if mobile users in Jordan will find a mobile internet related application useful for them or not.

It was also aimed to show the participants of the study that whatever they can perform on the regular stationary tools internet is achievable using their mobile handset. For this purpose, the mobile application discussed in this chapter was

developed to handle an important aspect in the Jordanian daily life (car violations).

There was a well-recognised issue of security and trust related to the payment option provided through the application. The Jordanian mobile users hesitated and refused to try any "untrusted" method of payment. This is related directly to uncertainty avoidance dimension explained thoroughly in literature by Geert Hofstede.

It was clear that the participants generally liked the design and stated that it was easy to use, navigate and interact with. In addition, the application was found to be useful, especially when it enabled the participants to avoid long queues at the Traffic Department.

Both young and old participant's effective participation came to confirm that there was no age difference between the age groups of the study.

However, there was an issue of trust and security mentioned by participants in relation to the online payment system. As a result of this, many of the participants stated that they would not recommend the payment option to anyone. By following such approach they are performing uncertainty avoidance in a direct way.

Finally, it was clear that the application is a new idea in Jordan, and it is very easy to use. The key benefit of the application for participants lies in saving time, by avoiding long queues at the Traffic Department.

Results of the three conducted studies for the completion of this PhD, builds up a picture of users' attitudes towards using the mobile internet. The first study explored the gap of mobile internet use in Jordan by addressing the problem in terms of familiarity, usability and cost. The second study compared the use of internet platforms (PC and Mobile) in Jordan. This comparison made allowed for a better understanding of the usability issues and familiarity issues which could affect the uptake of mobile internet use in Jordan. This was looked at in the third

study which focussed on a user-led (design of a mobile application prototype that focuses on a common activity within the Jordanian context (e.g. checking and paying any car violations).

Chapter 7: Conclusion

7.1 Introduction:

Internet access is no longer limited by place or time. Many of the mobile operator companies around the world are offering this service for their customers. These providers offer certain charges for such services in order to fulfil the customer needs, while the customer retains the right to use or not to use the designated services. In Jordan, the mobile internet service is available and offered by most current mobile operators. However, the uptake of the services is at very low rates.

This low uptake of the service is due to numerous issues concerning culture, usability, trust, and familiarity.

Culture is the major barrier behind the low uptake of such services. Mobile users in Jordan tend to avoid using something they are not sure about. This is caused by applying uncertainty avoidance. Uncertainty avoidance is known as "the extent to which the members of a culture feel threatened by uncertainty and ambiguity along with their eagerness to avoid such situations" (Hofstede, 2001).

This is true in the Jordanian context. The Jordanian mobile users avoid using their mobile handsets for internet-related activities, preferring to use the normal stationary tools. In doing so, they believe that they are keeping themselves away from any additional charges that might apply for using such services. The price of the internet service for mobile handsets is unjustifiably expensive in Jordan. The price of having 1GB of internet for the Jordanian mobile user monthly plan is about 20 GBP, while it costs 5 GBP in most of the monthly mobile plans in the UK.

A report by the Jordanian Statistics Department (which is the only and the official source of statistics in Jordan) indicates that the monthly wage for both male and female Jordanian workers increased from 350 JD in 2008 to 365 JD in 2009 (JSD,2012). This means that it would be near impossible to afford to browse the internet using a mobile handset in Jordan.

Based on a study conducted by the Jordan Statistics Department in 2010, it was found that the absolute poverty line in Jordan is 680 JD per person per year, which is equivalent of 56.6 JD a month. Also it has been mentioned by the same source that the average of spending per family on the basic food supplies was 36% of the total monthly income.

On the other hand, the typical Jordanian resident spends over 60% of their monthly income on other non-food goods, such as education, communication, energy and lightening, personal care, medical care, cleaning detergents, home appliances and clothes. In the year 2010, 7% of salary was allocated for transportation and fuel for motor vehicles. It should be remembered that the average number of family members is six members per family, which means more and more expenses to be paid towards living costs.

