Opening Smart T.V to third-party apps, user perspectives

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Abstract

A third-party app is any app that is developed by a party other than the device/platform vendor. For instance, in a Google mobile phone that runs Android OS, any app that is not developed by Google is considered a third-party. Third-party apps are usually developed by an individual or a known company. For example, Google Maps app that is running on a Microsoft mobile device is considered a third-party app of a known company.

In the smart phone arena, almost all platforms allow third-party apps from an individual to a company. In case of smart TV field, things are quite different, there were no third-party app developers in the market initially but recently smart TV's started opening their platforms for third-party apps that are developed by companies. But, we see that smart TV platform vendors are heading towards opening their platforms for individuals as well. Thus, the aim of this study is to investigate consumers/user's opinions and collect their feedbacks on opening platforms for third party app developers like individuals to develop apps for smart TV's.

In doing so, we are conducting an online questionnaire of 100 participants to answer the above question besides we study users' privacy assumptions about smart phones and smart TVs. Our analysis shows that the majority of the participants are in support of opening the platforms for third-party applications.

Introduction

A smart phone, apart from having the basic features of making and receiving calls, writing and receiving texts, is enabled with many advanced features like personal digital assistants which help in building event calendar, video games, digital cameras and GPS navigation These phones have access to the Internet which helps third-party providers to develop apps for such platforms. The industry of third-party mobile apps has exploded recently, online apps market such as Google Play Store and Apple App Store [1] include millions of apps.

A smart T.V, apart from having the basic features like telecasting, is enabled with many added functionalities like operating systems with Graphical User Interface (GUI), can be connected to Ethernet, Wifi, flash drives, USB ports, which help in streaming video contents found in the Internet. They also have added audio and video connections which helps users to watch live performances. [2]. Moreover, smart TVs have access to YouTube, Netflix, Hulu and also social networking sites like Facebook and Twitter. This helps provide user flexibility, accessibility and the leisure of a home environment. Moreover, many wireless devices like keyboards and tablet P. C's can be connected to smart TVs that aid in better web browsing experience. Smart TVs are connected to the Internet through wireless connections and they provide us with services and applications to browse for information, go for shopping and also perform online banking activities. [3]

Even though the functionality of these smart devices is greatly enhanced by introduction of a new age of technology, there are severe security and privacy threats for users who constantly use these platforms for their day-to-day activity.

In this study, we are investigating users' opinion towards opening smart TV platforms for third-party applications by individuals and having an open market the same we do in smart phones. In doing so, we

created an online questionnaire and asked participants to complete it. The questionnaire includes questions that compare users' privacy assumptions between the two platforms: smart phones and smart T.V.s. Before distributing the questionnaire, we put down two hypotheses: first, we believe that the majority of users are going to be with the idea of opening smart T.V.s platforms for third-party apps of individuals. Second, users will not be concerned about the level of access third-party apps would have on their smart TVs.

Background and Rationale Behind Choosing This Topic

We see signs that smart TV platform providers are shifting towards opening their platforms to third party developers, similar to the smart phones arena. We have seen in case of smart phones that third party apps have been used to compromise user's privacy. In this study, we are trying to understand user's perspectives with regard to using third party apps on their smart TV's. The goal of the study is to compare privacy view on smart TV's vs smart phones.

Our hypothesis for the research work is that the users won't mind opening smart T. V's applications to third party apps for individuals. Most of the participant's ultimate concern would be the privacy of their data that is stored in a camera log and also the microphone feature. We believe majority of the participants would prefer an authentication technique compared to no authentication. Another hypothesis could be that people would like to have the most frequently used apps on their smart phone into their smart TV. We believe that the privacy of the content in the social media sites will be of topmost priority in both the environments (Smart phones & smart TV's). Also, we think many people would not trust third party app developers for providing security and safety features.

The research work would explain the following:

- Third party concept in smart phones and smart TV's
- How installing third party apps can invade a user's privacy and also give some instances where such cases have happened previously.
- User's understanding and comprehension of security features on both the platforms
- Survey findings, analysis and hypothesis validation

Installing Apps Can Hamper Privacy of the User

The major players in the mobile app development industry are Google and Apple. Both the companies constantly face security and privacy threats as third party developers try to exploit their operating systems just for the sake of incurring profits.

Even if these large companies try to resolve the privacy issues, there are many problems which arise as soon as a new app is invented. For an example, when we download the social networking app like the Path, it automatically extracts the contact details, names, addresses, phone numbers from the users. This can be fatal in terms of security for the user.

Some of the privacy issues that are directly related to third-party apps are advertisements, SMS, dialing premium numbers. blackmailing, keylogging etc.

Many companies tie up with app developers to generate advertising profits. This helps in creation of fake accounts to increase the number of app downloads. Such practices are called scams which needs to be addressed to ban any app developer who engages in such malicious activities.

In comparison to the use of third party apps in case of smart TV's, the following attacks can be found like, denial of service attacks, exploits, convert malware (Smart TV's IP can be used to form botnets. Boot nets can access the smart TV's cameras and microphones which is a serious security threat.), loss of important financial information (Credit card numbers are saved on smart TV's and can be easily traced by hackers and in case of emails and social media sites, sensitive personal information can be easily extracted), privacy and security issues (many smart T.V's have built-in HD camera, twin microphones, face tracking and speech recognition features which invades the privacy of users) and finally eavesdropping (digital video broadcasting and implementations of DVB can be easily crashed, get infected by malware, be eavesdropped and can easily be controlled by attackers). [4]

To come up with a secure mobile & smart TV infrastructure, we need to comprehend user attitudes with regards to security and privacy of smartphones & smart TV's.

Method and Design

We are trying to collect user perspectives through questionnaire analysis which includes a sample size of 100 people. The sample size would include participants from different ethnic backgrounds, different age groups as well as a wide variety of educational backgrounds. The questions are going to be framed in such a manner that it captures our hypothesis for the research. It will consist of both open ended and closed ended questions. Likert scale was used to capture responses of the users in the survey. Thereafter we are going to analyze the data which would include our research findings and conclusion. We are using the statistical tool called SPSS tool and would be conducting two tests namely: Goodman and kushkals gamma & Chi-square test to analyze our findings.

The project work requires a timeline of two months. One week is spent towards literature review, another week is spent on developing an online questionnaire and two more weeks are required to collect data (fill up questionnaire) for a sample size of 100 people. For the next month, we need to spent time on doing questionnaire analysis for 3 days, 4 days are needed to be spent on writing abstract and introduction along with citing references, one more week for implementing the statistical tools and analyzing them and another week to be spent on the write up (developing hypothesis) and coming out with conclusions and hypothesis validation.

