Appendix A

The Questionnaire

I am conducting this survey for my master's thesis to measure the users' awareness and trust level on smartphone security threats and security features.

Please read the following questions and answer as honestly and responsibly as possible.

Please check the option of your choice.

Contact address: tahanihmoma@yahoo.com

Part A: General background

1- Gender: *

Male ☐

Female ☐

2- Age *

18 to 22 years ☐

23 to 27 years ☐

28 to 32 ☐

33 and Above ☐

3- Academic year *

First year ☐

Second year ☐

Third year ☐

Fourth year ☐

4- Academic specialization *

Science Department ☐

Literature Department ☐

5- Do you have a Smartphone? *

Yes (please continue) ☐

No (Thank you for your time) ☐

6- How many years have you been using Smartphone? *

One year ☐	Two years ☐	Three years ☐	Four Years ☐

7- How many Smartphones do you have?

One ☐	Two ☐	Three ☐	Four ☐

8- What are your Smartphone's network connection capabilities? Please tick. *

GPS ☐

WI-Fi ☐

Bluetooth ☐

Mobile network (e.g. 3G, LTE, etc.) ☐

Not sure ☐

Part B- Awareness and knowledge about Smartphone features

9- How do you constantly use your Smartphone? Please tick. *

Browsing the internet ☐

Playing games ☐

Online transaction (e.g. Banking, etc.) ☐

Checking and reading e-mails ☐

Preparing documents ☐

Social networks (e.g. Facebook, Twitter, etc.) ☐

Watching video ☐

GPS ☐

SMS ☐

Taking pictures ☐

Taking notes ☐

Others: ☐

10- What is your Smartphone's operating system?

Android ☐

Symbian ☐

Ios ☐

Windows phone ☐

RIM ☐

MAC ☐

Not sure ☐

No	Questions / Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Q11	I know the feature of my Smartphone's password.					
Q12	I know the availability of SIM PIN code on my Smartphone.					
Q13	I know the existence of Smartphone security software (e.g. Antivirus, firewall).					
Q14	I know the Smartphone's speak password.					
Q15	I know the screen lock on my Smartphone.					
Q16	I know the SIM card lock on my Smartphone.					

Part C: Awareness and knowledge about Smartphone threats.

No	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Q17	I know the existence of Smartphone malicious software (e.g. Virus, Trojan horse and Worms).					
Q18	I know what the term Smartphone phishing means.					
Q19	I use anti-virus software on my Smartphone.					
Q20	I consider applications in the official application repository to be secure for installation on my Smartphone.					
Q21	I store the personal data on my Smartphone.					
Q22	My Smartphone was attacked by malicious programs.					
Q23	I know the privacy setting on my Smartphone.					
Q24	I know the Smartphone protection mechanisms (e.g. File encryption, remote file deletion).					
Q25	I know the IMEI number.					
Q26	I am concerned about the privacy of my personal data.					

Part D: Users' Willingness on smartphone security features.

Q27	I am willing to use Smartphone's password on my Smartphone.					
Q28	I am willing to use antivirus and firewall on my Smartphone.					
Q29	I am willing to use the SIM PIN code on my Smartphone.					
Q30	I am willing to use SIM card lock on my smartphone.					
Q31	I am willing to use the screen lock on my Smartphone.					
Q32	I am willing to use file encryption on my Smartphone.					

Part E: Users' willingness on smartphone security training campaigns.

	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Q33	I am considering the awareness campaigns are important for smartphone users.					
Q34	I am ready to attend an awareness campaign about security of my smartphone.					
Q35	I am ready to use the new security features available on my smartphone.					
Q36	I am eager to improve my knowledge about security and privacy and how to protect my smartphone.					
Q37	My willingness to acquire new smartphone increases with new technological properties.					