The Department also found that the number of families who had at least one mobile handset increased from 97% in 2010 up to 98% in 2011, while the landline phone shares only 22% of the total number for each family. Each family had at least one mobile handset for each member; some members had 2-3 handsets to accommodate calling each different network. The reason for such behaviour is justified by the fact that each network charges differently for making calls to other networks in Jordan, thus customers save money calling numbers on each network from the same network (this also indicates that Jordanian mobile phone users are much more price-sensitive than users elsewhere, reemphasizing the prohibitive expense of mobile internet).

Mobile penetration is thus at a very high level in Jordan, According to the Jordanian Statistics Department, over 40% of Jordanian family members have two different mobile handsets, and 17% have three.

Besides the poverty or limited financial income, there are many other issues inhibiting mobile internet use, such as familiarity. The Jordanian internet user is more familiar with accessing the internet using the classic stationary tools. According to them, they used the internet for the first time using these tools and found it to be genuinely useful and reliable. As they became more and more familiar with the process of accessing the internet using stationary tools, they preferred this way of internet browsing and would hesitate to use any alternative.

Usability plays a major aspect as well in our scenario. The size of screen of the internet platform is extremely important. Most of Jordanian websites do not support mobile displaying design, which affects the display of information within the small mobile pages. This size usability issue and the limitation of web design abilities leads Jordanian internet user to always rely on and use the classic stationary tools. In addition to screen size, it was found that the classical input methods such as PC mouse and keyboard were more effective in the Jordanian context. The Jordanian internet users explained that it is less effective and more time wasting to use the mobile input methods (such as keypad and voice) to complete the internet tasks. Overall, it was found that the usability issue plays a major role in the existing gap.

Last but not least, trust was found to be a major obstacle. Throughout the studies reported in this PhD thesis, it was found that the Jordanian internet users do not trust e-commerce. The majority of participants both young and old in all three studies reflected their fears of using any financial functions related to internet shopping or dealing with e-commerce in general. In Jordanian culture, the idea of e-commerce is not mature enough, and as a consequence, Jordanian mobile users do not trust online sellers and the marketers, because of the immaturity of the Jordanian market. Such refusal is also justified by the uncertainty avoidance cultural dimension discussed previously.

7.2 Summary of study's findings:

The main findings of the three studies conducted in this research are presented below:

7.2.1 Mobile internet usage in Jordan:

Chapter four in this thesis investigated mobile internet usage in Jordan. The main findings of the study indicated three main aspects in terms of mobile context and usability problems. Firstly, mobile users in Jordan do not use mobile internet on a daily basis. More precisely, mobile users in Jordan do not consider using mobile internet as an internet browsing platform. The limited use of mobile internet that is made is mainly concerned with two categories, work and news. Mobile users in Jordan enjoy accessing the internet using stationary tools instead of mobile handsets. This preference was formed because users in Jordan habitually access the internet using stationary tools, forming a solid base of familiarity with those tools. In addition, mobile users use their mobile handset on a daily and hourly basis exclusively for making and receiving phone calls (telephony).

Secondly, participants in the first study considered security as a very serious issue, and they emphasized the security factors of using mobile handsets by refusing to enter critical details such as credit card information while browsing the internet via mobile handsets. Thirdly, the mobile handset users in Jordan avoid using mobile internet because of usability issues.

Screen size is one of the issues of avoidance; participants explained that it is much better to use stationary internet rather than mobile internet because of the larger screen size of the former, as they prefer to see and visualize the full-sized screen.

Moreover, they added that the input system might be an obstacle during the process of mobile browsing. One more reason was given, according to the participants from the first study; mobile internet is slower than regular stationary internet, which was perceived to waste time.

Finally, a very important reason why people in Jordan reject using mobile internet is the high cost of the service. The price of having internet service in a mobile handset is extremely expensive, and according to the participants this prevents them from adopting such services. In Jordan, the price of using such technology is still very high and most of the people cannot afford it. Participants explained that it is cheaper to browse the internet on regular stationary systems. Only people with monthly plans, usually provided to them via their companies and because of their rank as senior employees, used mobile internet to monitor work activities.

