

Students' thoughts about the importance and costs of their mobile devices' features and services

Abstract

In recent years, handheld devices have become one of the fastest growing communication gadgets. Mobile technology is becoming widespread and research in this area is urgently needed. Using a survey instrument, the thoughts of male and female students regarding the importance and costs of mobile devices were investigated. It was found that students tend to consider important the following features: battery life, mp3 player, video camera, photo camera, storage memory, Bluetooth, design and elegance, clock, calendar, organizer and reminder. Also, they are eager to spend an amount of money so as their mobile device to support them. On average, both genders would pay extra money for such features. However, the majority of females think less of the price than males do. On the contrary, most of the respondents do not consider important the following: touch screen, voice commands, chat, teleconference, encryption and cryptography, common use of files, printing. Therefore, they would not spend any money for these features. Interested decision makers would try to increase their interest on such features. Moreover, all respondents appear to own a mobile phone while most of them do not have Internet connection at home. In general, some gender differences are found in the importance and costs of the mobile devices but they are not statistically significant.

Keywords: 3G; Bluetooth; digital gadget; gender difference; GPS; handheld device; iPhone; mobile Internet; mobile phone; mobile telephony; mp3 player; questionnaire; PDA; portable device; SMS; survey; technical and functional features; usability; user experience; Wi-Fi.

1. INTRODUCTION

The use of digital gadgets has been growing in the developed countries and is becoming to grow in the developing world as well. Today, the number of iPods, cell phones, tablet PCs and personal digital assistants (PDAs) is increasing as they are among the most useful and popular gadgets (Switzer & Csapo, 2005). More than one out of six people worldwide own mobile phones, digital cameras, PDAs and laptops which are equipped with wireless fidelity (Wi-Fi) (Katz, 2005) since one of the most important characteristics of computer devices is wireless network access (Cutshall et al., 2006). In recent years, handheld devices are in a time of rapid change with subscriptions reaching over two billion worldwide (Wireless Intelligence, 2005). There has been a big growth in the variety of devices that are mobile and can process digital data and media (Anderson & Blackwood, 2004). As a result, the use of mobile phones is almost twice as high as that of personal computers (ITU, 2003).

Many users want to have all-in-one, so smart phones appear. They constitute a hybrid of PDA and mobile phone supporting digital camera, calendar, note-taking, calculator, alarm and other functions (Mifsud, 2004). Smart phones are Internet-enabled phones with many features plus messaging and Internet communications (Anderson & Blackwood, 2004). PDAs are portable and personal gadgets that can be used for a variety of functions; for example, to manage work or make schedules, to record and store data and information (Waycotte & Kukulka-Hulme, 2002). A PDA is generally viewed as a handheld device that provides electronic versions of the functions of a paper-based personal organizer. Such functions are

often grouped together under the term Personal Information Manager (PIM). Moreover, modern PDAs include many of the features of a typical desktop PC machine with basic office applications (Anderson & Blackwood, 2004). Two important matters regarding handheld devices are wireless connectivity and data synchronization (transfer to PDAs of the data stored in desktop and vice versa) (McDonough, 2006).

A person could always carry such a mobile device everywhere throughout his life (Sharples, 2000). The 'mobile component' of the mobile devices is the most important feature which also makes them very popular worldwide (Brown et al., 2001). People and especially children, consider the mobile phone as a fashion object which facilitates chat and gossip (Davie et al., 2004). Of course, there are also other reasons such as safety, and contact with people anytime (CEMA, 1998; Wehrman, 2002; Aoki & Downes, 2003). A large variety of gadgets such as cell phones, PDAs, laptops, but also devices like pen-scanners are used for mobile learning (Trifonova et al., 2006; Economides & Nikolaou, 2008). Moreover, the use of mobile devices in education has a lot of advantages over full-size computers (Triantafillou et al., 2008). Over the last decade the mobile phone has penetrated in every sector, giving many opportunities to higher education (Campbell, 2002). Handheld and mobile technologies have a lot to offer in compulsory education (Mifsud, 2004). Switzer & Csapo (2005) suggested that digital technologies should be utilized in the business education and curricula. They may have a positive impact on students' learning and career (Cheung & Huang, 2005). However, there were also some concerns regarding the use of mobile devices in education. Vahey (2002) questioned whether handheld technologies have impact on education and are different from all other technologies or not. Furthermore, it was also claimed that there are obvious obstacles in the use of mobiles such as their small screen and limited computational power (Mifsud, 2004). PDAs and smart phones were considered more as business tools and were rarely owned by students (Attewell, 2004).

Many studies about the usage of mobile devices have been done for different countries-USA, Japan, Republic of Korea, Morocco, Norway and other (ITU/MIC, 2004). These studies showed that mobile devices were widespread and they were used by nearly 100% of the young people. They were used in various locations and SMS (Short Messaging Service) was one of the most popular operations (Attewell, 2004). Other studies showed that students were among the best consumers of mobile phones and as a result the best audience for mobile applications (MobilEdia, 2005). It is worth mentioning that students who used e-learning were much more positive to m-learning (Trifonova et al., 2006). Previous studies argued that research has often neglected the use of telephone as a form of interpersonal communication (Dimmick & Sikand, 1994; Holladay & Crutcher, 1997; Katriel, 1999; O' Sullivan, 2000; Sarch, 1993). This could occur due to the fact that it does not fit to any previous category and it is not considered as mass communication or social tool (Sarch, 1993).

According to most surveys, the gender gap in Internet use has narrowed significantly in the college age group (Goodson et al., 2001; Odell et al., 2000) as well as the general population (Brenner, 1997; Jackson et al., 2001; Newburger, 1999; DeBaillon & Rockwell, 2005; Ono & Zovodny, 2003). However, some gender differences have been found in attitude towards technology, intensity of Internet use, online applications preferred and experience in cyberspace. Sometimes, there is a contradictory relation between gender and web use demonstrating a need for further investigation. Generally speaking, it can be claimed that some of the differences between genders have vanished. However, technologies are not always utilized in similar ways by men and women and as a result some differences still exist (Mitra et al., 2005).

Many international studies reported that males had significantly more positive attitudes toward computers than females did (Makrakis & Sawada, 1996; Collis & Williams, 1987; Smith & Necessary, 1996). Also, it was suggested that women have to increase their level of involvement with computers and both teachers and parents have to support them in this (Shashaani & Khalili, 2000). Another study among Chinese and British students reported that men in both countries used email and chat, played computer games and were confident about their computers skills more than their female counterparts (Li & Kirkup, 2007). Nevertheless, other studies contradicted these findings and reported that gender had no significant effect on any of the dimensions of computer attitude studied (Jennings & Onwuegbuzie 2001; Shaw & Gant, 2002). Moreover, one study found female college students to possess more positive attitudes towards Internet than males (Zhang, 2002). Another study pointed out that males tended to try new activities, while females preferred traditional ways. However, girls tend to use more often media types when they deal with them daily than boys did (Trifonova et al., 2006). The incongruity in findings related to gender behaviors might be attributed to differences in methods or might show the increasing adoption of technology by women (Mitra et al., 2005).

Particularly, females tended to be very social as they used e-mail and instant messaging more than their male peers (Media Report for Women, 2000). Electronic mail messaging was the most important function of the Internet for women (Wilson, 2000) as they were found to use e-mail more than males (Boneva et al., 2001; Jackson et al., 2001). Another survey reported that females sent more SMS messages and spoke more on the cell phone than men did. Also, teenage girls used their devices more often for the expression of feelings whereas boys were more interested in the technical aspect (Doring et al., 2004). It is worth mentioning that females tended to study online more than men as online learning may be appropriate for their needs and lifestyles and they also tended to look for further views of education (Selwyn, 2007). The most pronounced gender difference in the web use was found in the online applications. Male students were more likely to use the Internet for entertainment and information gathering while females preferred to use it for communication (Shaw & Gant, 2002). According to Saunders & Quirke (2002), males wanted to find answers quickly and easily and they worked alone or sometimes in pairs. On the other hand, females focused on the quality of information and they preferred interactive group work. Selwyn (2007) reported that as the current situation changes, educational technology can be seen as a predominantly feminine activity. Generally, there were gender differences even if they were not always large, and further research has to take place (Doring et al., 2004). Concluding, some previous studies located gender differences with respect to technology while others did not find any gender differences (Appendix). So, further research is needed.

In this study, we developed a survey to examine gender differences among students regarding the importance and costs of mobile devices' characteristics. We aimed to provide a better understanding of what features and services are considered important by students' perspective and how much money they would pay for these extra features and services. The survey was conducted among undergraduate university students in a European Union country. In this country, the number of mobile telephony subscribers is quite larger than the population. That means that many persons hold multiple subscriptions either personal or business. In 2007, the cost of the mobile phone subscription was about 20 euros/month with 100 minutes free talk plus 0.25 euros/minute for extra time. The cost of the SMS subscription was about 10 euros/month with 120 free SMS plus 0.10 euros/SMS for extra SMS. The cost of a video call was about 0.7 euros/minute, live-TV was about 1.8 euros/day, and music was about 1.8 euros/song. Most people talked about 250 minutes/month paying about 40 euros/month. The

average call lasted for 2.1 minutes. The cost of wireless broadband Internet access at 3.6 Mbps was about 35 euros/month for 5GB free plus 1 euro/MB for extra traffic. However, these prices may change soon since this is a highly competitive market.

Many scholars agreed that further investigation is required as there is a shortage of theory and inadequate results. The present study differs from previous studies in the following aspects:

1) Most previous studies examined the penetration rate, the reasons for owning (e.g. safety, fashion, social status, relationships, loneliness, freedom) and the effects (e.g. addiction, distraction, gratification, psychology) of mobile phones. We explicitly examined what mobile devices' features are considered important by university students and how much money they are willing to spend for them.

2) Previous studies investigated the use of mobile phones regarding only some popular functions (talking on the phone or sending/receiving SMS). We examined the comparative importance of all mobile devices' features.

3) Each question in the questionnaire consisted of many items and this gave to the students the chance to show their comparative attitudes and preferences towards the various mobile devices features.

4) The questionnaire contained questions on both the importance and the willingness to pay every feature so that to limit the contingency of randomly asked questions.

5) There were not any previous studies on students' opinions about mobile phones in this country.

6) There are few previous studies regarding gender differences in the use of mobile phones. Some of these studies found gender differences, while others did not find any gender differences.

According to the results of this study, students tend to consider important a lot of operations and characteristics and they are eager to spend a significant amount of money on some of them. On average, both genders would pay extra money for a feature, but generally the majority of females think less about the price in comparison to males. In addition, all respondents appear to own a mobile phone, but most of them do not have Internet connection at home. Also, most of them do not connect to Internet via the mobile devices and they do not use mobile Internet services. Generally, there are some small gender differences in the importance and costs of mobile devices' features. The next section describes the methodology of this study. Afterwards, the results are analyzed. Finally, managerial implications are presented and conclusions are drawn.

2. METHODOLOGY

During spring 2006, a questionnaire was designed to determine the comparative importance of mobile devices' features and operations, and the amount of money people would spend for these extra characteristics and services. During 2006-07 the questionnaire was distributed to 416 full-time undergraduate University students in a European Union country. Most of the respondents were between the ages of 18 and 25. They answered the questionnaire anonymously and voluntarily. There were completed 384 questionnaires. Female students accounted for 55 per cent of the respondents. All participants had one hour to fill out the questionnaire. They were given mainly two-choice and multiple-choice questions to answer.

The students also participated in other surveys where it was discovered that they used the mobile phone mostly for sending messages and making phone-calls.

In the questionnaire, there were the following eight multiple choice questions:

- 1: What type of mobile phone do you use?
- 2: Which company's model is your mobile device?
- 3: What type of phone connection do you have?
- 4: What amount of money do you spend every month for mobile phone's usage?
- 5: What type of Internet connection do you have at home?
- 6: What amount of money do you spend every month for Internet usage?
- 7: How much important do you consider and how much more money (€) would you spend in order that your mobile device to include the following technical characteristics.
- 8: How much important do you consider and how much more money (€) would you spend in order that your mobile device to support the following applications.

The last two questions try to qualitatively estimate the perceived importance and the willingness to pay for various devices' features. The 7th question contains 25 technical characteristics. The 8th question contains 20 applications. The students' statements regarding the amount of money for specific features do not exactly correspond to the actual money they will pay for these features. Rather they reflect their willingness to pay extra money for these features. Each one of these questions tries to capture what features are considered important. The confirmation of their importance comes from their willingness to spend extra money for these features in comparison to other features. So, it was tried to find out what of the 25 technical characteristics and the 20 applications are considered more valuable.

Previous studies asked questions about the most popular cell phones' features, characteristics students would appreciate, opinions about prices of telephone and Internet services, Internet connection at home, availability of devices (Switzer & Csapo, 2005; Trifonova et al., 2006; Doring et al., 2005). However, our questionnaire asked much more specific and detailed questions. Furthermore, a lot of research is still required in this sector since the previous studies have not reached a definitive conclusion.

Males' and females' answers to the questionnaire were classified separately. This was done in order to investigate for the existence of any gender differences. Initially, we developed separate tables with the percentages and the averages of the males' and females' answers to every question. By this way, similarities and differences between the two group choices would be identified. Finally, the unpaired t test was used in order to statistically test the relationship between genders and their preferences, and determine if there was any significant difference between gender and individuals' preferences. Further discussion about the preferences and generally the answers of the two groups takes place in the next section.

