Influencing factors for Mobile Banking Application Usage

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Abstract - **Nowadays with the improvement of Information Technology usage, most people are using mobile applications to access various services. Mobile banking applications are offered by banks or financial institutions to provide a variety of banking services to their customers. The study has been conducted to examine the factors that influence the mobile banking usage in Sri Lanka. Demographic factors such as age, gender, income level, current living city, occupation and user perception about application are affect the usage of mobile banking applications. Data for this study has been collected from 103 people using an online questionnaire. To determine if demographic factors affect the application usage, and if demographic factors and application related user perception factors are related, the responses are analyzed using statistical tests including chi-square and test for a single proportions. According to the results, females people, age limit between 16-35 people, not married (single) people and who are living in Colombo Gampaha like urban areas are using banking apps compared with other groups. And also application usage frequency is related with the education level of the user according to statistical results. Most users think user interfaces need to be simple as future improvements and most of them recommend mobile banking applications to others.**

Key words: **Mobile Banking Applications, demographic factors, chi square test, user perception, randomization**

I. INTRODUCTION

The spread of mobile phones across the world is one of the remarkable technology revolutions of the past decade. With the improvement of Information technology, most services are implemented as smart online systems with the same functionality as physical services. Banking sector introduces mobile banking applications to provide financial services through mobile phones. With the improvement of mobile users all over the world, there is great opportunity to connect to the customers through mobile phones in an interactive manner. So with the rapid development of mobile technology and mobile devices have resulted in developing mobile banking into a simple information delivery channel in the current global banking industry [1].

Mobile banking is a service provided by a bank or other financial institution that allows its customers to conduct financial transactions remotely using a mobile device such as a smartphone or tablet [2]. Unlike the related internet banking it uses software, usually called an app, provided by the financial institution for the purpose. Mobile banking is usually available on a 24-hour basis which is considered the most useful benefit of mobile banking applications. General banking transactions such as online money transactions, bill payments, balance inquiries are offered as services in mobile banking applications.

SMS banking which is powered by SMS communication was there before introducing mobile banking. Then mobile web was introduced and mobile banking was offered through WAP (Wireless Application Protocol) and it was restricted to a specific set of hand-sets. Then USSD (Unstructured Supplementary Service Data) came into practice which permitted a real time interactive access to bank accounts on many basic handsets. Nowadays, mobile banking applications which can be downloaded to smart phones through the internet can be used for mobile banking in a very user interactive manner[1].

1.1 *Mobile Banking in SriLanka*

Sri Lanka has recorded strong growth in Internet penetration and smartphone usage. The rate of internet penetration of Sri Lanka has been recorded around 34.11% in the year 2019[3]. And also Sri Lanka has the highest literacy rate compared to other South Asian Countries. When considering the banking sector, they continually expand financial services that are provided to customers. According to the Annual report of Central Bank 2019, 26 commercial banks continued operations [4] while

expanding the banking network and introducing new diverse banking solutions to attract new customers.

Adoption of mobile banking has become fundamental in the banking industry in Sri Lanka. Most commercial banks in the country are offering mobile banking services for the last couple of years. Maturity level of mobile banking services has grown with past years and in order to access the process of current state of Sri Lankan banking sector industry 4.0 maturity model.The results of this study indicate that the Sri Lankan banking sector is in the third maturity level of the model "Defined" as the overall maturity is 3.668 [5]. According to this model, in third level processes are defined and considerable practices for planning and management procedures are employed. And data driven services are taken into consideration. So currently mobile banking has introduced information and transaction level facilities including balance inquiry, fund transfers including between own and third party accounts, information on account history, credit card and utility bill payments and alerts on account activities.

Despite such facilities, the use of mobile phones or tablets to conduct banking transactions or access financial information is not as widespread as might be expected [6]. Automatic Teller Machine (ATM) may be the most popular service used by Sri Lankan banking customers since it can provide basic banking services 24 hours per day, 365 days per years and customers can deposit or withdraw cash, transfer funds from one account to another, inquire about account balance and request for cheque books and account statement using ATM. The high level of penetration of mobile phone usage and the enormous potential of mobile banking, the adoption of mobile banking services in Sri Lanka is not as expected. Majority of the customers still prefer banking in traditional ways. Thus there is a need to study and understand influence factors of mobile banking applications.