7.2.2 Personal computer versus mobile internet access in Jordan:

As the aim of the research was to investigate internet usage via mobile handsets in Jordan, the results obtained from the second study of this PhD thesis, found that there were differences between people's use of stationary tools and mobile internet access. Internet browsing on stationary tools remains the most popular method of internet access in Jordan due to many reasons, such as familiarity and better usability features (screen size). In Jordan, users of the internet have been accustomed to using stationary tools for a long period of time. It was found that mobile internet is very useful and manageable only when users are away from stationary tools. The benefits of mobile internet were only appreciated when users were forced to access the internet using such means by necessity.

In both platforms, it was found that screen size is the most important aspect of usability. The screen sizes of stationary tools and mobile handsets are significantly different. This difference appeals many users towards stationary tools rather than mobile handset internet.

These findings led to the realization that mobile users in Jordan require proof to convince them of the possibility and utility of browsing the internet via mobile devices. As a matter of importance, it was crucial to design an application to perform a task that handles a common activity among internet users in Jordan (car

violation checks) to convince them that using mobile handsets to access the internet can be efficacious.

7.2.3 Car Violation Application:

The final study aimed to explore the attitude of the Jordanian mobile users to completing an internet-related task via the mobile phone. For this third study, a mobile application was developed to handle an important aspect in the Jordanian daily life (car violations payments).

The application was found to be easy to use and useful, especially when it potentially offers participants' having avoid long queues at the Traffic Department.

The study revealed that the Jordanian culture is definitely communitarian and collectivist. The participants of the study found that the application was very useful, and they felt it was their duty and moral obligation to let other members of the community know about it. This reflects that this culture applies collectivism.

In addition, study showed that the majority of the participants who refused to recommend the application to their friends and colleges related this decision to the payment issue.

This decision was taken because these participants were trying their best to avoid any uncertain decisions that might involve uncertain procedures, in addition to lacking trust in e-commerce. The study revealed that Jordanian mobile users lack trust and confidence in online payment methods, as a result, they would not recommend it to anyone.

Finally, it was clear that the application is a new idea in Jordan, but it was easy to use. Participants in the study mentioned that it was easy to interact with it in order to complete different tasks. The key benefit of the application for participants lies in saving time, by avoiding long queues at the Traffic Department.

7.3 Attitude:

It was found that the majority of participants were supportive towards the application. They expressed that they were very happy trying something new like the proposed application. They actually expressed that they were more confident and they appreciated that the researcher gave them the chance to be involved in the research.

On the other hand, a few of the male participants from both old and young ages were negative and challenging. Their negativity increased to the extent that they challenged the researcher, saying that the payment option would never work: "*your application won't achieve its goals in terms of payment methods because it is not trustable*". Even though they added, "*I will not risk my money in something is not obvious, whether it is safe or not*".

Such behaviour is justified by uncertainty avoidance (Hofstede, 2001). The mobile users in Jordan, especially male, do not risk trying new things that they do not have any comparable experience to give them terms of reference for such experiences. They would simply avoid it and try something more trusted. In this case, the participants in the study, especially males did not like the idea of paying with their credit card. They would rather stand in the queue for a long time than use a suspicious method of payment.

Also such behaviour (not trusting online payments) would fall under mistrust of e-commerce generally. According to Hoffman et al. (1999) and Salam et al. (2005), technology consumers might hesitate giving their credit card details to commercial web vendors, because they lack enough trust to take part in business relationships involving faceless financial transactions. This is what Jordanian participants exhibited in the study.

This confirms Trompenaar's (1993) theory of neutral versus affective. According to Trompenaar, affective refers to the level in which the person or the individual in a specific society shows their emotions and feelings. People in affective

societies tend to reveal thoughts and feelings verbally and nonverbally. According to him, emotions flow easily and strongly without inhabitations.

7.4 Originality:

The originality of the research lies in the fact there have been no previous studies which have focussed on the Jordanian context in terms of attitude towards mobile internet use. This is the cornerstone of the originality of this research. Every study conducted in this research, as reported in chapters four, five and six, is unique by itself that no literature reported any of the issues covered in them.

In addition, the work carried out in the third study (chapter six) presents a unique methodology developed to give the Jordanian mobile users the chance to experience and evaluate internet-related tasks on a mobile handset.

