

Factors Affecting Online Banking Applications

Non online banking users' perspective - Sri Lanka

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github.com/JMIsham/online-banking

Abstract—This paper focus on understanding the factors preventing from adopting online self care baking applications. We have conducted an online survey sent to mobile phone users in specif regions of Sri Lanka. We used snowballing approach to target people with good education status and access to the smartphone and the internet to understand why they are not using online banking self care applications. We used simple statistical methods such as distribution of proportion and chi square goodness of fit to understand primary the primary factors. This survey was conducted in Sri Lanka During the month of November 2020 and includes 142 survey responses.

Index Terms—Mobile banking, innovation adoption, statistical inference

I. INTRODUCTION

In this modern world with rapid changes in the financial services, increased competition from new players in the banking sector, more services offered, globalization and advancement in technologies, adaptation and availability of smartphones, it is really a betel in the banking sector to keep the loyal customers to themselves. One such important services people mainly look in to is the self-care mobile baking applications. This is not only a useful feature for the customer but also one of the main ways of operational cost cutting techniques which allows banks to reduce the ATM and banking counters and reduce the workforce as well. It is really important for banks to provide good internet banking services to the customers to have the competitive advantage and also retain the loyal customers with them for many years to come.

Since the introduction of the facility in early 1980s in The United States of America, the world soon grabbed on to the concept due to the major benefits it brought upon the banking industry. Banks and financial institutions too were eager to adopt this new technology in an effort to cut costs while maintaining reliable customer service (Hogarth, 2004).

Sri Lanka too embraced the concept in the later 1980s and networked bank branches, introduced electronic cards and facilitated banking across geographically spread branches from one single location. Even though it is been there for a while, the self care applications become widely adopted by many banks only within a decade. Since then banks have been trying to adopt their customers towards their online banking services.

Even though internet banking is been widely popular in many countries for many years, It is still considered as a "cutting edge" banking feature among customers in Sri Lanka.

There are some obvious factors that prevents users from leaning towards online banking,

- Access to internet
- Access to smartphone
- Ability of using mobile applications

Since these factors affects vast majority of non internet banking users from adopting to the internet banking, the banks of Sri Lanka is been trying to resolve the issue by complimenting low budget smartphones and awareness of internet banking applications. Even though this is a fair effort to bring more customers towards online banking applications, there is another segment of people who have all these facilities and abilities and still not using mobile banking applications.

There are many Sri Lankans who has access to smartphones, access to good internet connectivity 24/7 and the ability of using smartphones with fluency who are still not using internet banking applications. Who are still accessing physical ATM and bank counters to full-fill their banking needs. Understanding this segment of customers is more important for the banking industry to attract more customers towards the baking applications.

There are many competitive advantages by identifying issues with this segment. They have already on boarded with smartphone and internet connection, so it is less hassle for banks to start with. They are also an easier audience for target market ting.

The aim of the study is to understand some primary factors preventing the users who are capable of using a mobile self-care application from using it. We have used some effective ways to target the participants who fits to the study. We have used the collected data and applied some basic statistical inference methods to validate our hypothesis and identify the significant of factors.

To help us understand these factors we formed some hypothesis and created the questionnaires to primarily focus on these hypothesis to narrow the focus. We then used statistical significant methods to identify if there are enough support to reject the null hypothesis. The followings are some of the

primary questions we tried to answer in this study in the context of mobile banking usage in Sri Lanka.

- 1) Are there any gender bias when it comes to mobile banking usage?
- 2) Does Living in urban areas contributes to more mobile banking usage?
- 3) Do people who are working tends to use mobile banking applications than undergraduates?
- 4) Is there are correlation between a user's banking need and their online banking application usage?
- 5) What are the popular opinions which prevents users form enrolling to mobile banking applications?

II. RELATED WORKS

A. Internet Banking Factors

Mansumitrchiand AL-Malkawi [4] mentioned eight factors that affects adaptation of internet banking, and they are; difficulty, trust, compatibility, third party concerns, human contact, and social influence, security, and computer proficiency. the research was mainly conducted to identify the factors affecting internet banking adaptation of Mexican banks. the study concluded the following as the main differentiation factor which between a user and no user: difficulty, trust, compatibility, and human contact. Human or physical contact during banking transactions was considered important for non-adopters.