Questionnaire

A. Demographic Questions:

1. What is your age?
   - 18 to 24
   - 25 to 34
   - 35 to 44
   - 45 to 54
   - 55 to 64
   - 65 to 74
   - 75 or older
2. What is you gender?
   - Male
   - Female
3. What is your race/ ethnicity?
   - Asian/ Pacific islander
   - Black/ African- American

- White/ Caucasian
- Middle eastern
- Hispanic
- Native American/ Alaska Native
- Other/ Multi racial
- Decline to answer

4. What is the highest level of education you have completed?
   - High School/ GED
   - Associates degree
   - Bachelor's degree
   - Master's degree
   - Doctorate Degree
   - Other
   - Decline to answer

B. Use of different environment for third party applications questions:

5. Do you have a smart phone?
   - Yes
   - No
6. How often do you use third-party apps on your smart phone?
   - Always
   - Very Frequently
   - Occasionally
   - Rarely
   - Very Rarely
   - Never
7. Do you have a smart T.V?
   - Yes
   - No
8. How often do you use third-party apps on your smart T.V?
   - Always
   - Very Frequently
   - Occasionally
   - Rarely
   - Very Rarely
   - Never
9. What do you think of opening smart TVs platforms for third-party apps (for individual) and have online store for them, the same we do for smart phones?
   - Strongly Agree
   - Agree
   - Undecided
   - Disagree Strongly
   - Disagree
10. What do you think of opening smart TVs platforms for third-party apps (companies) and have online store for them, the same we do for smart phones?
    - Strongly Agree

- Agree
- Undecided
- Disagree Strongly
- Disagree

11. What app do you use the most on your smart phone that you would like to have on your smart TV?

C. **Comparison between different environment for third party applications questions:**

12. When you choose to install/use an app on your smart phone, how important is the level of access the app is requesting on your device?
    - Very important
    - Important
    - Fairly important
    - Slightly important
    - Not important
13. When you use an app on your smart TV, how important is the level of access this app is having on you TV?
    - Very important
    - Important
    - Fairly important
    - Slightly important
    - Not important
14. Overall, I trust third-party apps that I use on my smart phone.
    - Strongly Agree
    - Agree
    - Undecided
    - Disagree
    - Strongly Disagree
15. Overall, I trust third-party apps that I use on my smart TV.
    - Strongly Agree
    - Agree
    - Undecided
    - Disagree
    - Strongly Disagree
16. List three resources on your smart phone that you consider very sensitive/private (start from the most sensitive)
17. List three resources on your smart TV that you consider very sensitive/private (start from the most sensitive)
18. What priority would you assign for the using camera feature in terms of security of your smart phone? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important

19. What priority would you assign for the using camera feature in terms of security of your smart T.V? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
20. What priority would you assign for the using microphone feature in terms of security of your smart phone? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
21. What priority would you assign for the using microphone feature in terms of security of your smart T.V? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
22. How important it is for you if someone is able to access your browsing history in terms of security of your smart phone? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
23. How important it is for you if someone is able to access your browsing history in terms of security of your smart T.V? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
24. How important it is for you if someone is able to access your videos/recordings feature in terms of security of your smart phone? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important

25. How important it is for you if someone is able to access your videos/recordings feature in terms of security of your smart T.V? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
26. How would you rate if someone accesses financial information for logging into your personal bank account in terms of security of your smart phone? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
27. How would you rate if someone accesses financial information for logging into your personal bank account in terms of security of your smart T.V? (Rate between 1 to 5. 1 being the highest priority and 5 being the lowest priority)
    - 1 - Very Important
    - 2- Important
    - 3- Moderately Important
    - 4- Slightly Important
    - 5- Not Important
28. Rank the following authentication methods in terms of usability when used on your smart phone (Rate between 1 to 5. 1 being the least usable and 5 being the most usable)
    __ Fingerprint authentication
    __ Retina scan authentication
    __ Face recognition authentication
    __ PIN Method
    __ No authentication
29. Rank the following authentication methods in terms of usability when used on your smart TV (Rate between 1 to 5. 1 being the least usable and 5 being the most usable)
    __ Fingerprint authentication
    __ Retina scan authentication
    __ Face recognition authentication
    __ PIN Method
    __ No authentication

D. **Usage pattern questions:**

30. How often do you install third party applications on your smart phone?
    • Always
    • Very Often
    • Sometimes
    • Rarely
    • Never
31. How often do you install third party applications on your smart T.V?
    • Always

- Very Often
- Sometimes
- Rarely
- Never

32. How comfortable are you browsing the social media on your smart phone?
    - Very comfortable
    - Comfortable
    - Neither comfortable nor uncomfortable
    - Uncomfortable
    - Very uncomfortable
33. How comfortable are you browsing the social media on your smart T.V?
    - Very comfortable
    - Comfortable
    - Neither comfortable nor uncomfortable
    - Uncomfortable
    - Very uncomfortable

Questionnaire Analysis:

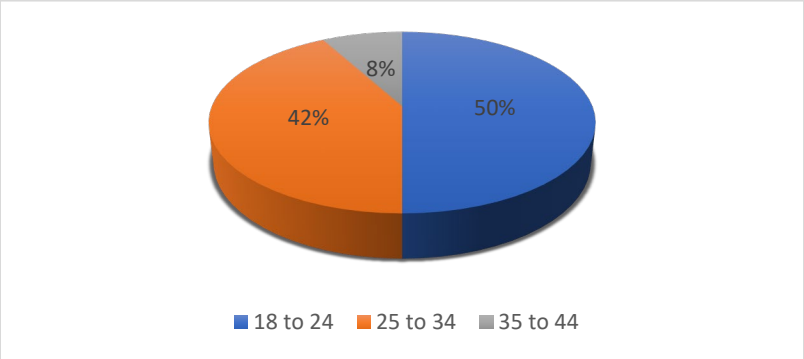


Fig. 1 Age

The age group of participants (shown in Fig 1) who got involved in the study were mostly between 18 to 24 years. The market potential for third-party apps lies between the age group of 18- 44 years. So, this age class needs to be tapped and explored to increase the volume of sales for the use of third-party apps.

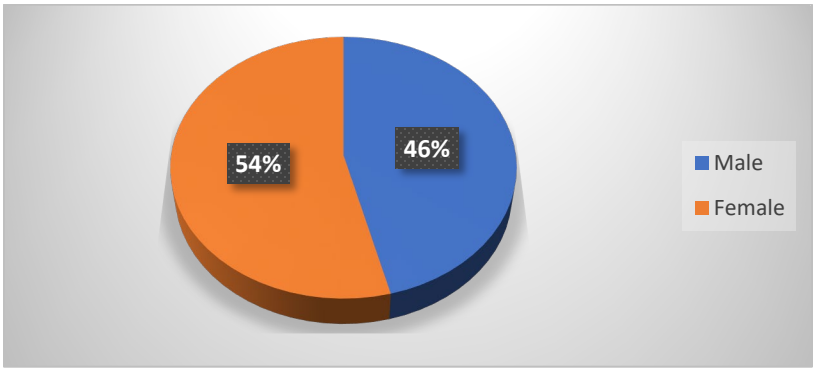


Fig. 2 Gender

The gender of the participants (shown in Fig 2) states that about 54% of the participants were females and 46% of the participants were males. So, majority of the third party-apps are used by females as compared to the male counterpart.