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7.5 Limitations of the study:

This thesis is arranged to use a balanced mixture of both quantitative and qualitative methodology. Three forms of data collection methods were used: questionnaire, open-ended questions and sketching.

The reason of using sketching method was to give the Jordanian mobile users the chance to give an idea about what application they would like to use. Besides that, questionnaire was used because it can feel natural to the participants to complete, and it maintains respondents' direct involvement (Coolican, 2004). However, as questionnaire might not provide rich enough feedback from the participants, open-ended questions were used to capture more and more of the participant's thoughts and ideas towards the use of the mobile application.

For the first study reported in chapter four, it was hard to find participants who used their mobile handset to access internet. The researcher thus spent a good deal

of time searching for participants. Secondly, when participants were finally found, their use of the internet through their mobile handset was limited to two issues (work and news). Additionally, these activities were done on very rare occasions, and not on a daily basis.

For the second study, the limitations that the researcher faced were limited to two issues. The first issue was that it was extremely difficult to convince Jordanian internet users of the feasibility of using mobile internet. The main reason behind that was the popularity and familiarity with the process in dealing with stationary tools internet. They clarified that in the time they would take to learn how to use the mobile handset to complete an internet-related task and complete it, they would have finished what they are intending to do using the regular stationary tools. The second issue was screen size. Most of the people refused and hesitated to participate in the study because of the screen size. The explained that they did not want to exert themselves using the internet on a small screen (that was the main response they gave).

The third study's limitation was the rejection of using e-commerce methods represented in the payment option provided by the car violation application. The participants revealed that they do not trust e-payments and they had never used them and would never do so. This behaviour is pointing directly to the lack of trust in e-commerce and e-payments within the Jordanian context.

7.6 Future Work:

In the first instance, more research is needed to confirm the findings of these studies; this indicates that this needs to be performed on a larger number of participants. A relevant future study would be one with qualitative interviews with Jordanian mobile users and service providers regarding all the concerns found within the studies. These data will be really valuable in terms of understanding the way mobile users think in Jordan; for example, future work would benefit from obtaining information on the mobile internet users in Jordan about the internet and

3G service provided to them by the operators. This in its turn would give the mobile providers a definitive idea of how to alter possible and suitable services to the users. This data will also achieve good profit margin to the mobile service providers if studied seriously.

Over the period required to complete this PhD thesis, a number of services appeared in the Jordanian telecommunication market. These services, which are all about 3G internet services, were used successfully within a very limited group of mobile internet users, while other important layers of the community found that these plans and services were financially impossible for them. This heavy financial burden would compel them to retain stationary tools as their sole internet platform. Future study could understand what requirements these layers and sectors might need and reach to a point of agreement between the providers and the users.

7.7 Chapter Summary:

This chapter has discussed the main findings of the research conducted to achieve the objectives of this PhD thesis. A complete discussion of the main findings had been presented. In addition, the originality of this research was successfully proven. Finally, limitations and areas for future work were presented.

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Appendix A

Primitive study explained in chapter four:

Questionnaire

Age: Gender:

1. Which mobile phone brand make do you own?

☐Nokia ☐Sony Ericsson ☐ Samsung ☐Other ( )

2. Why did you prefer this mobile brand make? Please explain why

☐ High reselling value ☐ Reliable ☐ Easily maintained ☐other ( )

……
…..

3. Do you prefer a monthly contract or Pay as you go method of subscription? Please explain your answer.

☐ Monthly contract ☐ Pay as you go

……
…..

4. Which method of mobile phone communication do you use to contact others? Please explain your answer.

☐Phone calls ☐ Missed calls ☐ Text messaging

……
.....

5. Where do you find yourself comfortable using your mobile phone? Please explain your answer.

☐Restaurant ☐ Public transportation ☐Office ☐ all of the above ☐other

……
…..

6. Where do you think that mobile phone should be switched off? Please explain your answer.

☐Places of Worship ☐Classes ☐Meeting ☐other

……
…..