Nathet al. [5] Mentioned in their studies on Bankers' prespective on e-banking that there is greater incidence of ebanking usage among the middle age men (30 to 50 years of age); and women customers use such services much less frequently. Occupation-wise, the professionals, followed by business class, make more use of e-banking services. Bankers are satisfied regarding the retention rate and access rate of e-banking customers and they are also satisfied with switch over rate of customers from traditional banking to e-banking.

B. Online Survey

Andrews, D., Nonnecke, B., Preece, J [6] mentioned few important factors in their study on conducting research on internet. Achieving high response rates to an electronic survey depends very much upon how people are asked to participate. Web-based surveys are slightly more flexible than email surveys. The language used in the invitation, the type of notification media and the follow-up process (e.g., the type, and number, of reminders) must be customized to the target population. in the aspect of privacy, the have mentioned that Web-based surveys present issues of privacy and confidentiality infringement that must be addressed if researchers wish to collect personal information from respondents to ensure qualification to complete the survey. They also have mentioned these folliwing challenges when it comes to sampling and subject selection for online research

- Online results generalizable to offline population is unattainable
- Identification of online populations continue to be impractical

- Alternative: Series of indicative, not generalizable, results through artificially defined sampling frames

The others also mentions some of the frequent mistakes which has to be avoided when it comes to survey piloting.

- Bias in question/answer wording
- Inconsistent wording and spelling errors
- Requesting inappropriate demographic data Overlapping question scales or selection options
- Inaccurate or missing instructions
- Technical vocabulary with no definitions
- Insufficient space for open-ended question answers
- Lack of motivational techniques to go to the surveyand/or complete it

In another study on social research, *Social Research 2.0* [7], the authors have mentioned that snowball sampling and the effects of incorporating virtual social networks (Facebook) to detect hard to reach populations. Facebook and other similar social media can be a remarkably good substitute for data obtained through more expensive procedures. SNSs sampling shares most of the limitations associated with other forms of web-based research but it is an appropriate tool to research on "hard to reach" populations that are difficult to study through conventional survey methods. Although we did not build a random sample, their geographical distribution preserved the statistical relation with total population distribution. In their study of immigrant entrepreneurs in Spain the main advantages of using Facebook as a sample frame are the time and cost save, the extent of the size of the sample and the geographical scope of the study. In fact, this virtual sampling technique allowed them to improve the contributions about ethnic entrepreneurship accessing to a considerable size sample of a minority group, contrary with the commonly method applied in this research field, that is, small samples studied in depth. Thus, they managed to reduce the selection bias observed in ascending methodologies research, extending the sample size and improving the representativeness of the sample. *Dusek, Gary Yurova, Yuliya Ruppel, Cynthia* [8] also mentioned that they were able to use LinkedIn as a social tool for doing snowball sampling successfully.

C. Statistical Analysis

The study done by *de Winter* [9]study showed that there is no fundamental objection to using a regular t-test with extremely small sample sizes. Even a sample size as small as 2 did not pose problems. In most of the simulated cases, the Type I error rate did not exceed the nominal value of 5%. A paired t-test is also feasible with extremely small sample sizes, particularly when the within-pair correlation coefficient is high. Given infinite time and resources, large samples are always preferred over small samples. Should the applied researcher conduct research with an extremely small sample size ($N = 5$), the t-test can be applied, as long as the effect size is expected to be large. He also mentions that a ranktransformation and the Welch test are generally not recommended when working with extremely small samples.

In this study done by *Camilli, Gregory, and Kenneth D. Hopkins* [11] the authors have described proper ways of applying chi-square tests to 2 X 2 Contingency tables. The 2 X 2 contingency chi-square is used for the comparison of two groups with a dichotomous dependent variable. We might compare males and females on a yes/no response scale, for instance. The contingency chi-square is based on the same principles as the simple chi-square analysis in which we examine the expected vs. the observed frequencies. The computation is quite similar, except that the estimate of the expected frequency is a little harder to determine.