3. RESULTS & DISCUSSION

3.1 General profile

Firstly, the students stated the type and model of their mobile phone, the type of their mobile connection, and the amount of money they spend on it. Also, they stated the type of Internet connection that they use at home and the amount of money they spend on it.

In 2007, 3G was used by only 10% of European as compared to the 40% of Japanese and S. Korean mobile subscribers. It is estimated that there are 100 million UMTS (Universal Mobile Telecommunication System) customers among the 2.6 billion mobile customers worldwide. 8% of the mobile phones have 3G capabilities. The results of our survey show that 26.63% males and 33.95% females own 3G mobile phones. Note that the respondents are young people. The majority of both males (73.37%) and females (66.05%) use 2G (second generation) mobile phones. The result of the unpaired t test indicated that there was not a significant relationship between gender and this preference ($t=0.4386$, $df=2$, $p=0.7038$). The fact that most respondents own 2G mobile phones may be attributed to various reasons: 3G mobiles are expensive, 3G services are expensive, there are not many useful 3G services, respondents are not aware of 3G possibilities, respondents do not need 3G services, or something else. Although 3G mobiles offer many services, they are relatively new products in the local market, so students are not yet very willing to buy them.

Regarding the type of mobile connection, most males (68.64%) and females (52.09%) have contracts while the rest use cards. The unpaired t test indicated that there was not a significant relationship between gender and connection preference ($t=0.7228$, $df=2$, $p=0.5449$).

The majority of females (33.49%) pay 31-50€ every month for the mobile phone bills while most males pay 31-50€ (27.22%) and over 50€ (27.81%) (Table 1). On "average", both genders pay about 33€ per month. There was not found any significant difference between genders ($t=0.6954$, $df=8$, $p=0.5065$).

	0 -10 €	11 - 20€	21 - 30€	31 - 50€	>50€	"Averages"(€)
MALE	5.33	14.79	24.85	27.22	27.81	33.83
FEMALE	3.26	15.81	26.51	33.49	20.93	33.40

Table 1. Percentages of males and females spending various amount of money every month for the use of mobile phone and the 'averages' of the amounts.

In the third quarter of 2006, the mobile phone market share had the following distribution worldwide: Nokia (36.1%), Motorola (21.9%), Samsung (12.5%), Sony (8.1%), and the rest. In our survey, the majority of males (39.64%) and females (29.77%) own Nokia devices while Sony-Ericsson devices come second (34.91% males and 27.44% females) (Figure 1). The rest devices follow with females preferring Sharp and Motorola, while males preferring Sharp, Motorola and Samsung. So, we remark the strong position of Sony-Ericsson among the respondents in contrast to its worldwide position. The opposite happens for Motorola. The unpaired t test did not show a significant relationship between gender and individuals' preferences for mobile phone company ($t=0.7228$, $df=2$, $p=0.5449$).

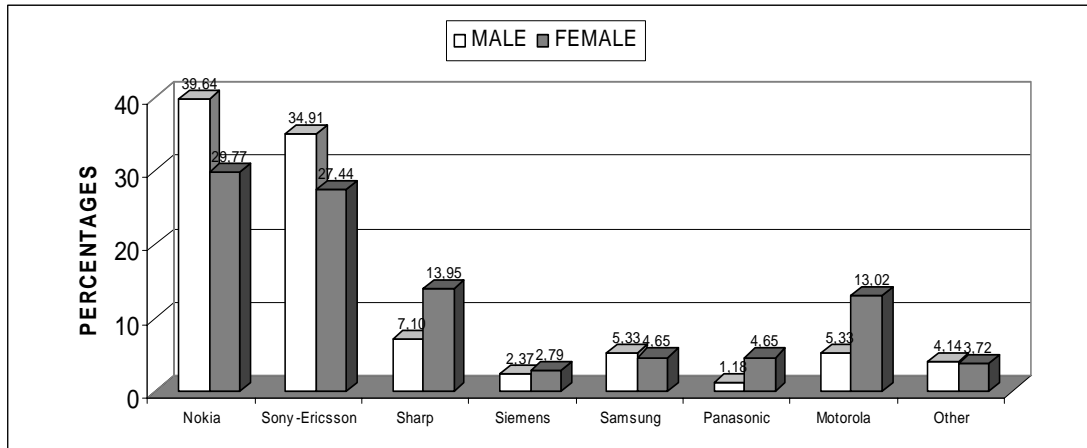


Figure 1. Mobile phone ownership with respect to companies.

Both genders appear to have the same preferences for mobile devices, but females tend to prefer Motorola and Sharp in larger percentages than males perhaps due to the fact that these companies produce sometimes very elegant devices with beautiful design and colors, factors that attract females a lot. Previous studies claimed that females valued a lot the design, ring tones and color while males valued the technical features of the devices (Skog, 2002; Doring et al., 2005).

The majorities of both males (42.6%) and females (53.02%) do not have any Internet connection at home (Figure 2). The rest have mostly ADSL connection at home (28.4% of males and 17.67% of females). As long as the cost of broadband Internet connection is decreasing, the number of broadband connections would increase. According to Trifonova et al. (2006), the majority of Italians used ADSL connection while Bulgarians did not use it at all. Moreover, the 93.8% of Italians and the 62.7% of Bulgarians had Internet connection at home. The result of the unpaired t test indicated that there was not a significant relationship between gender and Internet connection at home ($t=0.3870$, $df=10$, $p=0.7069$).

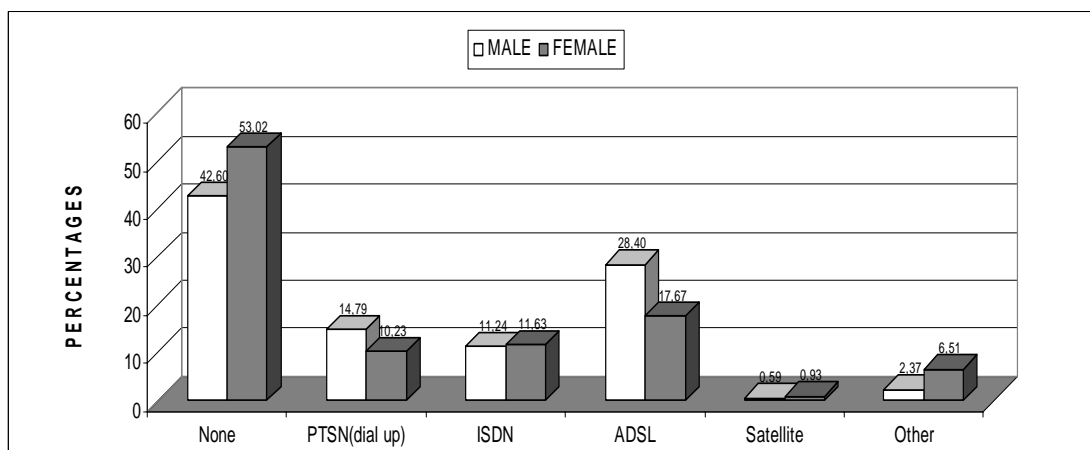


Figure 2. Type of Internet connection at home.

Fewer males than females do not have an Internet connection at home. This is in accordance to the findings that males tend to be more intensive Internet users than their female counterparts (Bimber, 2000; Ono & Zavodny, 2003) as they deal more with Internet services.

More than half of both males and females pay 0-10 € every month for Internet usage (Table 2). However, on “average” they pay about 13€. So, they spend much less money in Internet than in mobile phone connections. The unpaired t test indicated that there was not a significant relationship between gender and the amount of money ($t=0.3139$, $df=8$, $p=0.7616$).

	0 -10€	11 - 20€	21 - 30€	31 - 50€	>50€	“Averages”(€)
MALE	57.99	15.98	19.53	4.73	1.78	13.16
FEMALE	63.26	10.23	17.67	6.51	2.33	13.06

Table 2. Percentages of males and females spending an amount of money every month for the use of Internet and the averages of the amounts.

After portraying the respondents, we proceed to examine the characteristics, features and services of their mobile devices. We investigated technical, functional and usability features of the devices. We examined what students consider important to have and what extra money they are eager to pay in order to have it.

3.2 Importance and willingness to pay for technical characteristics

The following Tables 3 to 6 show the distribution of the considered importance and cost of the various devices’ technical characteristics. Briefly, we remark that the respondents consider the following characteristics to be very important: battery life, mp3 player, video camera, photo camera, large storing memory, Bluetooth technology, as well as design and elegance. They also consider the following characteristics to be important: low weight and dimensions, resilience in water, drops, etc., wide screen, high processing speed, hands-free or Bluetooth earphone, easy to use menu, icons, etc., easy structure and organization of menu, organization of personal files, photo, SMS etc., easy use of tools and applications. Remarkably, several useful characteristics such as Wi-Fi are not considered important. This may be attributed to several reasons: ignorance of using Wi-Fi, security concerns regarding Wi-Fi, unavailability of supported mobile applications (e.g. location-based m-commerce) or for some other reasons. Also, most of them do not care about IrDA (Infrared Data Association), 3G (third Generation), GPS (Global Positioning System), search engine, touch screen, voice commands, and easy interface.

Correspondingly, the respondents are eager to spend enough extra money for the mp3 player, photo camera, video camera, large storing memory, design and elegance, and battery life. However, most of them would not spend any extra money for most of the devices’ characteristics. Also, more than half of them would not spend anything for Wi-Fi, touch screen, or voice commands.

MALE	NONE	LITTLE	ENOUGH	MUCH	VERY MUCH	‘Average’
Low weight and dimensions	21.89	18.93	34.32	17.16	7.69	1.70
Battery life	10.06	11.24	26.04	24.85	27.81	2.49
Resilience in water, drops etc.	19.53	24.26	20.71	22.49	13.02	1.85
Design and elegance	14.20	17.75	32.54	20.12	15.38	2.05
Wide screen	18.34	24.26	31.36	17.75	8.28	1.73
Large storing memory	9.47	9.47	31.95	29.59	19.53	2.40
High processing speed	16.57	20.71	27.22	24.85	10.65	1.92

Bluetooth technology	17.75	17.16	21.30	27.81	15.98	2.07
Infrared (IrDA)	29.59	23.67	19.53	17.16	10.06	1.54
Wireless local network (Wi-Fi)	52.66	14.20	15.98	8.28	8.88	1.07
3G	32.54	21.30	23.67	15.98	6.51	1.43
GPS	36.09	23.67	23.67	10.06	6.51	1.27
Sound recording	34.91	33.14	14.79	10.65	6.51	1.21
Photo camera	14.79	18.34	24.26	25.44	17.16	2.12
Videocamera	17.75	17.16	25.44	20.71	18.93	2.06
MP3 player	18.34	14.20	19.53	24.85	23.08	2.20
Search engine	40.24	23.67	17.75	11.24	7.10	1.21
Touch screen	51.48	20.71	12.43	8.28	7.10	0.99
Voice commands	51.48	24.85	10.65	10.06	2.96	0.88
Hands-free or Bluetooth earphone	17.75	17.16	27.81	26.63	10.65	1.95
Easy interface	40.24	21.89	19.53	12.43	5.92	1.22
Easy to use menu, icons etc.	13.61	15.38	32.54	22.49	15.98	2.12
Easy structure and organization of menu	14.79	19.53	28.99	27.22	9.47	1.97
Organization of personal files, photos, SMS etc.	18.34	24.85	23.67	23.08	10.06	1.82
Easy use of tools and applications	17.16	23.08	27.81	21.89	10.06	1.85

Table 3. Percentages of males considering the importance of various features of the mobile device and also the averages.

FEMALE	NONE	LITTLE	ENOUGH	MUCH	VERY MUCH	'Average'
Low weight and dimensions	15.35	27.91	36.74	15.35	4.65	1.66
Battery life	6.05	9.30	29.30	30.70	24.65	2.50
Resilience in water, drops etc.	10.70	9.00	27.91	24.65	14.42	2.10
Design and elegance	9.77	16.74	36.74	22.33	14.42	2.15
Wide screen	16.74	27.44	31.63	21.40	2.79	1.66
Large storing memory	6.05	13.02	32.09	31.16	17.67	2.41
High processing speed	13.95	29.30	28.37	20.93	7.44	1.79
Bluetooth technology	11.63	15.81	27.91	26.98	17.67	2.23
Infrared (IrDA)	15.81	28.37	22.79	22.79	10.23	1.83
Wireless local network (Wi-Fi)	32.56	29.30	18.60	14.42	5.12	1.30
3G	23.72	24.19	23.26	18.14	10.70	1.68
GPS	39.53	24.65	16.28	13.49	6.05	1.22
Sound recording	32.09	38.14	17.21	9.30	3.26	1.13
Photo camera	7.44	13.49	27.91	28.84	22.33	2.45
Videocamera	10.70	13.95	26.51	27.91	20.93	2.34
MP3 player	10.70	12.56	24.19	26.05	26.51	2.45
Search engine	34.88	32.56	16.28	12.09	4.19	1.18
Touch screen	52.56	28.37	6.98	6.05	6.05	0.85
Voice commands	49.77	28.84	9.30	6.98	5.12	0.89
Hands-free or Bluetooth earphone	10.70	20.47	24.65	23.72	20.47	2.23
Easy interface	41.40	26.05	20.47	6.98	5.12	1.08
Easy to use menu, icons etc.	13.02	18.14	36.28	21.86	10.70	1.99
Easy structure and organization of menu	12.56	19.53	35.35	20.93	11.63	2.00

Organization of personal files, photos, SMS etc.	12.56	20.93	31.16	22.33	13.02	2.02
Easy use of tools and applications	12.56	19.53	35.35	20.93	11.63	2.00

Table 4. Percentages of females considering the importance of various features of the mobile device and also the averages.