7. For what do you use missed calls? Please explain your answer

☐ Asking for a call back ☐ to reply back for a missed call

☐Others ( ) ☐ I don't use missed call at all

……
…..

8. Please list 3 functions you may consider them "easy" while using your mobile Phone:

1.

2.

3.

9. Please list 3 functions you may consider them "Difficult" while using your mobile Phone:

1.

2.

3.

Appendix B

Consent form used in all of the studies conducted in this research

Consent Form

Please tick as appropriate

	Yes	No
Have you read the Research Participant Information Sheet?	☐	☐
Have you had an opportunity to ask questions and Discuss this study?	☐	☐
Have you received satisfactory answers to all your questions?	☐	☐
Do you understand that you will not be referred to by name in? any report concerning the study?	☐	☐
Do you understand that you are free to withdraw from the study at any time and without giving reasons?	☐	☐

Whom have you spoken to?……..

Do you agree to take part in this study?

Participant's Name…….…….

Signature……..

Date……

Appendix C

Information sheet of first study reported in chapter four

Title of Research: Mobile internet usage in Jordan

Researcher: Firas Omar

Email: firas.omar@brunel.ac.uk

Purpose:

The aim of the study will be to explore and highlight the main reasons behind the rejection of using mobile handsets in Jordan to browse the internet in Jordan.

This study is being carried out to form the thesis required for the award of a PhD in Information Systems and Computing from Brunel University, United Kingdom.

Range of Participants: Participants are selected from the local community in Jordan.

Questionnaire: Participants are expected to answer the questionnaire based on their daily use of mobile internet. The questionnaire will also involve participants' daily interaction with mobile services and will give answers according to their experience.

Voluntary Participation: It is not compulsory to participate in this study and you may choose to withdraw at any time even if prior consent has been given. Also you do not have to give reasons for withdrawal and there are no consequences attached to your decision if you withdraw.

Confidentiality: All data and information taken during questionnaire will be kept confidential by the researcher and used for academic purposes only. Personal details will not be disclosed and all references will be made anonymous

Complaints: If you have any concerns or complaints regarding the ethical elements of this project please contact siscm-srec@brunel.ac.uk or Dr Laurence Brooks, Tel. No. 01895 266010

Appendix D

Questionnaire of the first study reported in chapter four:

1. Please choose your gender

☐ Male ☐ Female

2. Please choose your age group:

☐ 20 years or under ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ 61+

3. Level of education :

☐ High school & below ☐ Diploma ☐ Bachelor ☐ Higher education ☐ other …….

4. How would you describe your general mobile internet knowledge?

☐Very poor ☐ Poor ☐ Neutral ☐ Good ☐ Very good

Please explain your answer

……

……

5. How often do you use the internet on your mobile phone per day?

☐Hourly ☐Daily ☐Weekl ey ☐Monthly

Please explain your answer

……

……

6. What is the main reason for using mobile internet?

☐Work ☐ News ☐Music ☐ Chat ☐ Games

Please explain your answer

……

……

7. I prefer accessing the internet using a PC or laptop

☐Strongly Agree ☐ Agree ☐ Neutral ☐Disagree ☐ Strongly disagree

Please explain your answer

……

……

8. I would not like to access the internet using a mobile handset

☐Strongly Agree ☐Agree ☐ Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

9. I prefer to have a mobile handset with big screen for internet browsing

☐Strongly Agree ☐Agree ☐ Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

10. I would not like to use a mobile handset with QWERTY input system

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

11. I prefer to use a mobile handset with normal keypad input system

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

12. The size of a mobile handset is not important

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

13. The number of clicks pressed to complete a certain task while using internet via the mobile handset is important.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

14. Battery life is not important factor in using the internet on my mobile handset

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

15. I pay full attention to security measures while browsing internet with my mobile handset.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

16. Displaying internet websites on mobile handset is less enjoyable than on a PC or laptop

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

17. Using internet on my mobile will save me a lot of time

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

18. Using internet on my mobile will not improve my work performance

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please explain your answer

……

……

19. Using GPS via the mobile internet is useful

☐Strongly Agree ☐gree ☐Neutral ☐Disagree ☐Strongly Disagree

Please explain your answer

……

……

20. Secure net browsing is not important for using internet on my mobile handset

☐ Strongly Agree ☐ Agree ☐ Neutral ☐Disagree ☐Strongly Disagree

Please explain your answer

……

……

21. I am happy to provide credit card number details and other personal information while using internet services on my mobile handset.