Thank you for your time and your participation

Appendix B

Study Analysis

Table A: Security awareness on smartphone features frequencies

Frequencies and Valid Percent										
	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
Q11	16	5.4%	12	4%	85	28.3%	121	40.3%	66	22%
Q12	6	2%	24	8%	92	30.7%	122	40.7%	56	18.7%
Q13	8	2.7%	12	4%	80	26.7%	131	43.7%	69	23%
Q14	11	3.7%	46	15.3%	109	36.3%	100	33.3%	34	11.3%
Q15	7	2.3%	5	1.7%	59	19.7%	118	39.3%	111	37%
Q16	13	4.3%	27	9%	79	26.3%	111	37%	70	23.3%

Table B: Security awareness on smartphone threats frequencies

Frequencies and Valid Percent										
	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
Q17	6	2%	30	10%	84	28%	125	41.7%	55	18.3%
Q18	23	7.7%	58	19.%	131	43.7%	64	21.3%	24	8%
Q19	15	5%	31	10.3%	100	33.3%	83	27.7%	71	23.7%
Q20	10	3%	35	11.7%	93	31%	121	40.3%	41	13.7%
Q21	22	7.3%	59	19.3%	86	28.7%	106	35.3%	27	9%
Q22	33	11%	86	28.7%	109	36.3%	61	20.3%	11	3.4%
Q23	7	2.3%	13	4.3%	89	29.7%	116	38.7%	75	25%
Q24	16	5.3%	35	11.7%	100	33.3%	95	31.7%	54	18%
Q25	53	17.7%	77	25.7%	106	35.3%	47	15.7%	17	5.3%
Q26	7	2.3%	38	12.7%	83	27.7%	91	30.3%	81	27%

Table C: Awareness on smartphone threats Cross-tabulation

AThreats * gender Crosstabulation

			gender		
			male	female	Total
AThreats	strongly disagree	Count	0	1	1
		Within Athreats	0.0%	100.0%	100.0%
		within gender	0.0%	0.3%	0.3%
	Disagree	Count	8	11	19
		within Athreats	42.1%	57.9%	100.0%
		within gender	2.6%	3.6%	6.2%
	Neutral	Count	63	94	157
		within Athreats	40.1%	59.9%	100.0%
		within gender	21.0%	31.3%	52.3%
	Agree	Count	46	66	112
		within Athreats	41.1%	58.9%	100.0%
		within gender	15.3%	22.0%	37.3%
	strongly agree	Count	9	2	11
		within Athreats	81.9%	18.1%	100.0%
		within gender	3.0%	0.3%	0.3%
Total		Count	126	174	300
		within Athreats	42.0%	58.0%	100.0%
		within gender	100.0%	100.0%	100.0%

```
CROSSTABS
  /TABLES=AThreats BY gender
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN
  /COUNT ROUND CELL.
```

Table D**:** Awareness on smartphone features Cross-tabulation

AFeatures * gender Crosstabulation

			gender		
			male	female	Total
AFeatures	strongly disagree	count	0	5	5
		Within AFeatures	0.0%	100.0%	100.0%
		within gender	0.0%	1.6%	1.6%
	Disagree	count	5	0	5
		Within AFeatures	100.0%	0.0%	100.0%
		within gender	1.6%	0.0%	1.6%
	Neutral	count	44	46	90
		Within AFeatures	48.9%	51.1%	100.0%
		within gender	14.6%	15.4%	30.0%
	Agree	count	59	99	158
		Within AFeatures	37.4%	62.6%	100.0%
		within gender	19.7%	33.1%	52.8%
	strongly agree	count	18	24	42
		Within AFeatures	42.8%	57.2%	100.0%
		within gender	6.0%	8.0%	14.0%
Total		count	126	174	300
		Within AFeatures	42.0%	58.0%	100.0%
		within gender	100.0%	100.0%	100.0%

```
CROSSTABS
  /TABLES=AFeatures BY gender
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT ROW COLUMN
  /COUNT ROUND CELL.
```

Table E**:** Awareness on smartphone threats by gender (ANOVA)

ANOVA

AThreats

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.186	1	.186	.565	.453
Within Groups	97.950	298	.329		
Total	98.136	299			

Table F**:** Awareness on smartphone threats by age (ANOVA)

ANOVA

AThreats

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.057	3	1.019	3.173	.025
Within Groups	95.079	296	.321		
Total	98.136	299			

Table G**:** Awareness on smartphone threats by educational level (ANOVA)

ANOVA

AThreats

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.100	3	.367	1.119	.342
Within Groups	97.036	296	.328		
Total	98.136	299			

Table H**:** Awareness on smartphone threats by academic specialization (ANOVA)

ANOVA

AThreats

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.063	1	.063	.190	.663
Within Groups	98.073	298	.329		
Total	98.136	299			

Table I**:** Awareness on smartphone threats by smartphone experience (ANOVA)

ANOVA

AThreats

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.818	4	1.204	3.807	.005
Within Groups	93.318	295	.316		
Total	98.136	299			