In *Inflation of Type I Error Rates by Unequal Variances Associated with Parametric, Nonparametric, and Rank-Transformation Tests* [12], The authors have mentioned that in the case of normal distributions and some non-normal distributions, substitution of a separate-variances significance test, such as the Welch (1938) or Satterthwaite (1946) versions of the t test, often has favorable results. However, a decision to substitute an alternative test cannot reasonably be made on the basis of a preliminary test of equality of variances. If a separate-variance test is to be used, it is more efficient to perform it unconditionally whenever sample sizes are unequal.

III. METHODOLOGY

This survey primarily focus on the target group of people with the following attributes

- Access to smartphone and internet
- Has saving accounts
- Currently not using mobile banking application

There were few challenges pitfalls we had to overcome in order to conduct this survey successfully.

A. The Questionnaire

These are the few design decisions we made when creating the questions in order to mitigate some of the following risks

We had to make sure the questionnaire was not too long in order to keep the participant interested until the end of it. It is really important to not to put all the questions there is on a survey especially targeting the users on mobile phones. We carefully pooled all the questions that can be asked and then filtered to make sure we only include necessary questions that will help us evaluate the hypothesis.

We also wanted to keep the questionnaire effortless to fill in order to make sure the participant is not overwhelmed. one such technique we used is totally avoiding the short or long answer questions. We kept all the questions multi choice or single choice MCQ types of questions. This makes it easier for the participants to fill the questions. We also payed greater attention to the wordings of the questions and the answers so that we wont introduce any unwanted bias.

We broke the questionnaire in to multiple sections in order to make the forms seems small and also the related questions are contained whiting a section, in that way me managed to reduce the context switching of the user. This also helped us to skip certain set of questions for certain type of users.

We used Google forms for your survey. Google forms allows us to make conditional forms that behaves in dynamic ways based on the previous answers given by the users. Using this feature we were able to only show the questions that is related to non mobile baking user based on their answers. The mobile banking users only fill the basic and demographic questions. Since it is an online survey this will help us to reduce the noise by only allowing non e-banking users to fill the forms thus it represent purely the non banking user's overall opinions.

1) *Demographic Questions:* These basic questions are designed primarily to understand the users and their demographically status.

- 1) District - Even though we almost had responses from all the districts of the country there were 3 of them dominating with Ampara 20.4%, Colombo 18.3% and Kurunegala 14.8%
- 2) Gender - 52.1% of the responses were male and 47.2% were female
- 3) Age range - 28.2% of the participants are from 16 - 25 age range and 68.3% of the participants are between 26 - 45 age range
- 4) Education - While majority of the participants has a Diploma or bachelor's degree with 85.9% there were also 7% of the participants had Masters / PHD and 6.3% of them had only up to Advanced level.
- 5) Occupation - Even though we had participants from all the categories, 37.3% them were students and another 36.6% of them were Technical / Private sector related professionals.
- 6) Monthly Income - Due to the privacy concerns we grouped the income rather letting user enter manually. Since we had students taking part there were 38.7% of the participant did not have a job to report an income while 21.7% had income above hundred thousand rupees and 21.1% had in between fifty thousand and hundred thousand rupees while others had less then fifty thousand rupees monthly income.
- 7) Mobile Banking User - Out of all 55.6% of participants were mobile banking users and 44.4% of them were not
- 8) others - we also included questions regarding saving accounts and awareness of the availability of the internet banking services.

2) *Banking Needs:* In this section we mainly focused on how people currently fulfill their banking needs. This section and the following section was only answered by non mobile banking users. Since we used google forms we were able to only allow these two sections to the users who answered no to the 7th question, 44.4% (63). The percentage values in this sections and the following sections will only be out of 63 of the people who answered the these questions.

- 1) Number of bank accounts - 39.7% of the people had only one account where 33.3% had 2 accounts
- 2) Usage of ATM and Bank Counters - While the majority of them 92.1% was using ATM only 54% uses bank counters.