According to Mohammad Alafeef [7] the impact of demographic factors in developing countries is noted. In Jordan, the country has high levels of illiteracy, low levels of income and different culture levels. So demographic factors such as above mentioned factors are highly affected to the application usage than the trust or usefulness of application. As Shaikh mentioned, user satisfaction with mobile banking application usage has a strong positive association with usage of mobile banking applications [8]. In this study, demographic factors which can be categorized as age, gender, living city, income level, education level and user perspective about applications are investigated to identify relationship with mobile banking app usage.

II. METHODOLOGY

As for data collection, an online questionnaire was created and sent to the people who are using mobile banking applications, through emails and social media. To identify the current situation in mobile banking application usage in Sri Lanka and to reflect the influence of demographic factors on app usage, a questionnaire was distributed covering all age-limits, gender types, employment levels, income levels. 103 mobile banking application users' responses have been collected and they are internet and social media users. Questionnaire included questions about applications' security, usage frequency, future improvement suggestions and user satisfaction to analyze mobile banking app usage in different user perspectives. The study focuses on identifying how demographic factors affect mobile banking app usage and how demographic factors and application related user perception factors are related to each other. Various statistical tests have been performed for collected data including chi-square and test for a single proportions.
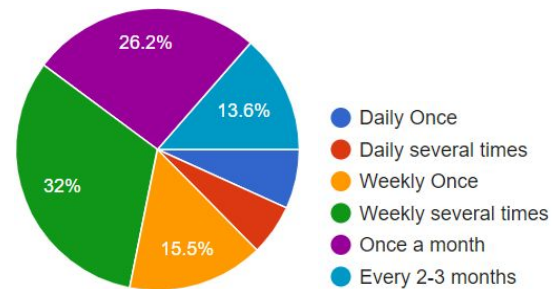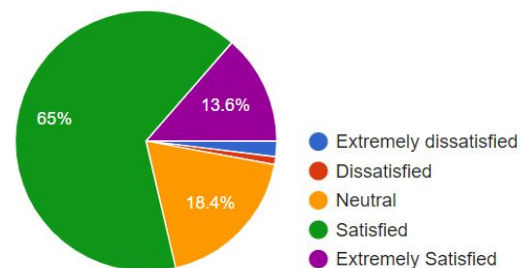

Fig. 1 Usage frequency results

Fig. 2 User satisfaction result

TABLE 1
RESPONDENTS PROFILE

Factors	Mobile Usage %
Gender	
Female	55.4
Male	44.6
Age	
Under 16	1.9
16-25	42.7
25-35	41.7
35-45	6.8
45-60	6.8
Above 60	1.9
Marital Status	
Single	75.7
Married	24.3
Education level	
Masters/Phd	3.9
Degree/diploma	68.9
A/L	23.3
Upto O/L	3.9
Monthly Income (Rs)	
Less than 15000	18.6
15000 - 100000	55.7
100000 - 200000	24.3
More than 200000	1.4

2.1 *Chi square Test*

A chi-square statistic is one way to show a relationship between two categorical variables. In statistics, there are two types of variables: numerical (countable) variables and non-numerical (categorical) variables. The chi-squared statistic is a single number that tells you how much difference exists between your observed counts and the counts you would expect if there were no relationship at all in the population.

There are a few variations on the chi-square statistic. Which one you use depends upon how you collected the data and which hypothesis is being tested. However, all of the variations use the same idea, which is that you are comparing your expected values with the values you actually collect. One of the most common forms can be used for contingency tables:

$$c^2 = \sum_{i=1}^{k} \left[\frac{(O_i - E_i)^2}{E_i} \right]$$

Where O is the observed value, E is the expected value and "i" is the "ith" position in the contingency table.