MALE	0 €	10 €	11 - 50€	51 - 100€	101 - 300€	301 - 500€	>500€	'Average' €
Low weight and dimensions	23.67	17.75	30.18	16.57	7.10	3.55	1.18	57.86
Battery life	18.34	14.20	28.40	19.53	13.61	4.73	1.18	76.99
Resilience in water, drops etc	25.44	23.67	18.93	17.75	7.69	4.73	1.78	64.80
Design and elegance	26.04	11.83	21.89	20.71	10.06	4.73	4.73	86.29
Wide screen	27.22	14.79	23.08	15.98	10.65	5.33	2.96	78.06
Large storing memory	14.79	14.20	24.85	23.67	13.61	5.92	2.96	92.65
High processing speed	25.44	17.75	21.30	16.57	10.65	5.33	2.96	78.26
Bluetooth technology	28.40	18.93	19.53	17.16	9.47	4.14	2.37	68.21
Infrared (IrDA)	41.42	23.08	14.79	8.88	7.69	1.78	2.37	47.89
Wireless local network (Wi-Fi)	59.76	8.28	11.83	8.88	5.92	2.96	2.37	46.69
3G	42.01	9.47	20.71	12.43	7.10	5.33	2.96	67.00
GPS	45.56	17.16	16.57	9.47	6.51	2.37	2.37	48.28
Sound recording	47.34	20.71	11.83	8.88	6.51	2.37	2.37	46.75
Photo camera	23.08	11.83	22.49	20.12	11.83	6.51	4.14	93.74
Videocamera	26.04	11.24	22.49	20.12	8.88	8.28	2.96	88.94
MP3 player	23.67	10.65	24.26	20.71	9.47	8.88	2.37	90.46
Search engine	46.15	18.93	10.65	11.83	4.14	4.73	3.55	59.09
Touch screen	55.62	11.83	8.28	13.02	6.51	2.37	2.37	47.90
Voice commands	57.40	13.02	8.28	10.65	5.33	4.73	0.59	44.46
Hands-free or Bluetooth earphone	25.44	23.08	21.89	14.20	9.47	4.14	1.78	64.15
Easy interface	45.56	22.49	10.65	11.24	6.51	2.37	1.18	42.43
Easy to use menu, icons etc.	28.99	17.16	26.63	10.65	6.51	8.28	1.78	72.98
Easy structure and organization of menu	25.44	24.26	21.89	14.20	8.28	3.55	2.37	62.49
Organization of personal files, photos, SMS etc.	28.99	27.22	17.75	10.65	8.88	4.73	1.78	61.81
Easy use of tools and applications	26.63	27.22	16.57	16.57	9.47	2.96	0.59	54.07

Table 5. Percentages of males who would spend an extra amount of money on features and the averages of the money they would spend.

FEMALE	0 €	10 €	11 - 50€	51 - 100€	101 - 300€	301 - 500€	>500€	'Average' €
Low weight and dimensions	23.26	17.21	27.91	17.21	12.09	2.33	0.00	56.79
Battery life	13.02	13.95	31.63	22.33	14.42	4.19	0.47	75.90
Resilience in water, drops etc	17.21	19.07	28.84	20.00	13.02	1.86	0.00	59.37
Design and elegance	16.28	17.21	21.40	26.51	10.70	7.91	0.00	81.38
Wide screen	24.65	22.79	20.93	14.42	12.56	3.72	0.93	64.28
Large storing memory	13.49	14.42	23.72	26.05	15.35	6.51	0.47	87.52

High processing speed	22.79	18.14	25.58	18.60	12.09	2.79	0.00	59.09
Bluetooth technology	17.67	19.07	25.58	19.07	14.42	4.19	0.00	69.78
Infrared (IrDA)	26.98	27.44	20.93	9.77	12.09	2.33	0.47	52.39
Wireless local network (Wi-Fi)	40.47	19.07	20.00	9.30	6.05	2.79	2.33	49.96
3G	30.23	14.88	15.81	15.35	14.42	7.44	1.86	85.92
GPS	46.51	15.81	17.67	9.30	7.44	3.26	0.00	41.96
Sound recording	46.98	25.58	11.16	11.16	3.72	1.40	0.00	27.44
Photo camera	17.21	12.56	20.47	23.72	16.74	8.37	0.93	97.16
Videocamera	18.14	12.09	21.86	23.26	17.21	6.51	0.93	90.67
MP3 player	18.60	13.95	19.07	18.14	19.53	8.84	1.86	104.77
Search engine	46.05	20.47	15.81	8.84	6.51	1.86	0.47	36.37
Touch screen	59.53	13.95	14.42	3.26	5.12	1.86	1.86	35.26
Voice commands	59.53	16.28	10.23	6.51	4.19	2.33	0.93	32.02
Hands-free or Bluetooth earphone	21.86	20.93	26.98	14.42	7.91	6.05	1.86	70.58
Easy interface	51.63	18.60	16.74	7.91	3.72	0.93	0.47	26.45
Easy to use menu, icons etc.	24.65	18.60	29.30	16.74	8.37	0.93	1.40	50.93
Easy structure and organization of menu	24.19	22.79	24.65	17.21	8.37	2.33	0.47	51.22
Organization of personal files, photos, SMS etc.	24.19	22.33	23.26	15.35	10.23	3.26	1.40	61.45
Easy use of tools and applications	24.19	22.79	21.40	19.07	9.30	1.86	1.40	56.28

Table 6. Percentages of females who would spend an extra amount of money on features and the averages of the money they would spend.

Let also calculate the “average importance” (NONE=0, LITTLE=1, ENOUGH=2, MUCH=3, VERY MUCH=4) and the “average amount of money” they are willing to pay for a characteristic. On “average”, both genders consider the following characteristics to be ‘enough important’ and would pay approximately 51-100€ for each one: low weight and dimensions, battery life, resilience in water, drops etc, design and elegance, wide screen, large storing memory, high processing speed, Bluetooth technology, easy to use menu, icons etc., easy structure and organization of menu, organization of personal files, photos, SMS etc., easy use of tools and applications, hands-free or Bluetooth earphone, photo camera and video camera. Furthermore, they consider the following characteristics to be ‘little important’ and are eager to pay about 11-50€ for each one: Wi-Fi, GPS, sound recording, touch screen, voice commands and easy interface.

However, there may be some differences on “average” between the two genders. For some characteristics, males attribute more value to them than females do. On “average”, males consider the wide screen of ‘1.73 importance’ and would spend 78.06€ for it, while females consider it of ‘1.66 importance’ and would spend 64.28€ for it. Also, males consider the high processing speed of ‘1.92 importance’ and would spend 78.26€ for it, while females consider it of ‘1.79 importance’ and would spend 59.09€ for it. Males consider sound recording of ‘1.21 importance’ and would spend 46.75€ for it, while females consider it of ‘1.13 importance’ and would spend 27.44€ for it. Males consider the search engine of ‘1.21 importance’ and would spend 59.09€ for it, while females consider it of ‘1.18 importance’ and would spend 36.37€ for it. Males consider the touch screen of ‘0.99 importance’ and would spend 47.90€ for it, while females consider it of ‘0.85 importance’ and would spend 35.26€ for it. Both males and females

consider the voice commands of '0.88 importance' whereas males would spend 44.46€, while females would spend 32.02€ for it.

For other characteristics, females attribute more value to them than males do. Males consider the 3G of '1.43 importance' and would pay 67€ for it, whereas females consider it of '1.68 importance' and would spend 85.92€ for it. Also, males consider MP3 player of '2.2 importance' and would spend 90.46€ for it, while females consider it of '2.45 importance' and would spend 104.77€ for it. Finally, males consider the easy interface of '1.22 importance' and would spend 42.43€ for it, while females consider it of '1.08 importance' and would spend 26.45€ for it. More specific analysis follows.

3.2.1 Weight and dimensions

Regarding the weight and dimensions of the mobile phone, the majority of both males (34.32%) and females (36.74%) consider their mobile phone's lightness and thinness to be 'enough important'. Also, the majority of both males (30.18%) and females (27.91%) would pay an amount of 11-50€ for this feature (Figure 3). The unpaired t test indicated that there was not a significant relationship between gender and any of these preferences [importance: ($t=0.6564$, $df=8$, $p=0.53$); cost: ($t=0.6069$, $df=12$, $p=0.5552$)].

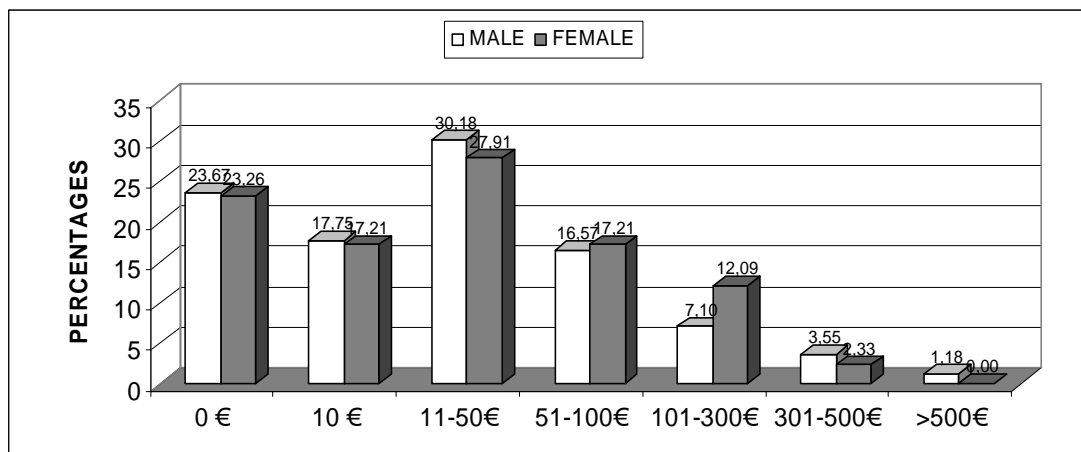


Figure 3. Willingness to pay for low weight and dimensions.

3.2.2 Wide screen, storing memory, easy structure and organization of menu, easy to use menu, icons, etc.

The majority (about 31%) of both genders consider the wide screen to be 'enough important'. However, most males (27.22%) and females (24.65%) would not spend any money for this feature. Also, the majority (about 32%) of both genders consider a large storing memory to be 'enough important'. However, there is a slight difference between genders regarding the amount of money they would spend. Most males (24.85%) would pay 11-50€, while most females (26.05%) would pay 51-100€ for it. Afterwards, easy structure and organization of the menu is considered 'enough import' by the majority of both males (28.99%) and females (35.35%). Most females (24.65%) would pay 11-50€ extra money for this while most males (25.44%) would not spend any money. Most males (32.54%) and females (36.28%) also consider the easy usage of menu, icons etc. to be 'enough important', with most females (29.3%) spending again an extra amount of 11-50€ and most males (28.99%) not spending any money at all. The unpaired t test showed a not significant relationship between gender and any

of these preferences [wide screen importance: ($t=0.7339$, $df=8$, $p=0.484$); wide screen cost: ($t=0.6973$, $df=12$, $p=0.4989$); memory importance: ($t=0.6758$, $df=8$, $p=0.5182$); memory cost: ($t=0.7347$, $df=12$, $p=0.4766$); structure of menu importance: ($t=0.8314$, $df=8$, $p=0.4298$); structure of menu cost: ($t=0.6230$, $df=12$, $p=0.5449$)| easiness of menu importance: ($t=0.8111$, $df=8$, $p=0.4407$); easiness of menu cost: ($t=0.5881$, $df=12$, $p=0.5674$)].

3.2.3 Easy use of tools and applications, organization of personal files, photos, SMS, etc.

More females (35.4%) than males (27.8%) consider the easy use of tools and applications to be 'enough important'. It is a surprise though that the majority of females (24.19%) would not pay any money for this feature, while the majority of males (27.22%) would spend an amount of 10€ for it. This is one of the few times that males tend to be more willing than females to pay extra money for a feature. Also, most females (31.16%) consider the organization of personal files, SMS, e-mail, etc. to be 'enough important' (Figure 4) while most males (24.85%) consider it to be 'little important'. Nevertheless, most females (24.19%) and males (28.99%) would not spend any money for it. The unpaired t test showed a not significant relationship between gender and any of these preferences [easiness of tools importance: ($t=0.8790$, $df=8$, $p=0.405$); easiness of tools cost: ($t=0.6256$, $df=12$, $p=0.5433$); file organization importance: ($t=1.059$, $df=8$, $p=0.3204$); file organization cost: ($t=0.6353$, $df=12$, $p=0.5372$)].