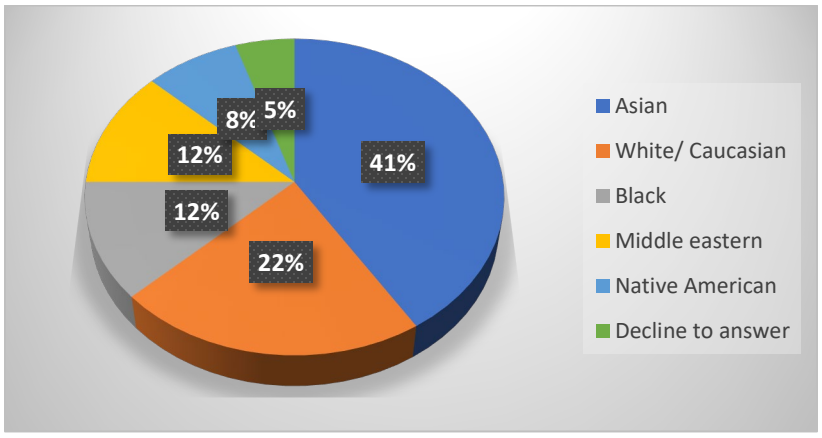


Fig. 3 Race / Ethnicity

Fig 3 shows that we got a good diversity in terms of ethnicity of the participants. It included people belonging to different races like Asian/ Pacific Islander, Black/ African American, White, Middle eastern etc.

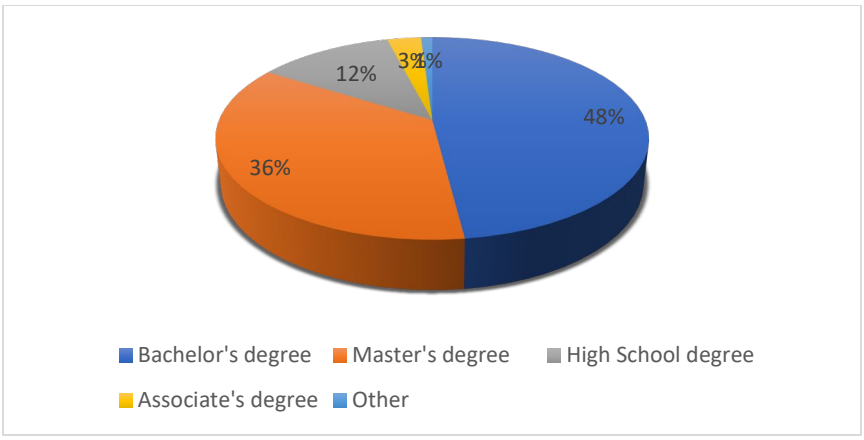


Fig. 4 Highest level of education

As shown in Fig 4, around 48% of the respondents have a bachelor's degree and coming close to the number were people holding their master's degree which were around 36% of the respondents. Around 12% hold a high school degree.

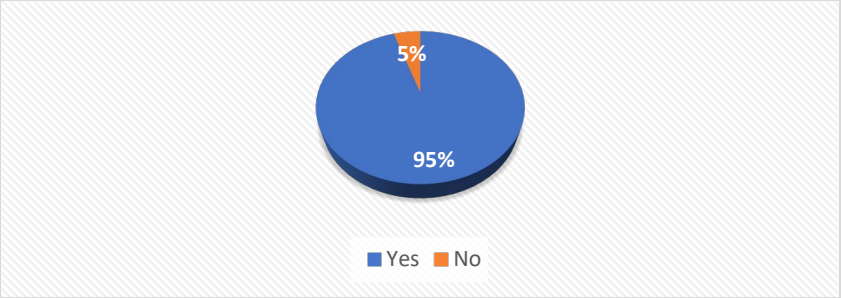


Fig. 5 Participants who have a smart phone

As shown in Fig 5, around 95% of the respondents have a smart phone.

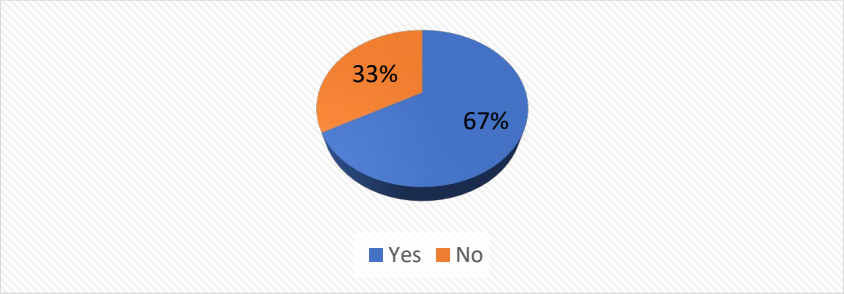


Fig. 6 Participants who have a smart T.V.

As shown in Fig 6, around 67% of the respondents have a smart TV.

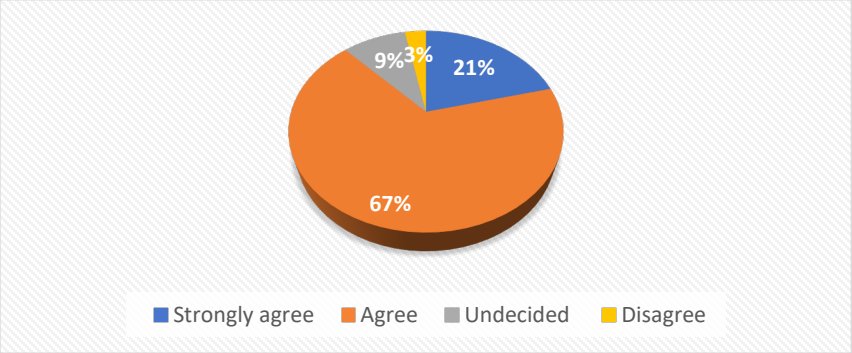


Fig. 7 Opening smart T.V platforms for third-party apps for individuals and having an online store for them

Fig 7 shows that around 67% of the respondents are with opening smart T.V platforms for third party apps. Hence, we can say that there is huge market potential for individuals to develop third-party apps on smart TV platforms.

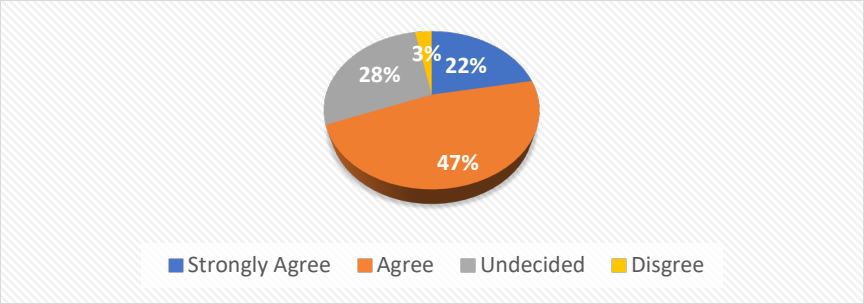


Fig. 8 Opening smart T.V platforms for third-party apps for companies and having an online store for them

Fig 8 shows that around 47% of the respondents are with opening smart T.V platforms for third party apps by companies and 28% of the respondents were undecided as to whether opening the smart TV platforms for third party apps by large organizations is a good idea or not.

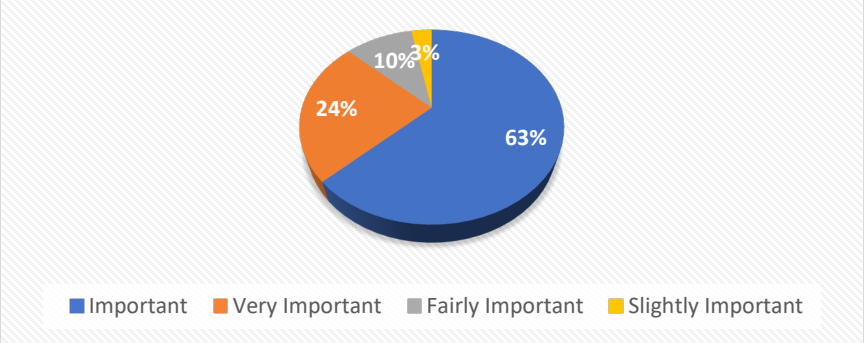


Fig. 9 When installing an app on your smart phone, how important is the level of access the app is requesting on your device

Fig 9 shows that about 63% of the participants feel that while installing an app on their smart phone, it is important with regards to the level of access the app is requesting on the smart phone.