A low value for chi-square means there is a high correlation between two sets of data. If observed and expected values were equal ("no difference") then chi-square would be zero; an event that is unlikely to happen in real life. Deciding whether a chi-square test statistic is large enough to indicate a statistically significant difference isn't as easy it seems. It would be nice if having a chi-square test statistic >10 means a difference, but unfortunately that isn't the case. Calculated chi-square value and critical value from a chi-square table are compared. If the chi-square value is more than the critical value, then there is a significant difference.[9]

2.2 *Test for single proportions*

The single proportion (or one-sample) binomial test is used to compare a proportion of responses or values in a sample of data to a (hypothesized) proportion in the population from which our sample data are drawn. This is important because seldom have access to data for an entire population.

We can perform either a one-sided test (less than or greater than) or a two-sided test. One-sided tests are used to evaluate if the available data provide evidence that a sample proportion is larger (or smaller) than the comparison value (the population value in the null-hypothesis).[10]

III. RESULTS

Table 1, shows the results of demographic factors as percentages. According to that results, female people are using mobile banking applications more than male people. People who are aged around 16-25 and 25-35 are using more than compared to other aged groups. And also people who are not married are using more than married people. When considering the education level, people who are having a degree or diploma as the highest education level are using mobile banking applications more than other educational level groups. As well as these results, when considering the city they are living at, most people are living in urban areas such as Colombo, Gampaha. So these demographic factors are increasing the mobile banking application usage.

As figure 1 displays, 32% of respondents are using mobile banking applications weekly several times

and 26.2% are using them once a month. Those results can be affected by which service they are used in applications. According to the questionnaire results, 74% people use mobile banking applications for online transactions and 73% people are using mobile banking apps for paying bills as highest usage purposes. So mostly people pay bills monthly and do online transactions weekly. That could be affected for usage frequency in this manner.

According to figure 2, the majority of users are satisfied with the current situation in mobile banking applications. When considering the user perception about application security (Figure 3), most people have responded as 'somewhat' security. So that indicates people are expecting these applications can be improved from a security perspective. 75% of people think mobile banking applications need to be improved with simple user interfaces as future improvements (Figure 4). And also 94.2% of users recommend mobile banking applications to others (Figure 5) since they think these applications are good in many perspectives such as 24 hour access and time saving.
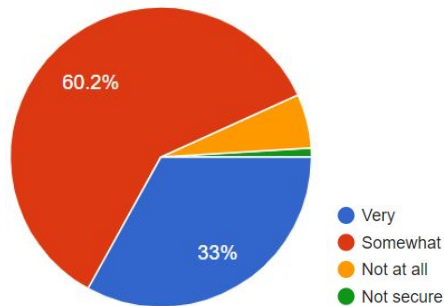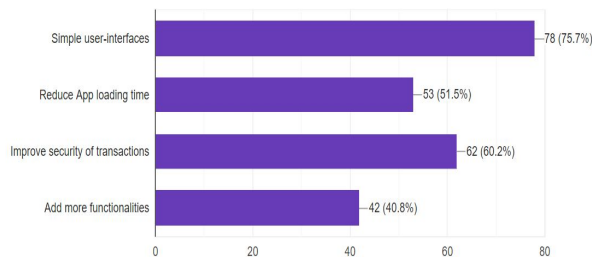

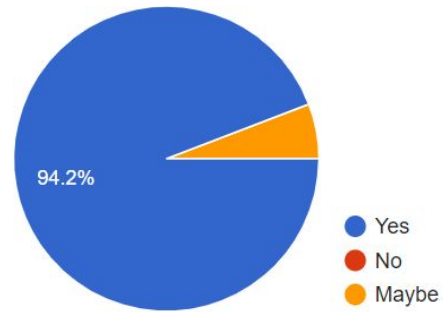Fig. 3 User perception about security

Fig. 4 Improvement Suggestions

Fig. 5 User recommendation result

Statistical test called test for single proportions has been performed to determine as proportion females are using mobile banking applications than males. In sample data from 101 records, female count was 56 and male count was 45. So sample mean is 0.554. Null hypothesis and alternative hypothesis were taken as follows.