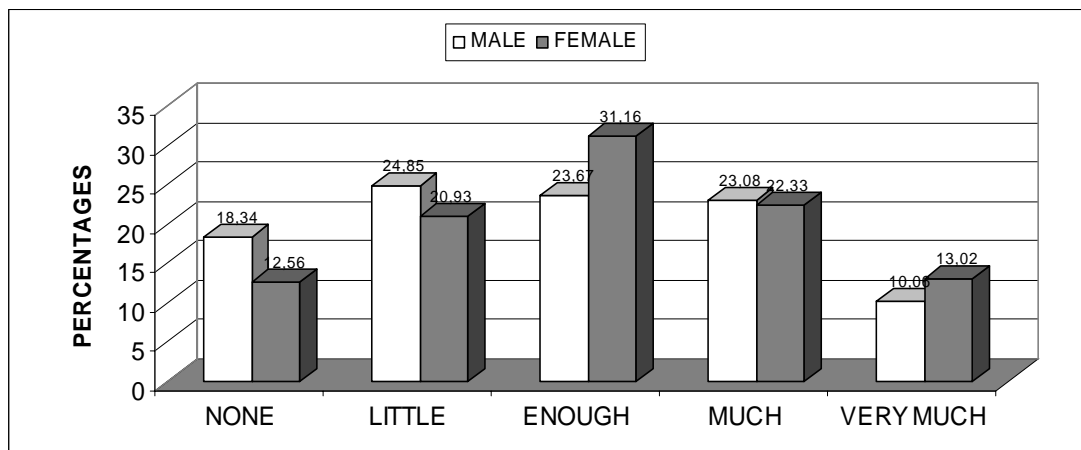


Figure 4. Importance of organization of personal files, SMS, e-mail, etc.

3.2.4 Mp3 player

MP3 player is another feature which is considered important by both genders but in a higher percentage by females. Most females (26.51%) consider the MP3 players to be 'very much important' while most males (24.85%) consider it to be 'much important' (Figure 5). Most males (24.26%) would pay 11-50€ extra money for it, but most females (19.53%) would spend 101-300€ for it. However, the unpaired t test showed a not significant relationship between gender and any of these preferences [Importance: ($t=1.141$, $df=8$, $p=0.287$); cost: ($t=0.8541$, $df=12$, $p=0.4098$)].

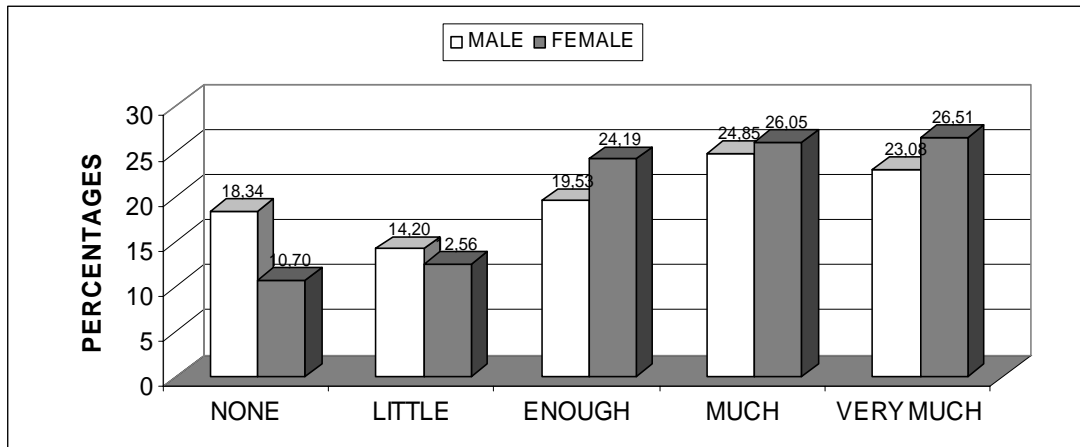


Figure 5. Importance of MP3 player.

3.2.5 Photo and video camera

Females would also spend extra money in order their devices to include digital photo and video camera. The majority of both males (25.44%) and females (28.84%) consider the photo camera on a mobile phone to be 'much important'. Also, most females (23.72%) would spend 51-100€ for it while most males (23.08%) are not eager to spend on it. As for the digital video camera, females consider it more important than males do (Figure 6). For example, more females (27.91%) than males (20.71%) consider it to be 'much important'. Besides that, most females (23.26%) would spend 51-100€ to include it in contrast to most males (26.04%) who would not spend any money. However, the unpaired t test showed a not significant relationship between gender and any of these preferences [photo camera importance: ($t=0.9579$, $df=8$, $p=0.3662$); photo camera cost: ($t=0.8248$, $df=12$, $p=0.4256$); video camera importance: ($t=1.195$, $df=8$, $p=0.2662$); video camera cost: ($t=0.7607$, $df=12$, $p=0.4615$)].

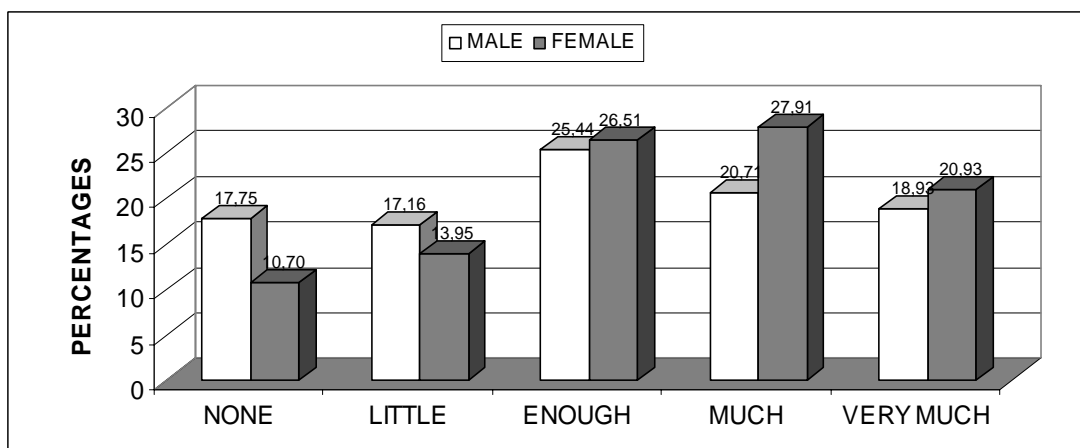


Figure 6. Importance of video camera.

3.2.6 IrDA

Regarding IrDA (Figure 7), most females (28.37%) consider it to be 'little important' and most females (27.44%) would pay an extra amount of 10€ for it. On the other hand, most males (29.59%) consider it to be 'not important' and most males (41.42%) would not spend any

money for it. The unpaired t test showed a not significant relationship between gender and preferences [importance: (t=1.054, df=8, p=0.3228); cost: (t=0.5167, df=12, p=0.6148)].

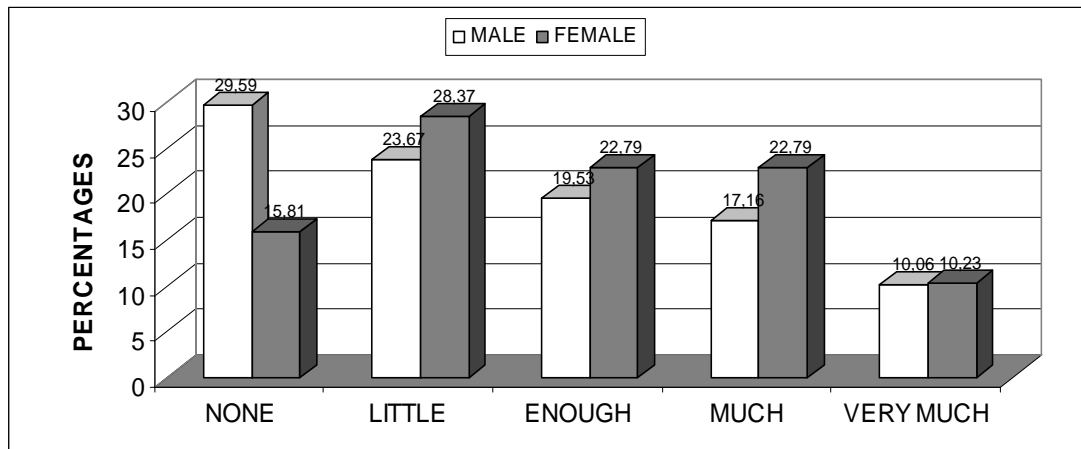


Figure 7. Importance of IrDA.

3.2.7 Resilience in water, drops, etc.

Regarding resilience in water, drops etc. (Figure 8), most females (27.91%) consider it to be 'enough important' but most males (24.26%) believe that it is 'little important'. So, most females (28.84%) would pay 11-50€ for it, while most males (25.44%) would not spend any money. The unpaired t test showed a not significant relationship between gender and any of these preferences [importance: (t=1.203, df=8, p=0.2632); cost: (t=0.6367, df=12, p=0.5363)].

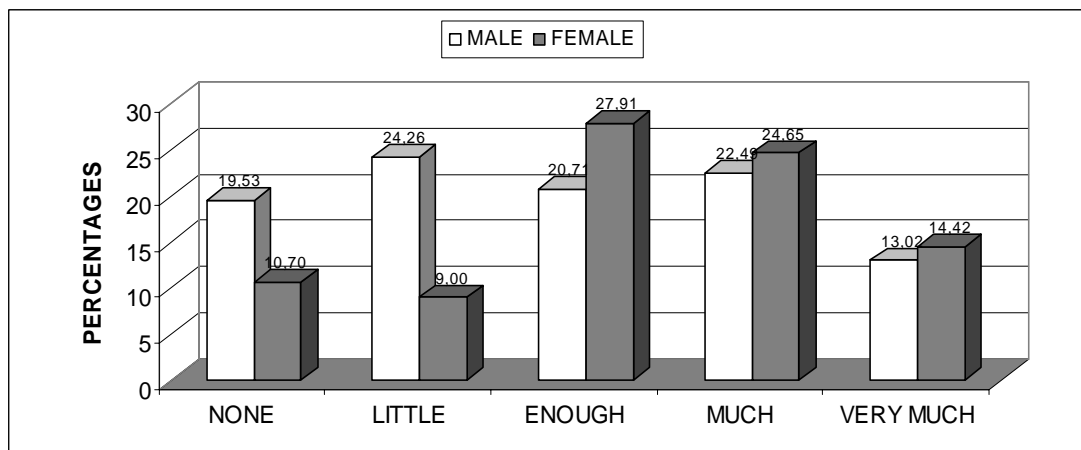


Figure 8. Importance of resilience in water etc.

3.2.8 Design and elegance

Most males (32.54%) and females (36.74%) consider design and elegance to be 'enough important'. It may have been expected that females would pay an extra amount for it as females most times care for appearance and design a bit more than males (Skog, 2002; Doring et al., 2005). Most females (26.51%) would spend 51-100€ for design and elegance while most males (26.04%) would not spend any money at all (Figure 9). The unpaired t test showed a not

significant relationship between gender and any of these preferences [importance: ($t=0.8040$, $df=8$, $p=0.4446$); cost: ($t=0.7261$, $df=12$, $p=0.4817$)].

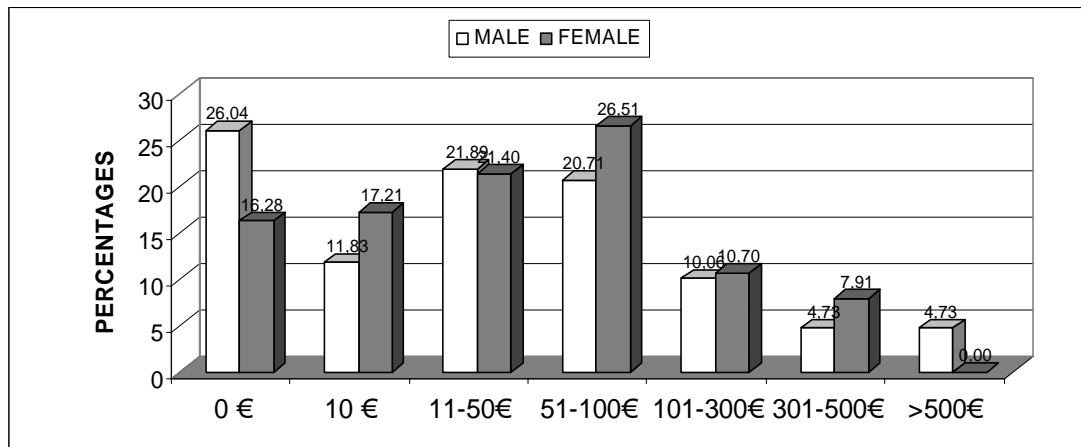


Figure 9. Willingness to spend in design and elegance.

3.2.9 Sound recording

Sound recording is considered to be 'little important' by most females (38.14%), and 'not important' by most males (34.91%) (Figure 10). Most of both females (46.98%) and males (47.34%) would not to spend on it. There were not found any significant gender differences [importance: ($t=0.5297$, $df=8$, $p=0.6107$); cost: ($t=0.3860$, $df=12$, $p=0.7062$)].