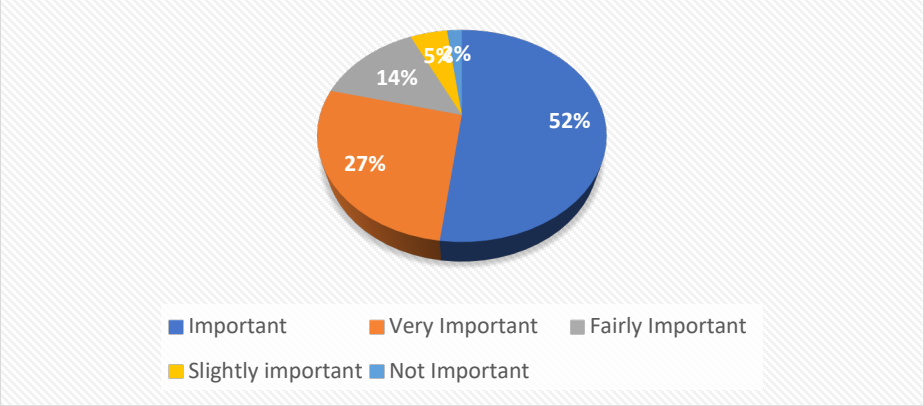


Fig. 10 When installing an app on your smart TV, how important is the level of access the app is requesting on your device

Fig 10 shows that about 52% of the participants feel that while installing an app on their smart TV, it is important with regards to the level of access the app is requesting on the smart TV.

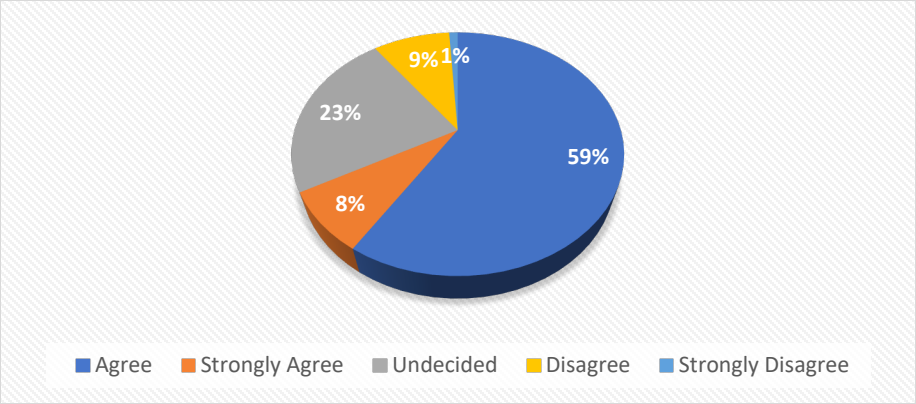


Fig. 11 Trust factor for third party apps in case of smart phones

Fig11 shows that about 59% of the participants agree to that fact that they trust using third-party apps on their smart phone.

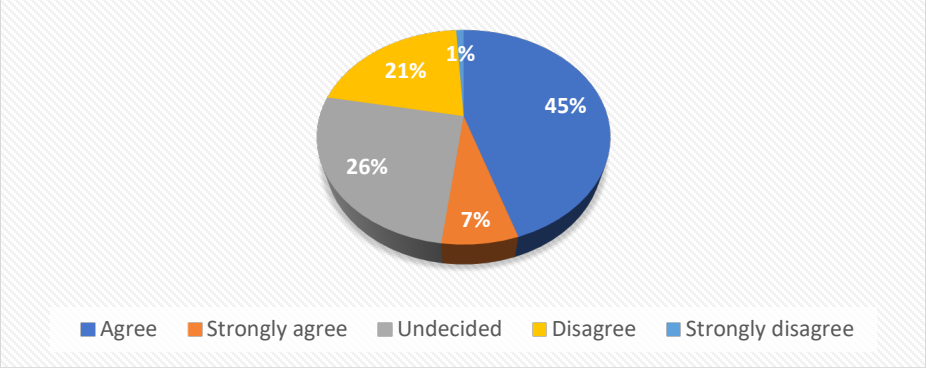


Fig. 12 Trust factor for third party apps in case of smart TV

Fig12 shows that about 45% of the participants agree to that fact that they trust using third-party apps on their smart TV. 36% are undecided.

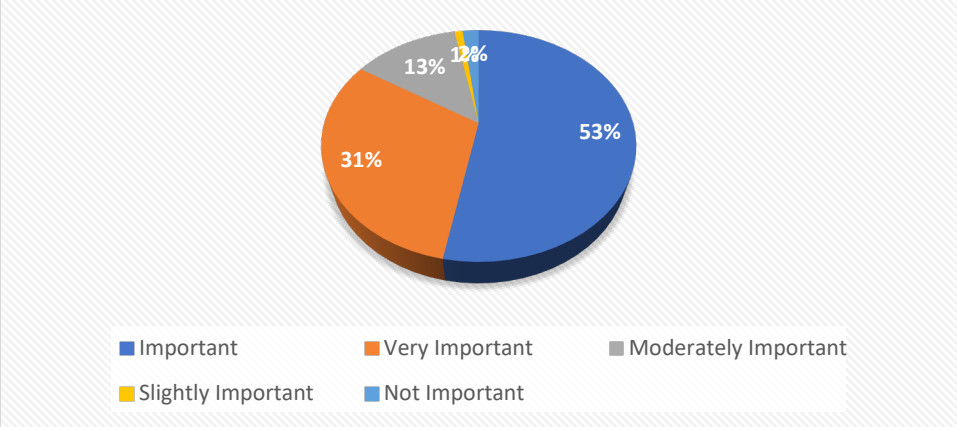


Fig. 13 User's opinion of using camera feature in terms of security of their smart phone

Fig 13 shows that 53% of the respondents feel that security is important while using the camera feature on their smart phone and 31% feel that it is very important.

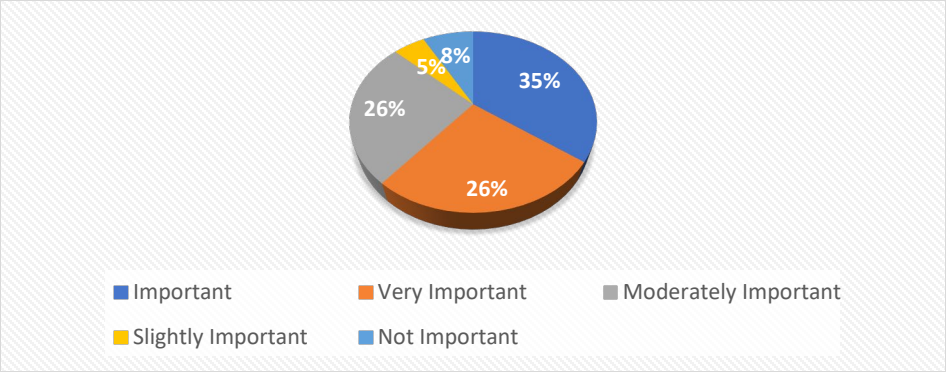


Fig. 14 User's opinion of using camera feature in terms of security of their smart TV

Fig 14 shows that 35% of the respondents feel that security is important while using the camera feature on their smart TV. 26% say that it is very important.