☐Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

22. Please list 3 reasons why you would use the internet on your mobile handset :

1.

2.

3.

23. Please list 3 reasons why you would not use the internet on your mobile handset.

1.

2.

3.

Appendix E

Information sheet for the second study reported in chapter five

Title of Study: Personal computer against mobile internet.

Researcher: Firas Omar

Email: firas.omar@brunel.ac.uk

Purpose:

The aim of this research is to explore and discover the main issues and reasons of both culture and usability that lead users to favour using standard methods and techniques over mobiles for internet activities in Jordan.

Range of Participants: Participants are selected randomly from the local community in Jordan.

Study:

Three parts where designed to run this study. The first part was to browse and perform ten different internet-related tasks using a PC. While the second part was to perform another five internet-related tasks using a mobile handset. The time consumed to complete each task was taken and documented as part of the results. Finally the 3rd part of the study is to fill in the questionnaire as the final part of the study.

Voluntary Participation: It is not compulsory to participate in this study and you may choose to withdraw at any time even if prior consent has been given. Also you do not have to give reasons for withdrawal and there are no consequences attached to your decision if you withdraw.

Confidentiality: All data and information taken during questionnaire will be kept confidential by the researcher and used for academic purposes only. Personal details will not be disclosed and all references will be made anonymous

Complaints: If you have any concerns or complaints regarding the ethical elements of this project please contact siscm-srec@brunel.ac.uk or Dr Annette Payne, Tel. No. 01895 266295

Appendix F

Study and questionnaire of the second study reported in chapter five

2nd Study: Mobile internet versus. PC Internet.

The main purpose of this study is to find out what are the main differences in using internet on both a mobile phone handset and a PC.

A. Browsing the internet using a PC. .

1. Browse your email inbox and check how many new email messages that you have.
2. Go to www.jordanweather.jo and check the weather forecast for the next five days.
3. Go to www.xe.com and check the rate of exchange for the British Pound against the Jordanian Dinar.
4. Search for term "HCI" on the Google search engine and write down its definition.
5. Open your Facebook account and check the available posts for today on your wall.
6. Was it easy for you to find the information you were looking for in this task. Please explain your answer……

B. Brows internet using mobile handset. This task is to be completed using the mobile handset provided.

1. Browse your email inbox and check how many new email messages that you have.
2. Go to www.bbc.co.uk and check the weather forecast for the next five days.
3. Go to www.x-rate.com and check the rate of exchange for the British Pound against the US Dollar.
4. Search for term "TAP" on the Wikipedia web site.
5. Open www.mahjoob.com web site and enjoy the caricature of the day.

6. Was it easy for you to find the information you were looking for in this task. Please explain your answer……..

1. Did you prefer using the PC or the mobile phone to complete these tasks, please explain your answer?
2. What are the benefits of using a mobile handset to access the internet in comparison to a PC?
3. What are the drawbacks of using a mobile handset to access the internet in comparison to a PC?

C. After finishing both task A & B. Please complete the following questionnaire:

Appendix G

Questionnaire of the second study explained in chapter five:

1. **Please state your gender**
   ☐Male ☐Female

2. **Please choose your age group**:
   ☐ 20 years or under ☐ 21-30 ☐ 31-40 ☐ 41-50☐ 51-6☐
   61+

3. **Level of education** :
   ☐ High school & below ☐ Diploma ☐ Bachelor ☐ Higher education ☐
   other …….