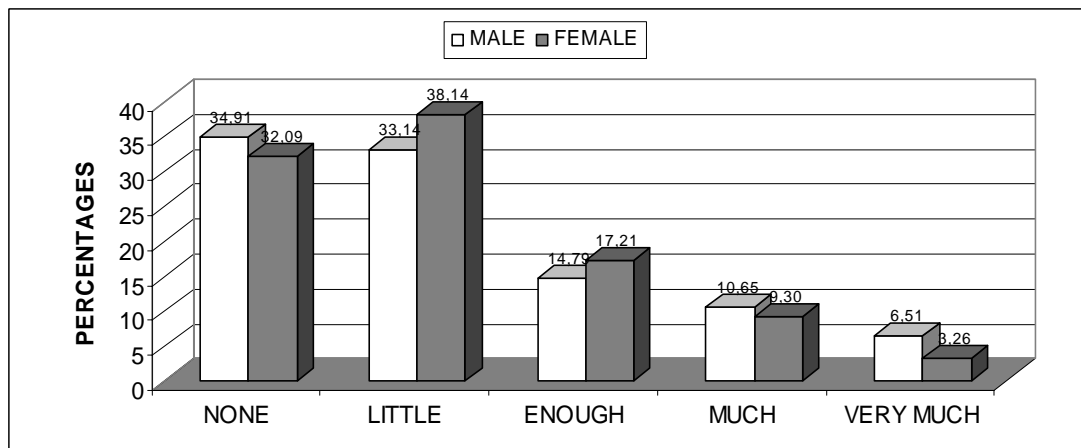


Figure 10. Importance of sound recording.

3.2.10 3G (Third Generation)

As it was described before, participants mainly own 2G mobile phones. It is noticed that most males (32.54%) consider the 3G feature to be 'not important' while females' opinions are allotted among 'not important', 'little important' and 'enough important' (Figure 11). The majority of both males (42.01%) and females (30.23%) would not pay an extra amount of money for 3G. They are not willing to pay for 3G maybe due to the high cost of 3G, the limited advanced services, their lack of experience or some other reasons. There were not found any significant gender differences [importance: ($t=1.007$, $df=8$, $p=0.3433$); cost: ($t=0.5874$, $df=12$, $p=0.5678$)].

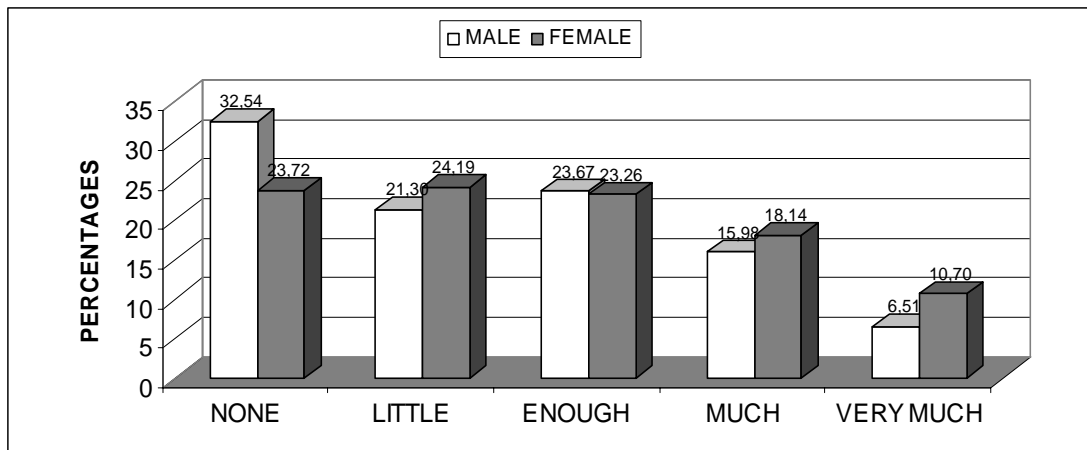


Figure 11. Importance of 3G.

3.2.11 Battery life

The battery life is considered 'very much important' by the majority of males (27.81%) and 'much important' by the majority of females (30.70%) (Figure 12). Nevertheless, most males (28.40%) and females (31.63%) would pay 11-50€ for this. It is one out of the few features that most males are willing to pay for it. As mentioned before, the majority of males usually choose not to spend money for operations or features even if they think that are important. So, battery life represents an important characteristic they would seriously consider when choosing a mobile phone. Again, there was not found any significant difference between genders [Importance: ($t=0.7157$, $df=8$, $p=0.4945$); cost: ($t=0.6350$, $df=12$, $p=0.5374$)].

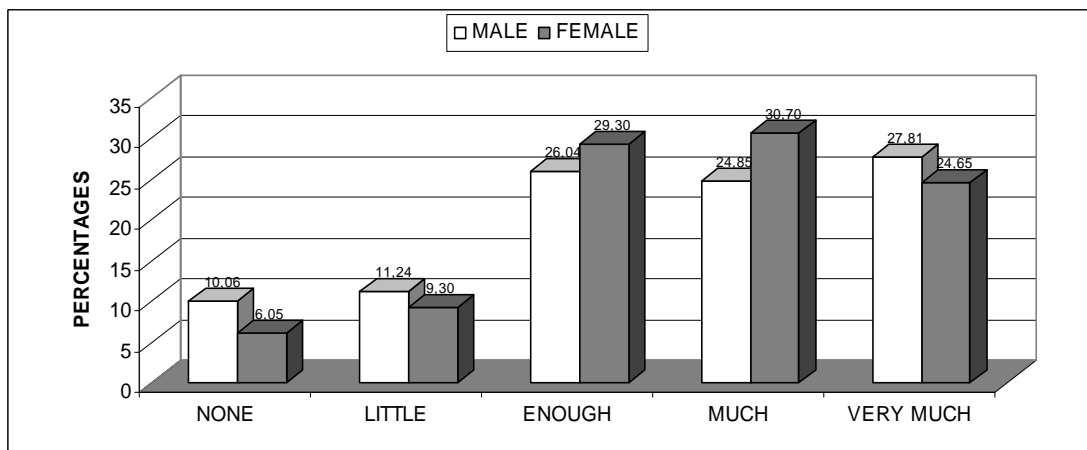


Figure 12. Importance of battery life.

3.2.12 Processing speed

There is also a slight difference among the respondents considering the fast processing speed. Most males (27.22%) consider it to be 'enough important' while most females (29.3%) consider it to be 'little important' (Figure 13). Nevertheless, most males (25.44%) would not pay any money for it, but most females (25.58%) would pay the extra amount of 11-50€ for it. The result of the unpaired t test indicated that there was not a significant relationship between

gender and these preferences [importance: ($t=0.8922$, $df=8$, $p=0.3984$); cost: ($t=0.6878$, $df=12$, $p=0.5047$)].

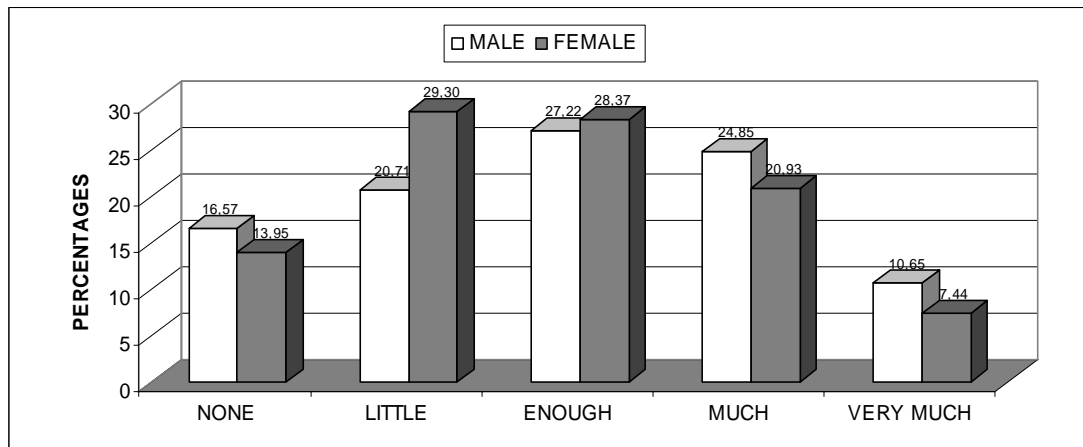


Figure 13. Importance of high processing speed.

3.2.13 Hands-free or Bluetooth earphone, Bluetooth technology

Today, most mobile devices include hands-free or Bluetooth earphone. The majority of both males (27.81%) and females (24.65%) considers it to be 'enough important'. Most males (25.44%) are not eager to spend any money contrary to most females (26.98%) who would spend 11-50€ for it. Also, most males (27.81%) consider Bluetooth technology to be 'much important' while most females (27.91%) consider it to be 'enough important' (Figure 14). Most females (25.58%) would pay 11-50€ for Bluetooth, but most males (28.4%) are not willing to spend any money. The result of the unpaired t test indicated that there was not a significant relationship between gender and any of the above preferences [hands-free importance: ($t=1.212$, $df=8$, $p=0.2602$); hands-free cost: ($t=0.6752$, $df=12$, $p=0.5123$); Bluetooth importance: ($t=1.184$, $df=8$, $p=0.2703$); Bluetooth cost: ($t=0.6938$, $df=12$, $p=0.501$)].

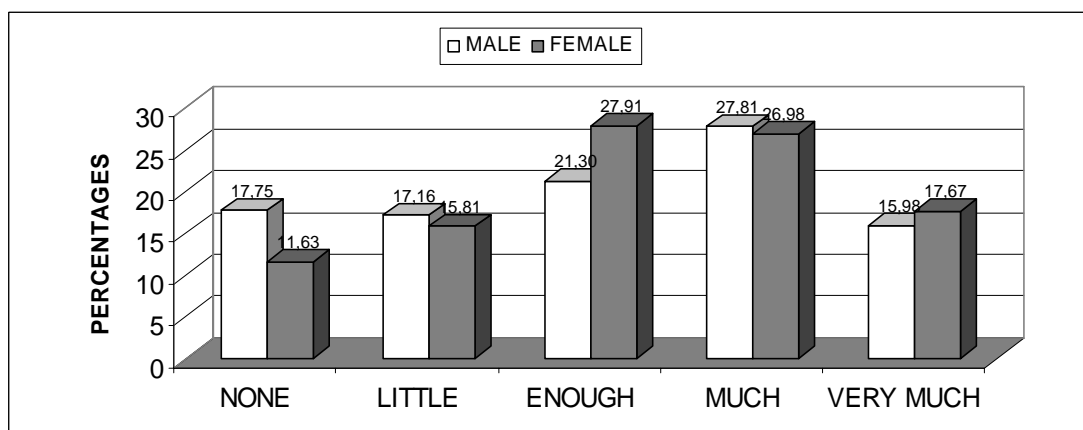


Figure 14. Importance of Bluetooth technology.

3.2.14 Wi-Fi, GPS, search engine, touch screen, voice commands, easy interface

Interestingly, the majority of both males (52.66%) and females (32.56%) consider the Wi-Fi technology to be 'not important'. Consequently, about 60% of males and 41% of females would not give any extra amount of money in order their phones to support Wi-Fi. Also, the majority of both males (36.1%) and females (39.5%) consider GPS to be 'not important'. As a result, most of them would not pay any money for it. Similarly, the respondents do not care too much about usability features of the devices. Most males (40.24%) and females (34.88%) consider the search engine to be 'not important'. The majority (about 46%) of both genders would not spend any money for it. Also, the touch screen and the voice commands are considered unimportant. The majority (about 51%) of both genders consider these features to be 'not important'. So, most of them are not eager to pay extra money for them. Furthermore, approximately 41% of both genders consider easy interface to be 'not important'. So, most males (45.5%) and females (51%) would not give any money for it. It seems that either the respondents are satisfied with the existing usability characteristics of the devices or they do not understand their usefulness, or for some other reasons. The result of the unpaired t test indicated that there was not a significant relationship between gender and any of the above preferences [WiFi importance: (t=0.5208, df=8, p=0.6166); WiFi cost: (t=0.3854, df=12, p=0.7067); GPS importance: (t=0.6038, df=8, p=0.5627); search engine importance: (t=0.5717, df=8, p=0.5832); search engine cost: (t=0.4105, df=12, p=0.6887); easy interface importance: (t=0.5310, df=8, p=0.6099); easy interface cost: (t=0.3722, df=12, p=0.7162)].

As it is obvious, there are some slight differences among the percentages of respondents who rate a characteristic or service to be 'little important', 'enough important' etc. and the amount of money they are willing to spend for them. Generally, opinions vary and many participants are not eager to spend extra money for features they might even like and consider them to be important. Also, there are some differences between males and females but they are not large. The findings show that most females are eager to spend money for features that they may consider to be important while most males do not pay extra money easily even if they consider a feature to be important. According to Trifonova et al. (2006) females were not interested in new services as much as males, but when they became eager to explore them, they did not think about the price and were willing to pay while males were not.

3.3 Importance and willingness to pay for applications

The following Tables 7 to 10 show the distribution of the considered importance and amount of money that students are willing to pay for the various devices' applications. In summary, only the clock, calendar, organizer and reminder are considered 'very important'. The students assign 'average importance' to the calculator, sending and receiving MMS (Multimedia Messaging Service), and locking the keys, touch screen and device. However, they would spend enough extra money for having translation of foreign languages.