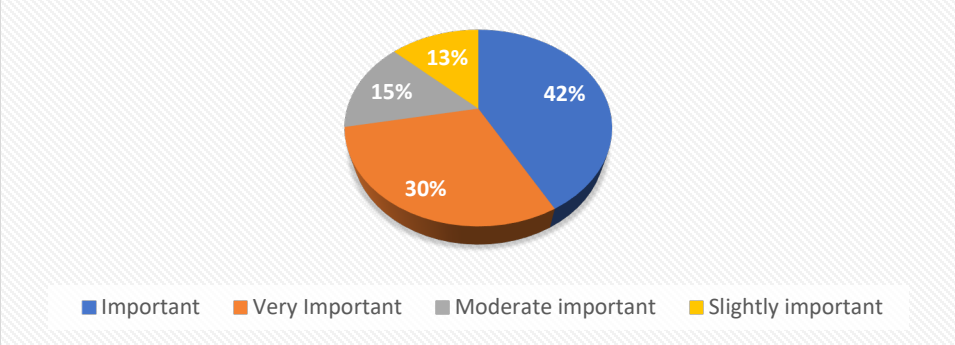


Fig. 15 User's opinion of using microphone feature in terms of security of their smart phone

Fig 15 shows that 42% of the respondents feel that security is important while using the microphone feature on their smart phone. 30% say that it is very important.

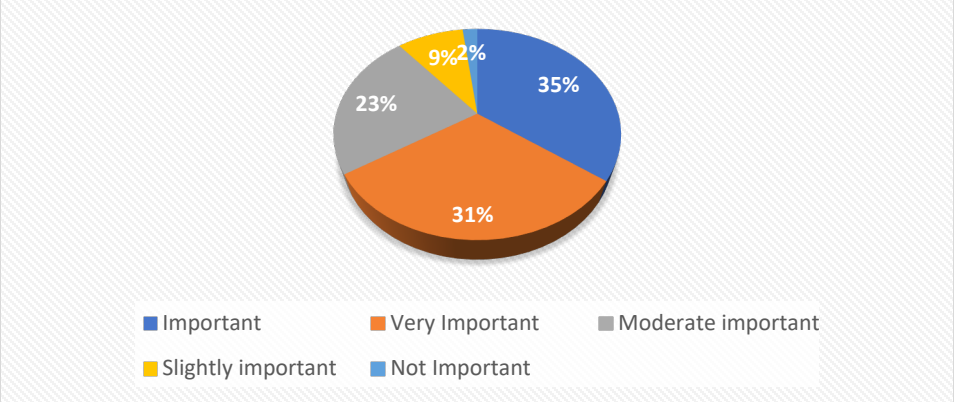


Fig. 16 User's opinion of using microphone feature in terms of security of their smart TV

Fig 16 shows that 35% of the respondents feel that security is important while using the microphone feature on their smart phone. 31% say that it is very important. Another 23% feel that it is moderately important.

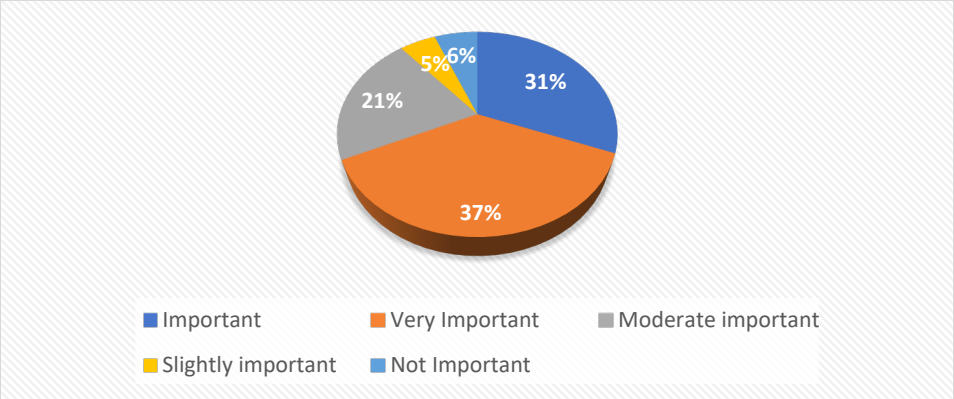


Fig. 17 User's opinion of accessing browsing history in terms of security of their smart phone

Fig 17 shows that 37% of the respondents feel that security is very important while accessing the browsing history of their smart phone. 31% say that it is important.

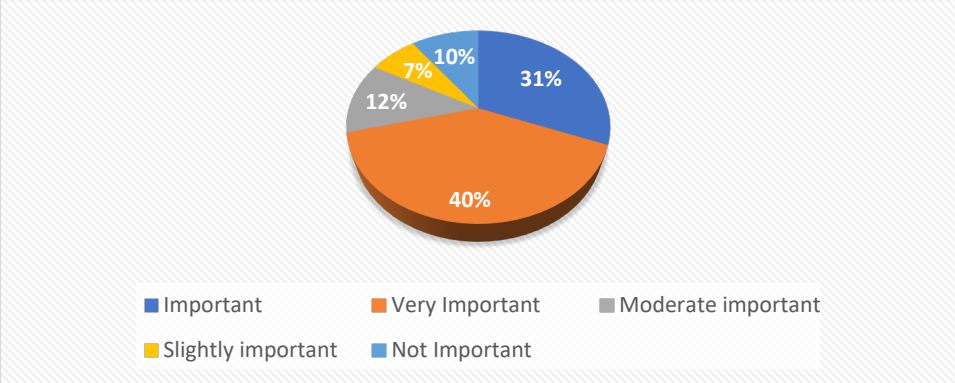


Fig. 18 User's opinion of accessing browsing history in terms of security of their smart TV

Fig 18 shows that 40% of the respondents feel that security is very important while accessing the browsing history of the smart TV. 31% say that it is important and 12% say that it is moderately important.

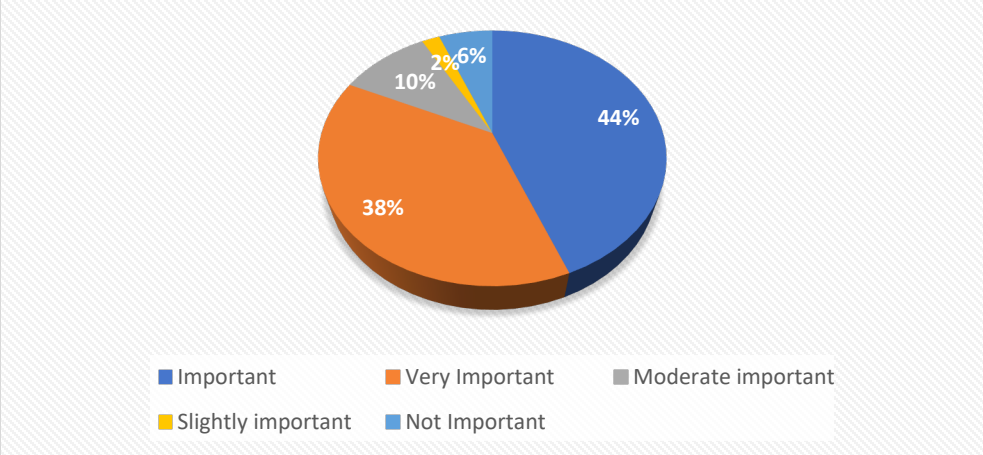


Fig. 19 User's opinion of using video/ recordings feature in terms of security of their smart phone

Fig 19 shows that 44% of the respondents feel that security is important while using the video/recordings feature on their smart phone. 38% say that it is very important.