Table J: Person Correlation between Students' Awareness level on Smartphone Security Features and Students' Awareness Level on Smartphone Security Threats

Correlations

		AFeatures	AThreats
	Pearson Correlation	1	.587**
	Sig. (2-tailed)		.000
	N	300	300

**. Correlation is significant at the 0.01 level (2-tailed).

Table K: Reliability for part B

Reliability Statistics

Cronbach's Alpha	N of Items
.762	25

Table L: Reliability for part C

Reliability Statistics

Cronbach's Alpha	N of Items
.748	10

Appendix C: Research Paper and Certificate

A Study of User Awareness and Willingness toward Smartphone Security and Privacy Protection Features among Zawia University Students

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Abstract

The spread of smartphones led to produce many challenges for the users; most of these challenges are related to information security and privacy. The biggest issues for the users are the losing personal information due to the lack of users' knowledge about security risks. In order to mitigate those issues, modern smartphone has security features integrated. This paper study on user awareness and willingness toward these smartphone's information security features. Based on the pilot study, we found that the users' awareness level of Smartphone security features was a high level; the percent was 84% of the users are aware. Also, there is no relationship between the gender, age and the level of users' awareness and willingness toward smartphone security and privacy features. Finally, conclude the users' willingness level to use the smartphone security features is dependent on their awareness level. In order to obtain more accurate findings, comprehensive study will be conducted involving the actual data. In addition, suggestions and recommendations for improving the awareness and willingness is proposed.

Keywords: information security and privacy, smartphone, user awareness and willingness.

1. Introduction

The term of "Smartphone" first appeared in 1997, Smartphones can be defined as handheld mobile telephone devices that integrate advanced information processing functions with conventional mobile phone capabilities. With a large number of products equipped with touch screens, Smartphones characteristically offers users the ability to customize their handset as they please, enabling unrestricted installation of desired applications in much the same manner as PC. The application in smartphone has limited function compared to the PC based edition. Popularity of smart phones is constantly growing together with a number of third-party applications and Smartphone applications, such as Google play and Ovi store [7].

Also, there are a few disadvantages to these Smartphones, one of these disadvantages is the attack by malicious software and often these malware are distributed through electronic store applications because of the minimum control measures on the content it provides. Even with the antivirus products, firewalls and security software, it's still difficult to find 100% secure

network. Sadly, the biggest damage in these cases is the data of Smartphone users. The greatest danger lies in the inappropriate users' behavior fed by mixing of personal and business use. As a result, managers and security professionals must educate their customers [6]. There are also many concerns about the privacy of personal data and corporation sensitive data stored on the Smartphones that it must be handled [1].

The concern proportion related to privacy problems is affected by the age of users as affirmed by a study about internet use on mobile phones and its effect on privacy. This study found out a relationship between age and privacy; increasing age leads to a lack of privacy concern and also found out that all users are concerned about their privacy when they use the internet but this concern decreases when users are older [5]. This paper study investigates the effect of the gender and age on the awareness and willingness to use the information security features in smartphones. The major part of the Smartphones users are very worried about the taping and an intruder could access to their devices. On the other hand, the users don't have any safety feeling or no advanced knowledge about how to use their Smartphones among adult people [2].

2. Methodology

This research has used the online survey. The questions of the questionnaire were sent to students who participate in the pilot study by their e-mail which taken from the university database. The questionnaire was designed in line with the purpose of the study, in order to achieve measuring the level of awareness and willingness of the sample. Each question in the questionnaire was designed to answer the research questions.

The technique of sample which used in this research is a non-probability sample method. The questionnaire was distributed randomly to participants that give an equitable representation of the population society in this study. This research uses a quantitative methodology, there are some reasons for choosing a quantitative methodology:

The quantitative study provides an unbiased approach; this unbiased approach uses statistical operations and some standards for validity and reliability for numerical measured [3].

The quantitative methodology offers the results using a large number of participants, also providing details of demographics with research questions [4].

2.1. Data collection and demographics

The population of the study was chosen to be Zawia university students, and the sample size of pilot-study was 25 students from four faculties in the university. The age of the participants is mostly 18- 25, these ages are more receptive to new technologies, also the major percentage of Smartphone users was in these age groups as shown in the figure (1).