MALE	NONE	LITTLE	ENOUGH	MUCH	VERY MUCH	'Average
Sending and receiving e-mails	42.60	25.44	18.93	5.33	7.69	1.10
Sending and receiving MMS	20.71	31.95	28.40	10.06	8.88	1.54
Chat	57.40	20.71	11.24	6.51	4.14	0.79
Teleconference	56.21	22.49	11.24	5.33	4.73	0.80
Internet navigation	37.87	18.93	23.08	10.65	9.47	1.35
Open software (e.g. Windows mobile)	42.01	18.93	17.16	12.43	9.47	1.28
Variety of supported files' types	30.18	21.89	28.40	11.83	7.69	1.45
Encryption and cryptography for exchanging data	55.03	26.04	11.24	2.96	4.73	0.76

Anti-virus and anti-spam protection	41.42	18.34	24.26	10.65	5.33	1.20
Conversion of voice-to-text and vice versa	44.97	13.61	20.12	11.83	9.47	1.27
Translation of foreign languages	34.32	21.30	21.30	15.98	7.10	1.40
Common use of files	45.56	24.85	14.79	10.65	4.14	1.03
Calculator	18.93	33.14	23.67	15.98	8.28	1.62
Clock, Calendar, Organizer, Reminder	13.61	20.71	26.63	21.89	17.16	2.08
Play games	36.69	30.77	20.12	7.69	4.73	1.13
Watch television	34.32	27.22	18.34	11.83	8.28	1.33
Print	44.38	25.44	13.61	10.06	6.51	1.09
View maps	38.46	23.08	21.89	8.88	7.69	1.24
Locking the keys or touch screen	23.08	26.63	20.71	17.75	11.83	1.69
Locking the device with password	25.44	26.63	18.93	14.20	14.79	1.66

Table 7. Percentages of males considering the importance of several services and features of the mobile device and also the averages of every category.

FEMALE	NONE	LITTLE	ENOUGH	MUCH	VERY MUCH	'Average
Sending and receiving e-mails	35.35	32.56	20.00	6.98	5.12	1.14
Sending and receiving MMS	12.56	29.77	29.30	18.14	10.23	1.84
Chat	55.81	25.12	9.77	7.44	1.86	0.74
Teleconference	61.40	21.86	11.63	2.79	2.33	0.63
Internet navigation	45.12	22.79	18.60	10.70	2.79	1.03
Open software (e.g. Windows mobile)	50.70	24.19	15.35	6.98	2.79	0.87
Variety of supported files' types	28.37	21.86	32.09	11.63	6.05	1.45
Encryption and cryptography for exchanging data	60.93	18.14	13.95	5.12	1.86	0.69
Anti-virus and anti-spam protection	42.79	20.00	19.53	10.70	6.98	1.19
Conversion of voice-to-text and vice versa	43.72	20.93	18.60	10.23	6.51	1.15
Translation of foreign languages	31.16	16.28	29.77	16.28	6.51	1.50
Common use of files	47.91	21.86	18.14	9.77	2.33	0.97
Calculator	18.14	25.58	29.77	18.60	7.91	1.73
Clock, Calendar, Organizer, Reminder	10.23	14.88	28.84	25.58	20.47	2.31
Play games	32.56	36.28	20.93	6.05	4.19	1.13
Watch television	46.98	20.47	19.53	8.84	4.19	1.03
Print	46.98	21.40	15.81	12.09	3.72	1.04
View maps	37.21	22.33	22.79	12.56	5.12	1.26
Locking the keys or touch screen	21.40	20.93	27.44	19.53	10.70	1.77
Locking the device with password	23.26	22.33	21.40	20.00	13.02	1.77

Table 8. Percentages of females considering the importance of several services and features of the mobile device and also the averages of every category.

MALE	0 €	10 €	11 - 50€	51 - 100€	101 - 300€	301 - 500€	>500 €	'Average' €
Sending and receiving e-	45.56	18.93	16.57	10.65	5.33	1.78	1.18	38.69

mails								
Sending and receiving MMS	31.36	21.89	22.49	13.02	7.10	2.96	1.18	50.88
Chat	61.54	15.98	8.88	5.92	4.14	1.78	1.78	33.06
Teleconference	60.95	14.20	11.24	5.92	2.96	2.96	1.78	35.97
Internet navigation	43.20	18.93	15.38	10.06	5.92	4.14	2.37	54.47
Open software (e.g. Windows mobile)	48.52	13.61	12.43	9.47	10.06	2.96	2.96	59.11
Variety of supported files' types	39.64	18.34	13.61	17.16	4.14	4.14	2.96	58.63
Encryption and cryptography for exchanging data	57.99	17.75	8.88	6.51	5.33	2.96	0.59	34.88
Anti-virus and anti-spam protection	45.56	15.98	15.98	8.88	6.51	6.51	0.59	55.25
Conversion of voice-to-text and vice versa	46.75	14.79	12.43	8.28	10.06	4.73	2.96	65.44
Translation of foreign languages	37.87	17.75	16.57	9.47	8.28	8.28	1.78	72.64
Common use of files	53.85	17.75	12.43	6.51	3.55	4.14	1.78	43.06
Calculator	28.99	38.46	12.43	9.47	7.69	2.37	0.59	42.64
Clock, Calendar, Organizer, Reminder	21.30	34.32	23.67	9.47	5.33	4.73	1.18	53.35
Play games	43.20	24.85	16.57	8.28	5.33	1.18	0.59	32.17
Watch television	42.60	15.38	15.98	11.24	9.47	2.96	2.37	57.57
Print	51.48	17.75	15.38	5.92	4.14	3.55	1.78	42.33
View maps	44.38	17.16	18.93	7.10	7.10	2.96	2.37	50.77
Locking the keys or touch screen	34.32	31.95	14.20	7.69	8.28	2.37	1.18	45.34
Locking the device with password	39.05	24.26	14.79	7.10	10.06	3.55	1.18	52.60

Table 9. Percentages of males who would spend an extra amount of money on services and features and the averages of the money they would spend.

FEMALE	0 €	10 €	11 - 50€	51 - 100€	101 - 300€	301 - 500€	>500 €	'Average' €
Sending and receiving e-mails	38.60	21.40	20.93	10.70	6.05	2.33	0.00	38.04
Sending and receiving MMS	21.40	22.33	27.91	15.35	8.84	2.79	1.40	58.20
Chat	61.86	18.60	9.30	3.72	4.65	1.86	0.00	24.28
Teleconference	66.51	12.56	10.70	6.98	1.86	1.40	0.00	19.10
Internet navigation	51.16	16.28	13.49	11.63	4.19	3.26	0.00	35.95
Open software (e.g. Windows mobile)	56.74	13.49	15.35	6.98	3.26	3.72	0.47	35.05
Variety of supported files' types	34.88	19.53	20.93	14.42	5.58	3.72	0.93	49.97
Encryption and cryptography for exchanging data	61.86	15.81	12.09	6.98	2.79	0.47	0.00	18.00
Anti-virus and anti-spam protection	45.58	17.21	13.49	14.42	5.58	1.86	1.86	44.67
Conversion of voice-to-text and vice versa	46.98	16.74	13.02	10.23	8.37	3.26	1.40	51.17
Translation of foreign languages	33.49	18.60	19.53	12.56	7.91	6.51	1.40	66.21
Common use of files	52.09	23.26	12.56	7.44	2.33	2.33	0.00	25.75

Calculator	29.77	35.35	19.07	9.30	2.33	3.72	0.47	38.27
Clock, Calendar, Organizer, Reminder	19.53	26.05	27.91	13.49	7.91	2.79	2.33	59.96
Play games	40.93	28.37	17.67	9.30	1.86	0.93	0.93	27.36
Watch television	51.63	14.88	16.28	7.91	6.05	1.86	1.40	38.97
Print	47.91	18.14	16.28	11.16	3.26	1.86	1.40	36.16
View maps	42.33	18.14	19.07	11.63	5.12	2.33	1.40	42.96
Locking the keys or touch screen	32.09	25.58	20.47	12.09	5.58	2.79	1.40	47.27
Locking the device with password	32.56	22.33	22.79	12.56	6.51	1.40	1.86	46.61

Table 10. Percentages of females who would spend an extra amount of money on services and features and the averages of the money they would spend.

On “average”, both genders consider the following applications to be ‘little important’ and they would spend 11-50€ for each one: sending and receiving e-mails, chat, teleconference, encryption and cryptography for exchanging data, common use of files, playing games, printing. Although conversion of voice into text and vice versa is considered ‘little important’, they would spend 51-100€ for it. In addition, both genders consider the following applications to be ‘little important’: Internet navigation, open software (e.g. Windows mobile), variety of supported files, anti-virus and anti-spam protection, watching TV. However, males would approximately spend 51-100€ for each of the above while females 11-50€.

They consider the calculator and locking the keyboard or touch screen to be ‘enough important’ and they would spend 11-50€ for each one. Moreover, they consider the sending and receiving MMS as well the clock, calendar, organizer and reminder to be ‘enough important’ and they would spend 51-100€ for each one. Finally, they consider locking the device with password to be ‘enough important’ and males would spend 51-100€ while females 11-50€.

There may be some differences on “average” between males and females. For some applications, males attribute more value to them than females do. On “average”, males consider mobile Internet navigation of ‘1.35 importance’ and would spend 54.47€ for it, while females consider it of ‘1.03 importance’ and would spend 35.95€ for it. Males consider open software of ‘1.28 importance’ and would spend 59.11€ for it, while females consider it of ‘0.87 importance’ and would spend 35.05€ for it. Males consider teleconference of ‘0.8 importance’ and would spend 35.97€ for it, while females consider it of ‘0.63 importance’ and would spend 19.1€ for it. Males consider encryption and cryptography of ‘0.76 importance’ and would spend 34.88€ for it, while females consider it of ‘0.69 importance’ and would spend 18€ for it. Males consider voice conversion of ‘1.27 importance’ and would spend 65.44€ for it, while females consider it of ‘1.15 importance’ and would spend 51.17€ for it. Furthermore, males consider TV watching of ‘1.33 importance’ and would spend 57.57€ for it, while females consider it of ‘1.03 importance’ and would spend 38.97€ for it. Finally, males would spend more money than females for the following applications: chat, variety of files, anti-virus and ant-spam, translation of foreign languages, common use of files.

On the contrary, females attribute more value to sending and receiving MMS as well to clock, calendar, organizer and reminder. Males consider sending and receiving MMS of ‘1.54 importance’ and would spend 50.88€ for it, while females consider it of ‘1.84 importance’ and would spend 58.2€ for it. Finally, males consider the clock, calendar, organizer and reminder of

'2.08 importance' and would spend 53.35€ for it, while females consider it of '2.31 importance' and would spend 59.96€ for it. More specific analysis follows.

3.3.1 Sending and receiving email, sending and receiving MMS

Most males (42.60%) and females (35.35%) consider the support of sending and receiving email to be 'not important'. So, the majority of both males (45.56%) and females (38.60%) would not spend any money for it. It seems that most respondents do not deal with operations that are supported by the mobile devices and are related to Internet. Similarly, other studies (Trifonova et al., 2006) found that almost everybody used the mobile devices for conversations and SMS.

Furthermore, the sending and receiving MMS is considered 'little important' by both males (31.95%) and females (29.77%). It was also rated as 'enough important' by similar percentages of males (28.5%) and females (29.3%). However, it is interesting that most females (27.91%) would pay an amount of 11-50€ for it while most males (31.36%) would not spend any money (Figure 15). There were not found any significant gender differences [importance: ($t=0.7774$, $df=8$, $p=0.4593$); cost ($t=0.5957$, $df=12$, $p=0.5624$)].

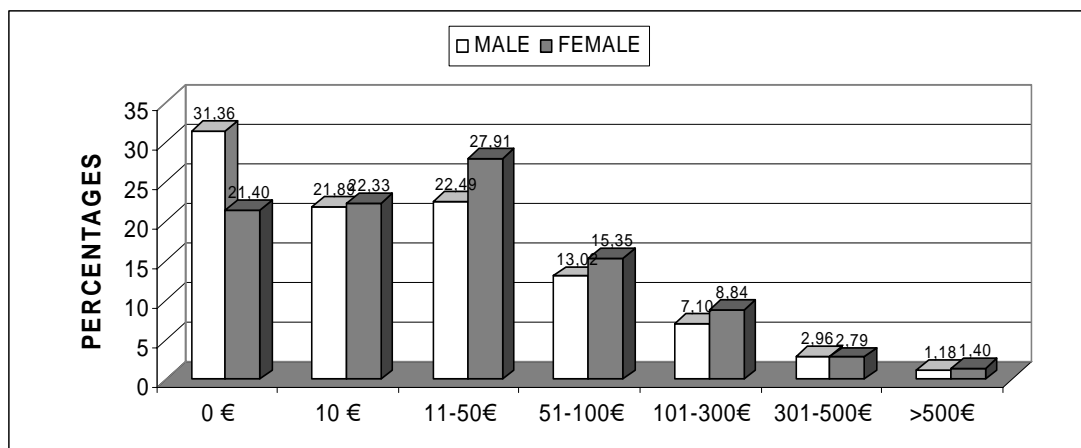


Figure 15. Willingness to spend in sending and receiving of MMS.