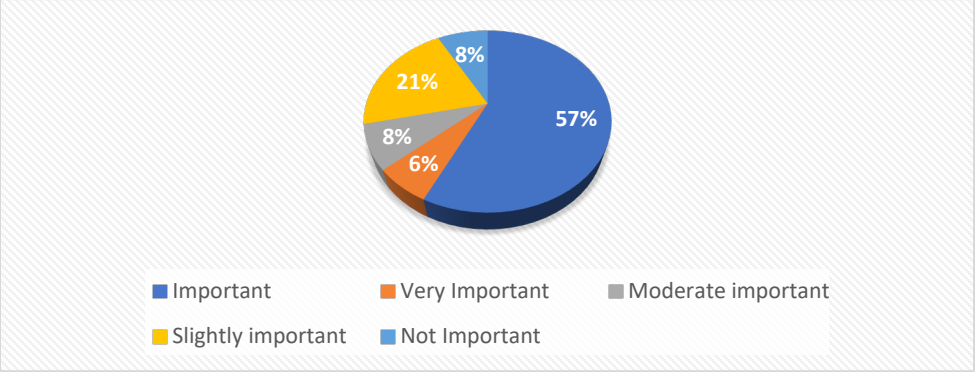


Fig. 20 User's opinion of using video/ recordings feature in terms of security of their smart TV

Fig 20 shows that 57% of the respondents feel that security is important while using the video/recordings feature on the smart TV. 21% say that it is slightly important.

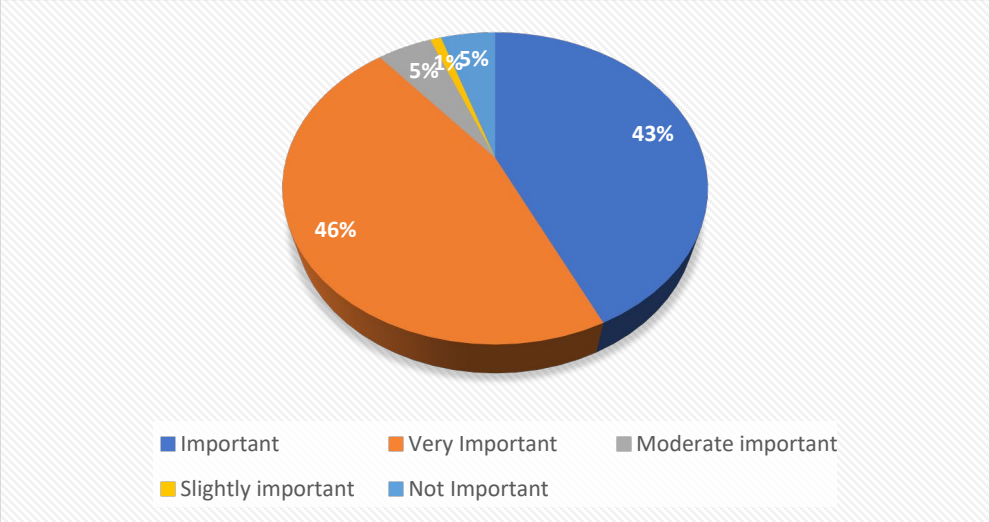


Fig. 21 User's opinion of accessing financial information in terms of security of their smart phone

Fig 21 shows that 46% of the respondents feel that security is very important while accessing the financial information in terms security of the smart phone. 43% say that it is important.

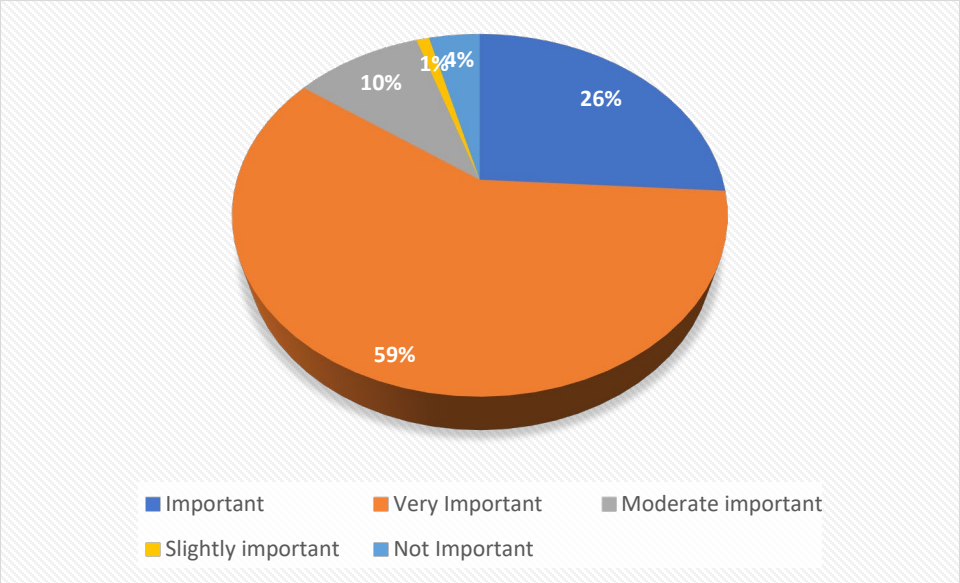


Fig. 22 User's opinion of accessing financial information in terms of security of their smart TV

Fig 22 shows that 59% of the respondents feel that security is very important while accessing the financial information in terms security of the smart TV. 26% say that it is important.

Results:

In our user study, we investigated the possibility of opening smart TV platforms to third-party apps both for individuals as well as for known companies. For that, we conducted an online questionnaire of 50 participants. The questionnaire included questions to capture users' privacy assumptions when using smart phones and smart TV's. The results of analyzing the questionnaire is summarized below:

- The age group between 18years to 44years actively use smart phones and smart TV's. 54% of the participants are female users.
- We also found a lot of diversity in the sample size of the respondents covering from Asian, White, Black and Middle Eastern population.
- Most of the respondents were found to be well educated. They had high school education, bachelors as well as master's degrees.
- While comparing both the environments, more than 95% of the participants had a smart phone, while only 67% of them had a smart TV.
- With regard to the opening of smart TV platforms for third-party apps and having an online store for them, around 67% of the participants felt that it should be opened to individuals while in case of companies, only 47% agreed to open it up for companies.
- Facebook, YouTube, WhatsApp, games etc. were the popular apps that the participants opted to be installed on their smart TVs.
- In case of the importance of the level of access the app is requesting on your device, for smart phones it was around 63% important and for smart t. v's it was just 52%.
- Majority (around 59%) of the participants trusted third party apps to be installed on their smart phone but the same was not true in case of smart TV.
- The three most important resources that was considered to be sensitive/ private in case of a smart phone were photos, messages and passwords. The three most important resources that was

considered to be sensitive/ private in case of a smart TV were photos, videos and financial information.