- 3) When Bank Counters - 57.1% of the time people use bank counters for transactions and deposit. Withdrawal 42.9% and utility bills 22.2% and 22.2% claims they never uses bank counters at all.
- 4) When ATM - 79.4% of the users uses ATM of money withdrawal and 54% of the participants uses ATM for deposit and money transfer as well.
- 5) Travelling to access AMT/ Bank counter - 66.6% them only travel less than 2km to reach either bank or ATM and 23.8% travels 3 - 6 km every time they need to access the bank or the ATM.
- 6) Frequency - while 90.5% of the users access banks only 1 - 3 times a week.

3) *Why Not Internet Banking:* In this section we tried to understand the opinion of the non internet baking users towards internet banking. We had questions that participants can chose wither one of these following 5 answers.

- 1) Strongly Disagree
- 2) Disagree
- 3) Neutral
- 4) Agree
- 5) Strongly Agree

There are the following questions asked

- 1) Do you think ATM and bank counters are more secure than mobile banking applications?
- 2) Are the ATM and bank counters a faster way to do transactions than mobile applications?
- 3) Are you afraid that you might make any mistakes when doing payments and transactions via online banking applications?
- 4) Does the process of onboarding to the mobile baking application for the first time too much time-consuming?
- 5) Should the online banking application fee be reduced?
- 6) Should the banking application user experience be improved?

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	1.6%	1.6%	42.9%	47.6%	6.3%
2.	12.7%	49.2%	23.8%	7.9%	6.3%
3.	0%	15.9%	30.2%	44.4%	9.5%
4.	1.6%	28.6%	39.7%	25.4%	4.8%
5.	0%	4.8%	20.6%	63.5%	9.5%
6.	0%	1.6%	19%	66.7%	12.7%

TABLE I
SECTION-3 ANSWER SUMMARY

B. The Sampling

In order to collect samples / participants, we used snowball sampling method. Snowball sampling or chain-referral sampling is defined as a non-probability sampling technique in which the samples have traits that are rare to find. This is a sampling technique, in which existing subjects provide referrals to recruit samples required for a research study. We mainly used social media groups to find the specific participants and then asked them to share the form with other groups that they are in.

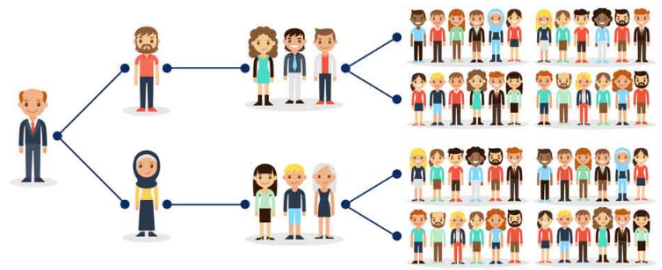


Fig. 1. Snowballing Sampling

<https://www>

C. Formulation of Hypotheses

Based on the previous studies and the Sri Lankan banking trends, we formulated these following hypothesis.

1) Gender Hypothesis: Women less likely to use online banking applications.

P1 = Proportion of men using mobile banking applications

P2 = proportion of women using mobile banking applications.

H01 : Men and women are equally likely to use mobile banking applications

H01 : P1 = P2

Ha1 : P1 > P2

	Using	Not Using
Female	27	42
Male	54	21

TABLE II
GENDER HYPOTHESIS READINGS

2) Geo Location Hypothesis: People lives in urban areas are more likely to use mobile banking applications than people lives in rural areas.

Based on the study done by Weeraratne, Bilesha. (2016) [13], Colombo, Gampaha, Kalutara, Kandy and Galle have more than 50% urban score, we will consider these districts are urban districts and every other districts as rural districts.