4. **I found it difficult to use the internet enabled mobile handset.**
   ☐Strongly Agree☐Agree ☐ Neutral ☐ Disagree ☐Strongly disagree
   Please explain your answer
   ……
   ……

5. **I prefer to keep using my current mobile handset because of its features.**
   ☐ Strongly Agree☐Agree ☐ Neutral ☐ Disagree ☐Strongly Disagree
   Please explain your answer
   ……
   ……

6. Browsing websites on a PC is easier than using a mobile handset.

☐Strongly Agree☐Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

7. Websites browsed on mobile handset are not the same with the ones browsed on a PC.

☐Strongly Agree ☐Agree ☐Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

8. It is quicker to browse on a PC than mobile phone handset

☐Strongly Agree ☐ Agree ☐Neutral ☐ Disagree ☐Strongly Disagree

Please explain your answer

……

……

9. I prefer using a PC keyboard for internet browsing than a keypad on a mobile phone.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

10. Using the mouse while browsing internet is good way to complete tasks.

☐ Strongly Agree ☐Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

11. I prefer a large computer screen to browse internet rather than the mobile handset screens.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

12. I would use the mobile internet to do internet shopping

☐Strongly Agree ☐ Agree ☐Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

13. The number of items displayed on each page of mobile handset is important

☐ Strongly Agree ☐ Agree ☐Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

14. Menu item colour is important on mobile phones and PC.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

15. Adding different applications to my mobile handset is not important.

☐Strongly Agree ☐Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

16. Displaying lots of information on the mobile handset screen is useful

☐ Strongly Agree ☐ Agree ☐ Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

17. Mobile handset keypads with multi functions are difficult to use.

☐Strongly Agree ☐Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

18. My mobile handset font is too small in comparison to my PC font size.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

Appendix H

Information sheet for third study explained in chapter six:

Title of Study: Car Violation Application

Researcher: Firas Omar

Email: firas.omar@brunel.ac.uk

Purpose:

The aim of the study is to observe the thoughts and ideas of participants of a mobile application designed study. This application is specially designed with regard to handling a critical issue that occurs in life (car violations). This application will show the internet users in Jordan that it is possible to do whatever they currently perform on the classical stationary internet tools (PC and Laptop), such as car violation check, on their mobile handset.

Range of Participants: Participants are selected from the local community in Jordan.

Questionnaire: Participants are expected to answer the questionnaire based on their experience with the designed mobile application (Car Violations Application).

Voluntary Participation: It is not compulsory to participate in this study and you may choose to withdraw at any time even if prior consent has been given. Also you do not have to give reasons for withdrawal and there are no consequences attached to your decision if you withdraw.

Confidentiality: All data and information taken during questionnaire will be kept confidential by the researcher and used for academic purposes only. Personal details will not be disclosed and all references will be made anonymous

Complaints: If you have any concerns or complaints regarding the ethical elements of this project please contact siscm-srec@brunel.ac.uk or Dr Annette Payne, Tel. No. 01895 266295

Appendix I

Questionnaire of the third study explained in chapter six

1. Please state your gender

☐Male ☐Female

2. Please choose your age group:

☐ 20 years or under ☐ 21-30 ☐ 31-40☐ 41-50☐ 51-60 ☐ 61+

3. Level of education:

☐ High school & below ☐ Diploma ☐ Bachelor ☐ Higher education ☐ pplication

4. I found it difficult to use the Car violation application on the mobile handset.

☐ Strongly Agree ☐Agree ☐Neutral ☐ Disagree ☐ Strongly disagree

Please explain your answer

……

……

5. The steps taken to complete the violation check were very complicated.

☐Strongly Agree ☐Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

6. During the use of the violation application it was not easy to recover from mistakes.

☐Strongly Agree ☐Agree ☐ Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

7. There was enough information displayed in the car violation application to help me to complete what I wanted to do.

☐Strongly Agree ☐Agree ☐Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

8. I would use the payment option provided by the car violation application

☐Strongly Agree ☐Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

9. the payment option provided by the car violation application is easy to use

☐Strongly Agree ☐ Agree ☐ Neutral ☐Disagree ☐ Strongly Disagree

Please explain your answer

……

……

10. I did not like the colours used in the car violation application

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

11. I not would recommend the car violation application to my friends and colleagues.

☐Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

Please explain your answer

……

……

12. Overall, I am pleased with the car violation application

☐Strongly Agree ☐ Agree ☐Neutral ☐Disagree ☐Strongly Disagree

Please explain your answer

……

……

Error! Reference source not found.