- In terms of security, camera feature was rated high for the smart phones (53%) compared to the smart t.v(35%). The same was also found to be true in case of microphone feature.
- Importance of accessing browsing history in terms of security for both the platforms was found to be similar.
- Security of video/ recording feature was found to be more important in the smart phones compared to the smart TV.
- The access to financial information in terms of security on both the platforms were found to be the same. This feature was rated high in terms of importance.
- Most users felt that fingerprint authentication was the most usable authentication technique on both platforms and nobody opted for the “no authentication” technique.

Most respondents replied that they very often install third-party applications on their smart phones as compared to installing them on their smart TVs. It was also found from the study that participants are more comfortable browsing the social media on a smart phone as compared to a smart TV. As per our hypothesis, we can safely conclude that users are agreeing to opening smart TV. platforms for third-party apps by individuals. Privacy of the social media sites were given top priority on both the platforms. Our hypothesis did not turn out to be good with regards to trust level of users for third-party app installations. Most respondents trusted the installation of third-party apps on their smart phones but not on their smart TVs. And also, privacy of financial information was way more important than camera, microphone or browsing history resources on both the platforms. The results suggest that although the majority of users are with opening smart TV platforms, yet, they are concerned about their privacy and ask vendors to regulate the level of access these apps might get.

Statistical tools (Chi-square and krushgal's gamma)

SPSS (statistical package for the social sciences) is a predictive analytics software which offers many advanced techniques in an easy way. We have used IBM SPSS statistical tool to analyze our data. This package will help us to find many new opportunities like improving efficiency and risk minimization. Using IBM SPSS, we can perform reporting and statistical analysis, data mining and predictive modelling, managing the decisions and deployment, analytics of big data using, SPSS Statistics data editor we can enter the data manually or we can just upload an already existing file and perform the statistical analysis.

SPSS will have two views to visualize the data, one is "data view" and the other one is "variable view". In the data view all the data we have collected is showed and in the variable view you can see the type of variable and each variable is represented in rows and the property or type of variable is represented in columns. With the collected data, we are going to perform Chi-square tests and Goodman Krushgal's Gamma tests.

Chi-square results are as follows:

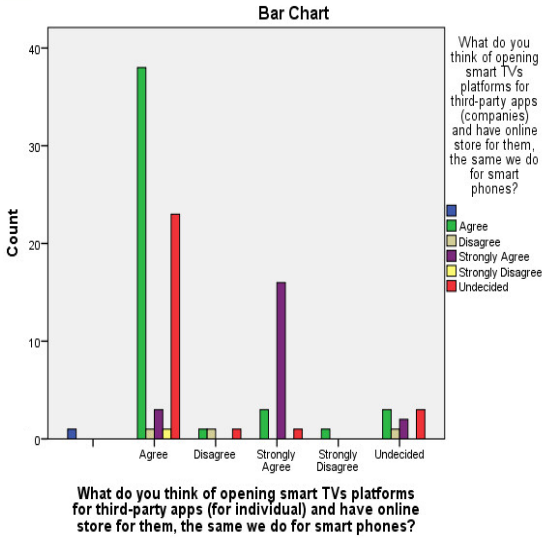
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	167.732[a]	25	.000
Likelihood Ratio	67.280	25	.000
N of Valid Cases	100		

a. 31 cells (86.1%) have expected count less than 5. The minimum expected count is .01.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	1.295	.000
	Cramer's V	.579	.000
N of Valid Cases		100	



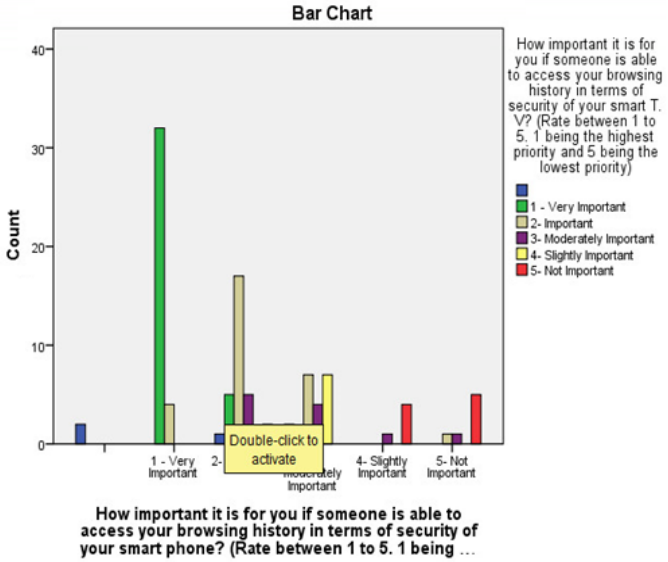
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	183.224[a]	25	.000
Likelihood Ratio	144.148	25	.000
N of Valid Cases	100		

a. 30 cells (83.3%) have expected count less than 5. The minimum expected count is .10.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	1.354	.000
	Cramer's V	.605	.000
N of Valid Cases		100	



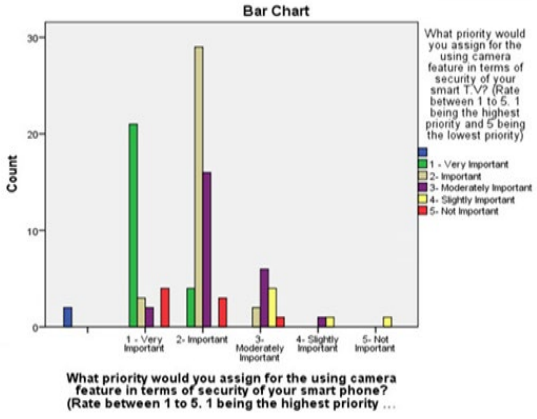
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	197.993[a]	25	.000
Likelihood Ratio	102.743	25	.000
N of Valid Cases	100		

a. 30 cells (83.3%) have expected count less than 5. The minimum expected count is .02.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	1.407	.000
	Cramer's V	.629	.000
N of Valid Cases		100	



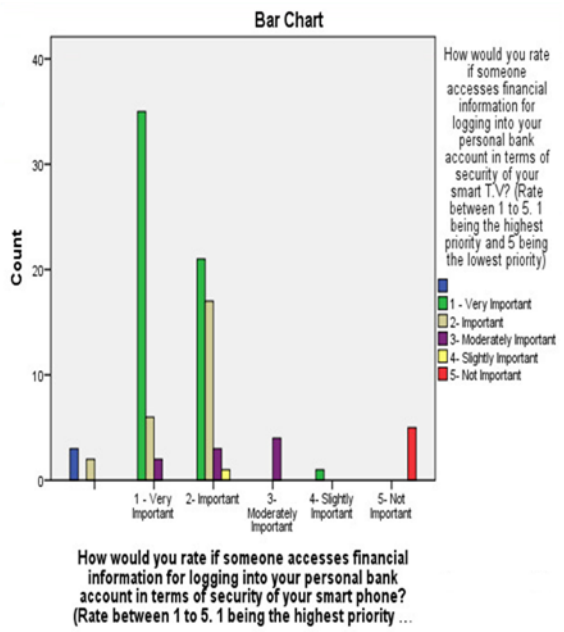
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	214.468[a]	25	.000
Likelihood Ratio	96.728	25	.000
N of Valid Cases	100		

a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .01.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	1.464	.000
	Cramer's V	.655	.000
N of Valid Cases		100	