P1 = Proportion of people from urban districts using the mobile banking applications

P2 = proportion of people from rural districts using the mobile banking applications

H01 : people from rural area are using mobile banking applications as much as people from the urban are

H01 : P1 = P2

Ha1 : P1 > P2

	Using	Not Using
Urban	32	21
Rural	47	42

TABLE III
GEO LOCATION HYPOTHESIS READINGS

3) Occupation Hypothesis: People who have graduated and working are more likely to use the banking applications than people who are undergraduates

$P1$ = Proportion of graduated and working using mobile banking applications

$P2$ = proportion of students using mobile banking applications.

H_{o1} : Graduates who got jobs and undergraduates are equally likely to use mobile banking applications

H_{o1} : $P1 = P2$

H_{a1} : $P1 > P2$

	Using	Not Using
Graduates	48	16
Undergraduates	27	28

TABLE IV
OCCUPATION HYPOTHESIS READINGS

4) *Convenient Hypothesis*: **Most of the people who are not using mobile banking applications think the user experience of the banking applications should be improved**
For this hypothesis we assume that for any application to be success, majority of the users will like the user experience offered by that application.

$P1$ = Proportion of the non users who thing user experience should be improved

P_o = 0.5 of the users

H_{o1} : $P1 = P_o$

H_{a1} : $P1 > P2$

D. Resolving Hypothesis

In this entire study we are only using promotions, for example, proportion of men using mobile banking applications or proportion of people who lives in rural areas who's not using mobile banking applications. Since hypothesis 1 - 3 are similar, we can use either test for difference in proportion methods [14] or chi square goodness of fit [15] methods.

For this study I'm using test for difference in proportion method. Since each category has at least 10 observations. Thus we can assume the difference in proportion is distributed as a normal distribution.

IV. RESULTS

In this section I have discussed the results we obtained from the hypothesis tests and some speculations based on the visualizations obtained form the data.

A. Gender Hypothesis

obtained z value = 3.98, Probability of the statistic obtained from R statistical package = 3.445e-05. This gives us a strong evidence to reject the null hypothesis. Hence female are less likely to use the mobile banking application.

B. Geo Location Hypothesis

obtained z value = 0.933, Probability of the statistic = 0.176. This does not give a strong evidence to reject the null hypothesis hence there are no prof of people from rural districts less likely to use the mobile banking applications.

C. Occupation Hypothesis

obtained z value = 2.92, Probability of the statistic = 0.0017. This give us a strong evidence to reject the null hypothesis, hence working graduates more likely to use online banking application than undergraduates students.

D. Convenient Hypothesis

By assuming in general a successful application will have at least it's 50% of the users satisfied with the user experience, I have calculated how significant is the dissatisfaction percentage of the mobile banking application. the z statistic obtained = 4.667, Probability of the statistic = 1.528147e-06, Thus we have a strong evidence to reject the null hypothesis, Hence Significant number of non mobile banking users thing the user experience has to be improved.

E. Traveling Distance to Access Banking Services

Fig.2 Shows how much on average non online banking users travels to access the banking services wither form an ATM or a Bank counter. From this we can clearly see that most of the people live close by to their nearest ATM or a branch of their banking service provider.

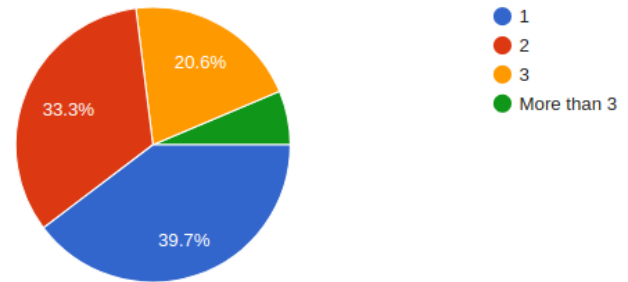


Fig. 2. Distance Traveled By a Non Banking User To Access Banking Service

F. Frequency of Accessing Banking Services

Fig.3 Shows that a vast majority of non online banking users only access their banking services 1 - 3 times a week. This shows that lack of frequent need for the service is also can be a deciding factor of addoptation of online banking applications.