3.3.2 Chat, teleconference, Internet navigation

Similarly, most males (56%) and females (62%) believe that it is 'not important' for their mobile to support chat, and approximately 63% of both genders would not spend any money for it. Likewise, teleconference is considered to be 'not important' by most males (56.21%) and females (61.4%). So, the majority of both males (60.95%) and females (66.51%) would not pay an amount of money for it. Moreover, males (37.87%) and females (45.12%) consider Internet navigation to be 'not important' and the majority of both males (43.2%) and females (51.16%) are not eager to spend any money for it. A considerable percentage of males (23.08 %) consider the Internet navigation to be 'enough important' (Figure 16) confirming the fact that males are more interested in Internet than females. It was also reported in Trifonova et al. (2006) that only a small number of respondents accessed the Internet via their mobiles while almost all respondents accessed it via other ways. The unpaired t test showed a not significant relationship between gender and preferences [chat importance: ($t=0.3448$, $df=8$, $p=0.7391$); chat cost: ($t=0.2930$, $df=12$, $p=0.7745$); teleconference importance: ($t=0.3219$, $df=8$, $p=0.7558$);

teleconference cost: ($t=0.2809$, $df=12$, $p=0.7835$); Internet navigation importance: ($t=0.5209$, $df=8$, $p=0.6165$); Internet navigation cost: ($t=0.3934$, $df=12$, $p=0.7009$).

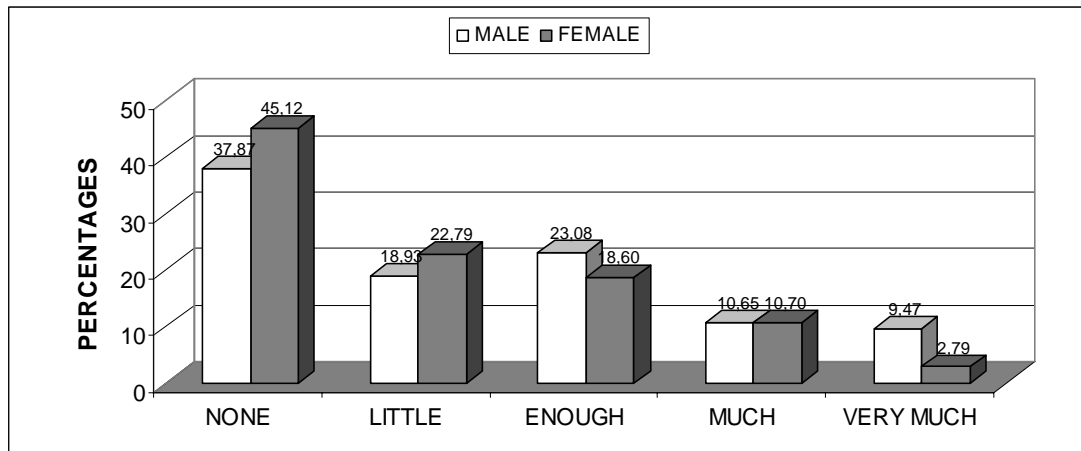


Figure 16. Importance of Internet navigation.

3.3.3 Support of open software and variety of files' types

Open software (e.g. windows mobile) support is also considered 'not important' by most males (42%) and females (50%). So, the majority of both males (48.52%) and females (56.74%) would not spend extra money for it. It seems that there is a small difference between males and females regarding their preference in the variety of supported files' types. Most males (30.18%) consider it to be 'not important' while most females (32.09%) consider it to be 'enough important' (Figure 17). It is interesting that the majority of both males (39.64%) and females (34.88%) would not spend any money for a variety of supported files' types (Figure 18). Even if females would prefer variety of supported files in their mobiles, they would not spend any money to include it. The unpaired t test showed a not significant relationship between gender and preferences [open s/w importance ($t=0.4442$, $df=8$, $p=0.6687$); open s/w cost ($t=0.3506$, $df=12$, $p=0.732$); files importance ($t=0.7087$, $df=8$, $p=0.4987$); files cost ($t=0.5147$, $df=12$, $p=0.6161$)].

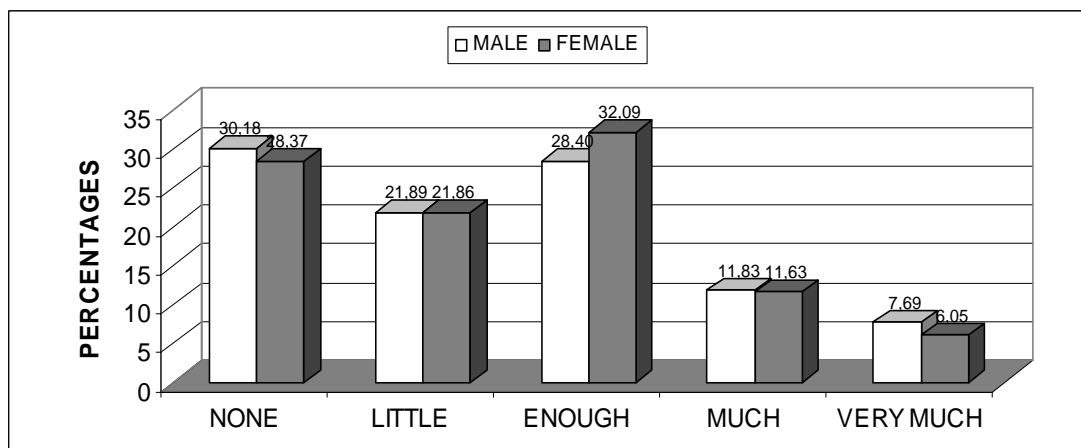


Figure 17. Importance of variety of supported files' types.

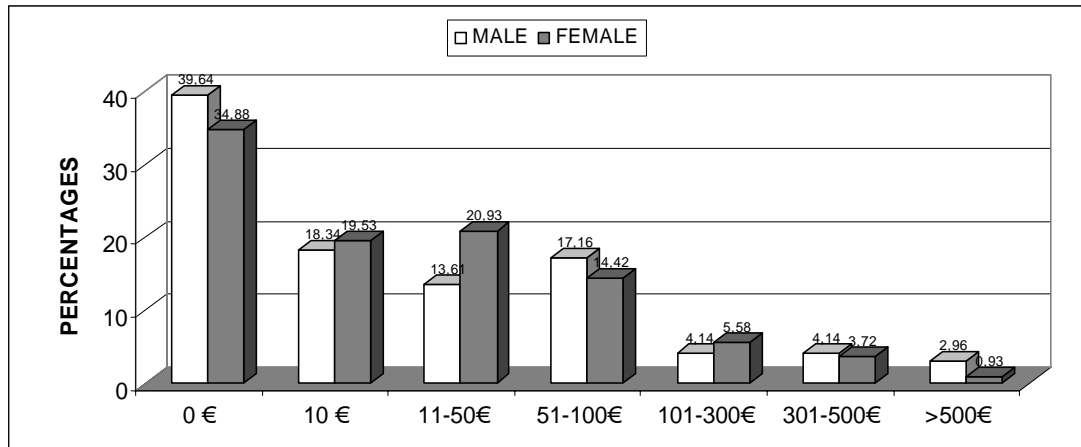


Figure 18. Expenditure in variety of supported files' types.

3.3.4 Encryption and cryptography for exchanging data, common use of files, anti-virus and anti-spam protection, conversion voice-to-text, language translation

Over 45% of both genders consider encryption and cryptography for exchanging data, and common use of files to be 'not important'. So, they would not spend any money for them. Similarly, the majority (over 41%) of both genders consider anti-virus and anti-spam protection, and the conversion of voice-to-text and vice versa to be 'not important'. So, they would not spend any money for these. Moreover, most students consider the language translation to be 'not important' and they would not spend any money for it. There were not found any gender differences [encryption importance: ($t=0.3274$, $df=8$, $p=0.7518$); encryption cost: ($t=0.4453$, $df=8$, $p=0.6679$); anti-virus importance: ($t=0.5393$, $df=8$, $p=0.6044$); anti-virus cost: ($t=0.4233$, $df=12$, $p=0.6796$); voice-to-text importance: ($t=0.5183$, $df=8$, $p=0.6183$); voice-to text cost: ($t=0.4187$, $df=12$, $p=0.6828$); language translation importance: ($t=0.7386$, $df=8$, $p=0.4812$); language translation cost: ($t=0.5730$, $df=12$, $p=0.5772$)].

3.3.5 Calculator, clock, calendar, organizer, reminder

The majority of females (29.77%) consider the calculator to be 'enough important' while the majority of males (33.14%) consider it to be 'little important' (Figure 19). Most males (38.46%) and females (35.35%) are willing to pay the amount of 10€ for the calculator. The unpaired t test showed a not significant relationship between gender and preferences [importance ($t=0.8657$, $df=8$, $p=0.4119$); cost ($t=0.4522$, $df=12$, $p=0.6592$)].

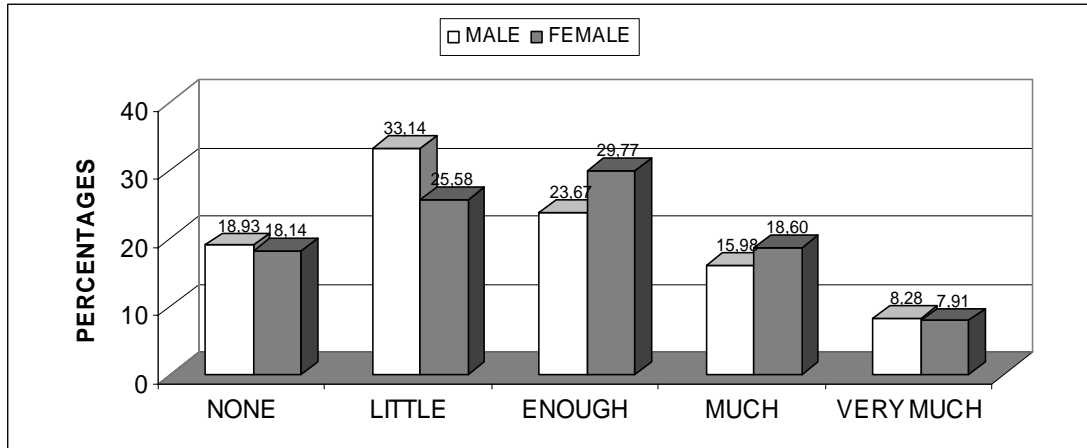


Figure 19. Importance of calculator.

The majority of both males (26.63%) and females (28.84%) consider the clock, calendar, organizer and reminder to be 'enough important'. Most females (27.91%) would give 11-50€ for these operations while most males (34.32%) would give up to 10€. Nevertheless, the unpaired t test showed a not significant relationship between gender and these preferences [importance ($t=1.122$, $df=8$, $p=0.2944$); cost ($t=0.5655$, $df=12$, $p=0.5822$)].

3.3.6 Playing games

Many people may think that males would be interested in playing games through their mobiles more than females. Previous studies pointed out that males use the technology and mainly connect to Internet for games, gambling etc. while females use it for reasons of sociality (Jackson et al., 2001; Goodson et al., 2001; Odell et al., 2000). According to our results, most males (36.69%) consider playing games to be 'not important', while most females (36.28%) consider it to be 'little important' (Figure 20). Nevertheless, neither males nor females in their majority (over 40%) are eager to pay any money in order to play games via their mobile. The unpaired t test showed a not significant relationship between gender and preferences [importance ($t=0.5209$, $df=8$, $p=0.6165$); cost ($t=0.4096$, $df=12$, $p=0.6893$)].

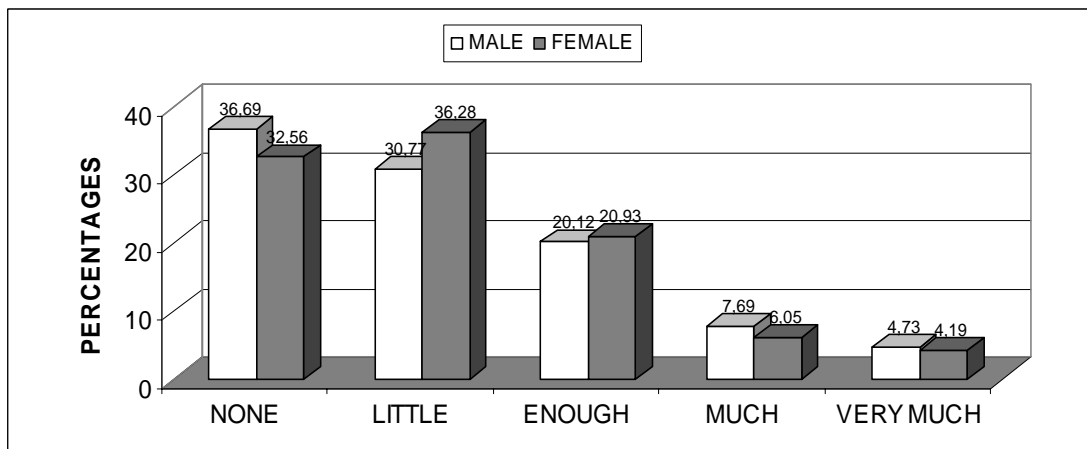


Figure 20. Importance of playing games.

3.3.7 TV watching, printing, viewing maps, locking the keyboard or the touch screen, locking with password

TV watching via mobile phone is not considered important by most males (34.42%) and females (46.98%). So, they are not willing to spend any money. Moreover, the majorities (over 37%) of both genders consider the printing and the viewing of maps to be 'not important'. Consequently, most of them (over 42%) would not spend any money for them. There were not found any significant gender differences [TV importance: ($t=0.5134$, $df=8$, $p=0.6216$); TV cost ($t=0.3951$, $df=12$, $p=0.6997$); printing importance: ($t=0.4698$, $df=8$, $p=0.651$); printing cost: ($t=0.3785$, $df=12$, $p=0.7117$); maps importance: ($t=0.6129$, $df=8$, $p=0.557$); maps cost: ($t=0.4393$, $df=12$, $p=0.6683$)].