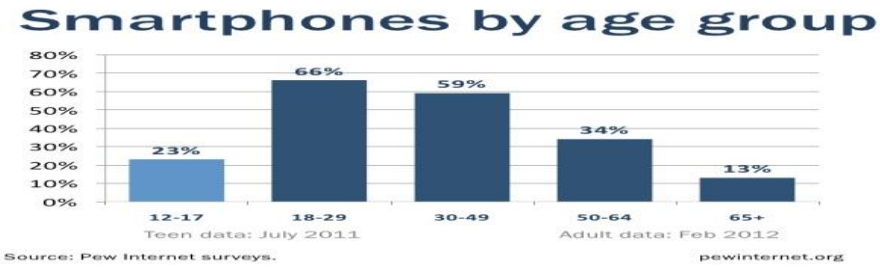

Figure (1): Smartphone users by age group

Source: Pew internet surveys

2.2. Data analysis

In this study some statistical analysis operations were produced to come out the level of Smartphone users' awareness and willingness. The pilot-study tested the validity and reliability to ensure the questions were clear [4]. This result was extracted by using SPSS 17.0 software. Using the pilot-survey population (N= 25), this measure was 0. 914; this has shown a strong internal consistency. As shown in the table (1).

Table (1): The reliability

Cronbach's Alpha	N of Items
.914	52

Also, this pilot-study tested the hypotheses of this research. There are two hypotheses for answering the questions of the study.

$H1_0$ - The users' awareness level of Smartphone security features does not depend on the gender and the age group of the users. $H1_A$ - The users' awareness level of Smartphone security features depends on the gender and the age group of the users.

$H2_0$ - The users' willingness level to use Smartphone security features does not depend on their awareness level. $H2_A$ - The users' willingness level to use Smartphone security features depends on their awareness level.

3. Results and Discussion

3.1. Demographic questions

The participants were asked about their gender, age and field of studies. The percentage of males was 40% of the participants, whilst the percentage of females was 60% of the participants. The main body of the participants was studying in English Language by 52% of the participants, followed by 32% study in Computer Science, 12% of the study in Mathematics and 4% of the participants study in Arabic Language. This study was also queried about the Smartphone usage; the result showed that the social network was the most commonly used by the users, where the percentage of use among the users was 84%. On other the hand, preparing the documents was less used by the users, where the percentage was 4% of the users. The Android operating system was the most commonly used by the users in this study, the percent of the Android usage was 84% of the users.

3.2. Users' awareness of Smartphone security features

In this part of the analysis was studied the relationship the gender, age and the level of users' awareness of Smartphone features. The result of the Pearson Correlation showed there is not a significant correlation between gender, age and the level of awareness. The significant correlation between gender, age and awareness level were (0. 632) and (0. 923). From the result of data analysis, this study showed that the level of users' awareness of Smartphone security features is a high level, where the percent of users' awareness was 84% of the users. Whilst the percent of users who unaware was 16% of the users.

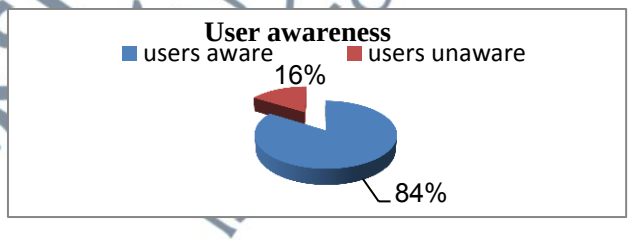

Figure (2): User awareness

3.3. Willingness of users to use the Smartphones security features.

By using Chi-Square test for known if the users' willingness level to use Smartphone security features depends on their awareness level or not. The result showed that the value of the chi - Square was 55.223 and the lowest value of significance was 0.003 as shown in the table (2), this value is less than value of α; therefore reject the null hypothesis $H2_0$. Thus conclude the awareness level and the willingness level is dependent.

Table (2): Chi-Square Tests

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	55.223[a]	30	.003
N of Valid Cases	25		

4. Conclusions

This paper has reported the results of data analysis, which gathered from the questionnaire by using the online survey. The quantitative analysis was performed using the SPSS in order to obtain the findings. Also to answering the research questions and validates the hypothesis. The results indicate the high level of the users' awareness of Smartphone security features; the percent was 84% of the users are aware. Also results indicate there is no relationship between the gender, age and the level of users' awareness and willingness. Finally, conclude the users' willingness level to use the smartphone security features is dependent on their awareness level.

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