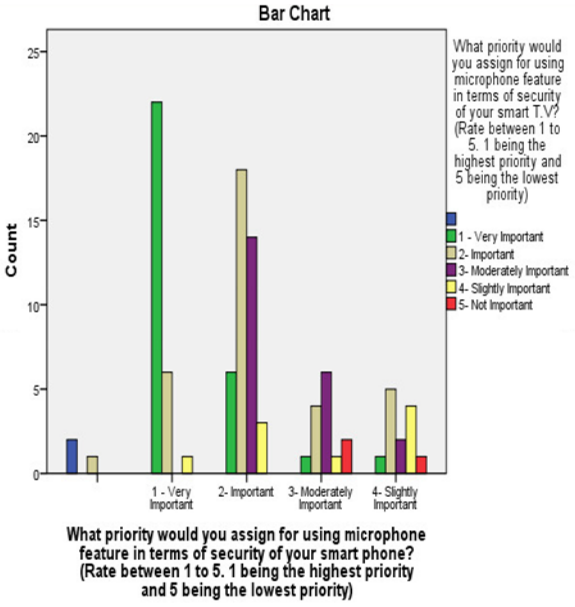
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	126.807[a]	20	.000
Likelihood Ratio	76.900	20	.000
N of Valid Cases	100		

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .06.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	1.126	.000
	Cramer's V	.563	.000
N of Valid Cases		100	



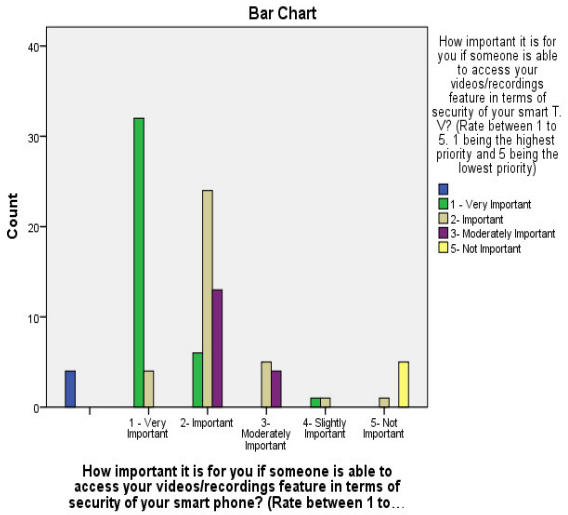
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	242.657[a]	20	.000
Likelihood Ratio	134.501	20	.000
N of Valid Cases	100		

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .08.

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	1.558	.000
	Cramer's V	.779	.000
N of Valid Cases		100	



Goodman and Kruskal's gamma tells us the direction of the association between two variables and strength of the association. Before performing the tests, we have to check whether our data is following the two assumptions of gamma.

1) the considered variables should be measured at an ordinal scale

2)a monotonic relationship should exist between those two variables.

<u>Opening the third- party apps for smart TV platforms by individuals and companies:</u>

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Ordinal by Ordinal	Gamma	.186	.133	1.367	.172
N of Valid Cases		100			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

<u>Comparing Camera feature in smart TV's and Smart phones:</u>

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Ordinal by Ordinal	Gamma	.685	.097	6.066	.000
N of Valid Cases		100			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Comparing the importance of security for browsing history feature in smart TV's and smart phones

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Ordinal by Ordinal	Gamma	.810	.062	11.054	.000
N of Valid Cases		100			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Comparing the importance of security for microphone feature in smart TV's and smart phones

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Ordinal by Ordinal	Gamma	.679	.077	7.508	.000
N of Valid Cases		100			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Comparing the importance of security for video recording feature in smart TV's and smart phones

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Ordinal by Ordinal	Gamma	.678	.103	4.799	.000
N of Valid Cases		100			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Comparing the importance of security for financial information in smart TV's and smart phones

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Ordinal by Ordinal	Gamma	.678	.103	4.799	.000
N of Valid Cases		100			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

INTERPRETATION OF RESULTS:

In Chi-square and Goodman and Kruskal's Gamma if the asymptotic significance is greater than .05 then the two variables are not statistically significant.

If the asymptotic significance is less than .05 then we can assume that the two variables are statistically significant.

Based on this below are the interpreted results,

CHI-SQUARE TEST:

- Comparing the importance of security for browsing history feature in smart TV's and smart phones the asymptotic significant value is .10 so it is not significant the two variables are not significantly associated with one another.
- Comparing the importance of security for camera feature in smart TV's and smart phones the asymptotic significance value is .02 the so it is significant the two variables are significantly associated with one another.
- Comparing the importance of security for video recording feature in smart TV's and smart phones the asymptotic significance value is .08 the so it is not significant the two variables are not significantly associated with one another.
- Comparing the importance of security for financial information in smart TV's and smart phones the asymptotic significance value is .01 the so it is significant the two variables are significantly associated with one another.

- Comparing the importance of opening third party apps for smart TV's by individuals and companies, the asymptotic significance value is .01 so it is significant the two variables are significantly associated with one another.
- Comparing the importance of security for microphone feature in smart TV's and smart phones the asymptotic significance value is .06 so it is not significant the two variables are not significantly associated with one another.

GOODMAN AND KRUSHKAL'S GAMMA TEST:

- Comparing the importance of security for camera feature in smart TV's and smart phones the approximate significance value is .00 so it is significant the two variables are significantly associated with one another.
- Comparing the importance of security for microphone feature in smart TV's and smart phones the approximate significance value is .00 so it is significant the two variables are significantly associated with one another.
- Comparing the importance of security for financial information in smart TV's and smart phones the approximate significance value is .00 the so it is significant the two variables are significantly associated with one another.
- Comparing the importance of security for video recording feature in smart TV's and smart phones the approximate significance value is .00 the so it is significant the two variables are significantly associated with one another.
- Comparing the importance of security for browsing history feature in smart TV's and smart phones the approximate significance value is .00 the so it is significant the two variables are significantly associated with one another.
- Comparing the importance of opening third party apps for smart TV's by individuals and companies, the asymptotic significance value is .172 so it is not significant the two variables are not significantly associated with one another.

Significance and Conclusion

The proposed research helped us to figure out the user opinions on opening platforms for individuals (third party apps) in case of smart TV platforms. It captured the user understanding and comprehension of using 3rd party apps on both the platforms, their trust level and comparison between the two platforms. This helped us to figure out whether or not it is a good idea to develop third party apps by individuals in case of smart TVs.

The research answered the question with regards to whether or not investing money for developing apps on smart TV platform be beneficial for individuals as well as users or not? If the users are willing to open the platforms, then what will be their most important security concern to come up with such apps. What apps are most frequently used in case of smart phones that the users want it in their smart TV's as well. The findings of this primary research will help us to come out with a plethora of more research work in the future.

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