H0: No different in the gender proportions $p = 0.5$
Ha: Significant different in the gender proportions
     $p > 0.5$

Z value is calculated as follows.

$$z = \frac{\hat{p} - p_0}{\sqrt{\dfrac{p_0(1 - p_0)}{n}}}$$

$$z = \frac{0.554 - 0.5}{\sqrt{0.5(1-0.5)/101}}$$

$z = 3.375$
p value = 0.000369

Since p value is less than the 0.05 considering 95% confidence interval, null hypothesis can be rejected. Based on collected data, there is strong evidence that the female proportion who use mobile banking applications is higher than the males.
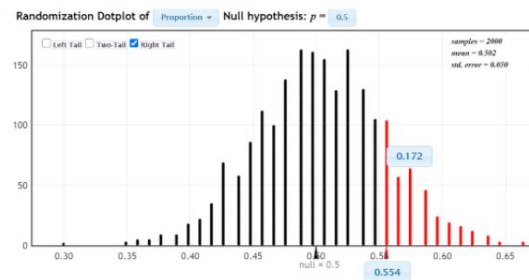

Fig. 6 Randomization distribution

Randomization distribution (Figure 6) was created to simulate samples assuming the null hypothesis is true. According to the results, p value was given as 0.172 from 2000 samples. So, since p value is greater than 0.05 and hence null hypothesis is true.

Tests for single proportions have been performed to determine as proportion not married (single) people are using mobile banking applications than married people. In sample data from 103 records, single person count was 78 and married count was 25. So sample mean is 0.757. Null hypothesis and alternative hypothesis were taken as follows.

H0: No different in the marital status proportions
$p = 0.5$
Ha: Significant different in the gender proportions
$p > 0.5$

After calculating the z value as before, z value came as 5.245 and p value came as $p < 0.00001$. So according to the results, the null hypothesis is rejected and there is significant evidence that single persons are using mobile banking applications more than married people.

These results can be influenced with biased data because when distributing questionnaires to the people, people who are using the internet and social media have accessed the questionnaire. And although a survey was sent to people covering all feature groups, most young people and people engaged with the IT industry have contributed to the questionnaire. So these factors can be affected to final results.

To determine the relationship between demographic features and mobile banking apps usage frequency, chi square tests have been performed for several demographic features.

Summary of the hypothesis testing:

(1) There is a significant relationship between gender factor of the user and the application usage frequency.
(2) There is a significant relationship between the education level of the user and the application usage frequency.
(3) There is a significant relationship between income level of the user and the application usage frequency.

(4) There is a significant relationship between the education level of the user and user perception about app security.
(5) There is a significant relationship between user perception about app security and usage frequency.

Hypothesis was taken as follows.
H0: Two variables are independent.
Ha: Two variables are dependent on each other.

TABLE 2
HYPOTHESIS RESULTS

Test No	x^2 value	df	P value	H0 accept/reject
1	10.421	5	0.06414	Accepted
2	32.315	15	0.00583	Rejected
3	22.355	15	0.09882	Accepted
4	6.8657	9	0.6511	Accepted
5	24.82	15	0.05242	Accepted

According to these results (Table 2) there is a significant relationship between education level and app usage frequency (with 95% confidence interval). But there are no relationships between other factors. There is no significant relationship between gender and income level factor with app usage frequency according to the data. Although application security can be affected to the usage frequency by the user, according to these results, there is no significant relationship between user perception about app security and usage frequency. It could be that the security of mobile banking applications are accepted by users in the current stage.

IV. CONCLUSIONS

This study successfully identified the factors influencing the usage of mobile banking applications in Sri Lanka. The finding of this study revealed that the proportion of female people who are using mobile banking applications, high than the male people. That result can be biased with Sri Lankan female/male population ratio. Because the female population is higher than the male population. And also single (not married) people as a proportion are using mobile banking applications more than married people. Although this result can be biased with collected data sample. Because the most people who accessed the questionnaire were single ones.

According to the statistical test results, there is a significant relationship between the education level of the user and the application usage frequency. But there is no relationship between gender factor, income level of the user and the application usage frequency. And also user perception about app security and usage frequency are independent features according to the statistical test results. But these results can be biased with collected data samples.

When considering the user suggestions for future improvements, most people have suggested simple user interfaces since some of banking mobile applications interfaces are complex at the moment. And also people expected more security features rather than increasing application functionalities.

As future improvements this project can be improved with more accurate data. Since data was collected using emails and social media, data could be biased. So to get more accurate results, this project can be improved by applying more tests, considering more features and using random sampling mechanisms.

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