Locking the keyboard or the touch screen is considered 'enough important' by most females (27.44%) and 'little important' by most males (26.63%). At the same time, their majority (over 32%) would not spend any money for it. On the contrary, most males (26.63%) consider the locking of the device with a password to be "little important" while most females (23.26%) consider it to be 'not important' (Figure 21). Most of them (over 35%) are not eager to spend any money for this feature. The unpaired t test showed a not significant relationship between gender and preferences [locking importance: ($t=1.283$, $df=8$, $p=0.2355$); locking cost: ($t=0.5039$, $df=12$, $p=0.6235$); password importance: ($t=1.561$, $df=8$, $p=0.1572$); password cost: ($t=0.5088$, $df=12$, $p=0.6201$)].

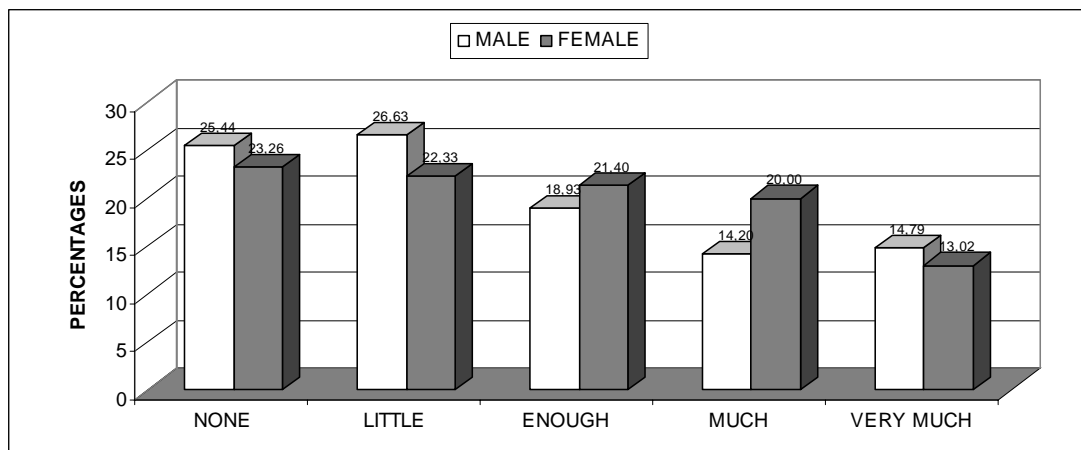


Figure 21. Importance of locking the device with password.

According to the results of our study, the students are not interested in operations such as e-mail, 3G, connection to Internet etc. In general, most students use mobile phones for SMS and phone calls. Such findings were also reported by other studies (Divitini et al., 2002) and were attributed to the high cost of the services. Although Divitini et al. (2002) found that the calendar was not a popular feature the present study found that it is considered important.

4. MANAGERIAL IMPLICATIONS

Managers in the mobile phone industry may consider the findings of this study into their strategies. Customers' opinions should be taken into serious consideration during all phases of a product's life: design, development, marketing, customer support, maintenance and

retirement. Managers may perform continuous market research to know the customers' needs and desires for mobile devices' features, as well as their willingness to pay for new features.

More specifically, there are managerial implications in the following areas: 1) Design and Development, 2) Advertising, Marketing and Promotion, 3) Training and Usage, 4) Pricing, and 5) Applications and Services.

4.1 Design and Development

Regarding mobile devices' design and development, this study found that students are particularly interested in specific features. Consequently, managers would consider providing such features in a more advanced status than the competition. For example, they would invest on increasing the battery life and available memory. They would also offer USB (Universal Serial Bus) Flash Drives. Obviously, they would invest on the devices' stylishness. Furthermore, they would offer product differentiation with respect to various features. For example, they would offer 4 device types: i) simple mobile phone, ii) mobile phone plus mp3 player, photo and video camera, and iii) mobile phone plus mobile Internet capabilities, and iv) all inclusive.

4.2 Advertising, Marketing and Promotion

Advertising, marketing and promotion would emphasize the unique advantages of the devices which are considered important by the students. For example, the customers' needs for long device's operation would be fulfilled by a long battery life. Cameras would enable the recording of important moments in everyday life.

On the other hand, the findings showed that respondents did not attach much importance to a wide range of features. This may happen for several reasons. It is possible that the students are not interested in such features (e.g. printing) or they do not need them (e.g. voice-to-text conversion). However, it is possible that they are not aware of their benefits (e.g. open software) or the risks (e.g. absence of security mechanisms- encryption and cryptography). Managers would consider raising consumer awareness and acceptance of these features. They would motivate customers and increase their interest and desire for such secondary features. For example, they would highlight the value and benefits of WiFi, chat and teleconference. They would promote the usefulness of GPS. They would also point out the risks from the absence of encryption and cryptography, antivirus and anti-spam protection. Furthermore, they would show the possibilities and opportunities of using 3G services. Finally, they would correct any misconceptions that customers may have regarding the use or pricing of the various features.

Well-known people would influence customers towards increasing the desire for and usage of various features. However, advertising should not over promise developing too high expectations. Another interesting result was that there are not significant differences between male and female students with regards to what they consider important. So, managers would design unisex advertising campaigns. They would simultaneously target at both males and females.

4.3 Training and Usage

This study found that students are not interested in many devices' features. This may happen because they do not know how to use them. So, involved decision makers would try to educate customers in order to facilitate the adoption of such features. If customers become familiar with

some features they may incorporate them into their daily life. So, managers would launch training projects in order to explain and teach the customers about advanced features. For example, guidance would be given in a detailed and easy-to-understand way on how to create a safe Wi-Fi local network. Training projects would create opportunities to gain experience on using a feature (e.g. videoconference).

Free trials would be offered to customers in order to explore and experiment with various advanced features. These free trials would be available either for a limited time period or for an initial portion of an item (e.g. half minute of a song). Leasing or renting a service would also facilitate the customers' acquaintance with it. Association of mobile phones with other familiar products (e.g. ipod, game consoles) would also help the adoption of new services.

Creation of user communities with similar interests would foster increased communication and social interaction among the participants. Early adopters would influence simple users. Expert users would suggest and guide novice users in accepting and using advanced features.

4. 4 Pricing

In order to attract new customers and retain the current ones low prices should be offered. This would enable the development of a critical mass. Also, incentives would be offered. Similarly, low prices would increase the usage per customer. Furthermore, simple and clear pricing and billing (e.g. flat rate) would encourage and stimulate the use of various services (Sismanidis & Economides, 2007).

4. 5 Applications and Services

In order to increase the usage, context-aware applications tailored to the customers' interest should be developed. For example, mobile applications that enable flirting among people would increase usage. Also, it should be easy for a novice to learn and use the application. Support should facilitate the user (either amateur or experienced) to use the applications.

Companies would increase their revenues even from simple applications (e.g. ring tones). Customers are familiar with simple applications (e.g. SMS). Connection of new advanced applications to such simple applications would facilitate the adoption of these new applications. Furthermore, compatibility and interoperability of new applications with existing ones would help. Security concerns should also be resolved.

The following decision makers are involved in the mobile device market: 1) Manufacturers, 2) Retailers, 3) Carriers and Operators, 4) Application and Service Developers, 5) Schools and Educators, and 6) Parents.

Manufacturers may wish to consider what students consider important when developing new generations of mobile devices. For example, they would create devices which include longer battery life and larger memory than the competitors. They would also include mp3, photo and video camera. For example, Apple's iPhone is a portable media player (iPod) with wide screen, a mobile phone with camera and an Internet communicator. Sony Ericsson's PSPPhone is a mobile phone and a games console. Manufacturers would advertise the advantages of their devices against the competition with respect to perceived important features (e.g. battery life, memory, design and elegance). Simultaneously, they would raise awareness and train the customers with respect to perceived unimportant features of their devices. For example, they would suggest community scenario based on Wi-Fi. Finally, they would offer devices with many features at tempting prices exploiting the bundling strategy.

Retailers would promote these devices which are more advanced with respect to the perceived important features. They would also raise consumer awareness and acceptance of perceived unimportant features (e.g. touch screen). They would train customers with respect to Wi-Fi, chat, teleconference etc. Furthermore, since both genders value similarly the various features, retailers would use a unisex strategy in promoting the devices.

Carriers and Operators would make money from customers' subscriptions and network usage as well as from application and content providers. In developed countries, almost everyone has a mobile phone subscription. So, carriers would try to increase the network usage per customer. For example, they would make aware to customers the benefits of watching TV on a mobile phone or using mobile Internet. They would also train consumers on teleconferencing. Simple and low pricing would also encourage increased network usage.

In addition, carriers would not charge application and content providers for providing their services over their networks. This would attract many providers and encourage the development of new content and services. By providing many useful inexpensive e-services and content, customers would have many options to choose. They would also consider simple price differentiation with respect to usage or services.

Finally, 3G operators should be careful with respect to pricing their services. They may try to transfer the high cost of the 3G license to their customers. However, customers would prefer the 2G networks at low prices instead of the advanced 3G networks at high prices.

Developers would consider developing attractive and useful mobile applications and services (e.g. mobile multiplayer games). They would not only develop applications that are considered important, but also foster development in other areas. For example, they would develop GPS-based touring, Wi-Fi communities for socializing, location-based advertising.

Schools and Educators would learn from the results about their students' thoughts so that they may develop appropriate educational activities. They would incorporate these results in pervasive and ubiquitous learning, mobile group learning and other educational activities (Triantafyllou et al., 2008; Vasiliou & Economides, 2007). For example, they would design outdoors learning activities using photo and video camera. The students would collaboratively explore flowers and plants in a national forest. Also, many people auto-connect to open Wi-Fi networks without considering security risks. Educators would train the students on how to set up a secure Wi-Fi local network or a teleconference. Finally, they would increase students' awareness regarding open software and common use of files.

Government would increase awareness about the devices' safety risks. Also, it would develop user guides and recommendations for safe and proper use. Special needs persons should be taken into consideration. They should be facilitated by the availability of voice commands, voice-to-text conversion and other accessibility facilities. In addition, Government should enable low prices for mobile services so that none is excluded from using the mobile services.

Training programs would educate people on using mobile Internet services. Mobile government projects would be also launched to facilitate citizens. For example, road traffic conditions or emergency warnings would appear on mobile devices. Citizens would also access government services via their mobiles. Similarly, the development of mobile learning and mobile health services should be supported.

Parents would explain to their children the devices' safety risks. For example, they would persuade them about the possibility that a stranger can take control of their devices through a

Wi-Fi network. Encryption and cryptography, as well as antivirus and anti-spam protection would enhance their security.

Finally, alliances may be developed among various decision makers (e.g. manufacturers, carriers and application developers) to efficiently serve the customers. Continuous market research would reveal the customers' demands, expectations, satisfaction or dissatisfaction.

5. CONCLUSIONS AND FUTURE RESEARCH

The findings may help to understand the perceived importance and the willingness to pay extra money for various mobile devices' characteristics and services. The results demonstrate what features are considered more important than others. Students prefer particularly specific characteristics and applications of their mobile devices. If their opinions are not taken into consideration, a chasm may appear between what manufacturers, carriers, educators, etc. consider essential and what users consider important for them. As pointed out earlier, there are many issues that have not been fully addressed yet due to the fact that mobile technology is still in early stages. Moreover, support may help students on learning how to use all the device's features.

This study found that university students consider important many features of the devices and they would pay an extra amount of money for some of them. On the other hand, there are other features that both genders consider them to be 'not important'. On "average", both genders would spend money so as to obtain a new feature, but generally the majority of females think less of the price related to males. In addition, all respondents appear to own a mobile phone, but most of them do not have Internet connection at home and do not connect to Internet via their mobiles. As a result, they also do not use some services which are related to Internet. This could be attributed to the fact that there is lack of knowledge and experience or even to the high cost of mobile Internet services.

There were found some gender differences but they were not statistically significant. It seems that both females and males have positive attitudes towards technology. The majority of females appear to care for appearance and design of devices more than males. Also, they consider some features such as 3G mobile phone, MP3 player, IrDA etc. more important and would pay for them more than their male peers. On the other hand, most males consider the device locking with password, battery life, high processing speed etc. to be important and they are eager to pay for some of these services. On "average" they also appear to navigate, search Internet etc. more than their female counterparts. Of course, as previously mentioned, the majority of participants do not connect to Internet via their mobile devices. According to the unpaired t test, the relationship between gender and individuals' preferences was found not significant.

This study aimed to explore the preferences of university students regarding mobile devices' features. Also, this study raised important issues about the costs and the importance of mobile devices' characteristics and services. Obviously, continuous investigation is required to evaluate the continuously increasing mobile users' needs and expectations. This study would be replicated in other countries as well in other target groups (e.g. pupils, workers, merchants, or elderly). For example, senior people would be interested in voice-to-text conversion and voice commands. Travelers would be interested in GPS and viewing maps on the devices. Also, variations may be found among various professional groups (e.g. journalists, mobile

salespersons, doctors). Finally, large variations may exist among countries. For example, 3G services are more developed in Japan and S. Korea than in the rest world.

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