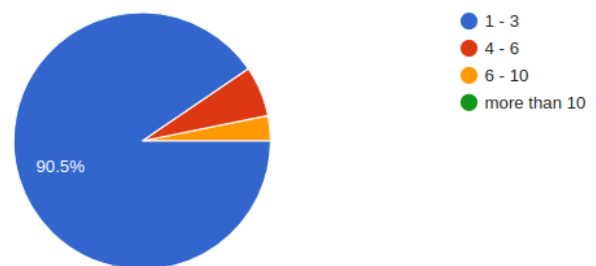


Fig. 3. Banking Service Access Frequency

G. Frequently Accessed Services

Fig.4 and Fig.5 Show the services frequently accessed by the non online banking users in ATM and the bank counters. As Fig.4 shows ATM is widely used by the non banking users for primarily for money withdrawal. We can also see that non online banking users does not have many other needs when it comes to accessing banking services. They mostly used few basic services frequently.

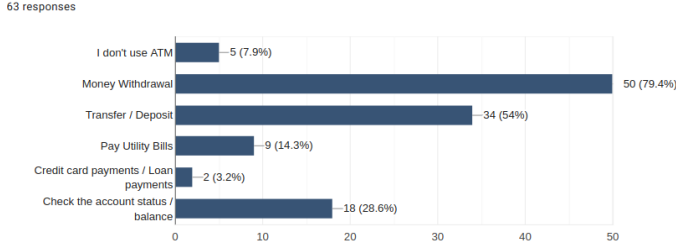


Fig. 4. Frequently accessed ATM services

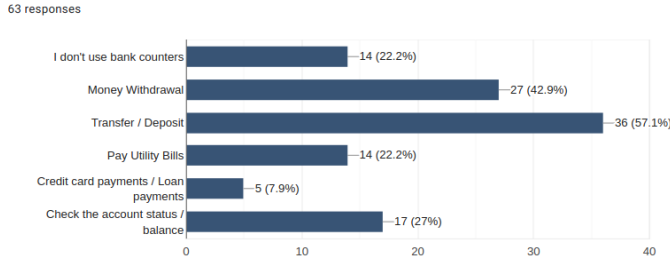


Fig. 5. Frequently accessed bank counter services

H. COVID-19 Mobile Banking

We also asked if people are willing to move towards the online banking applications given the COVID-19 pandemic situation and social distancing. Fig.6 shows that significantly more people are willing to move towards online banking given the situation.

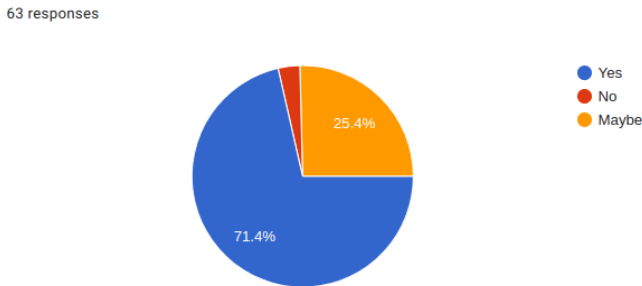


Fig. 6. impact of covid-19 on online banking adoption

I. Other Significant Opinions

We also performed significant tests for the collected information gathered under section 3, the opinion towards online

banking applications of non mobile banking users. The summary is in TABLE-I. We converted mapped answers to 1 - 5 scoring mechanism and was able to identify the significant in score assuming 3 as the average score for any question. Using significant in single mean method we were able to identify if the people's opinions for those questions are significantly consistent. Following are the results of the significant tests.

- 1) Significant non mobile banking application users think the transaction fee should be reduced.
- 2) Significant non mobile banking application users think user experience should be improved.
- 3) Significant non mobile banking application users think the ATM/Bank counters are more secure than internet banking application.
- 4) Significant non mobile banking application users are afraid of making mistakes when they are doing online transactions on their own.

V. CONCLUSION

It is useful to have the hypothesis formed before we start working on the questionnaire. This will allow us to narrow the questions to the exact point rather making the form too long and time consuming to fill. This will keep the participant engaged until the end of the survey and give their honest opinion.

Once questionnaire is framed it is also important to not to directly send it out online rather we did a closed beta testing to identify both technical and language related issues on the forms. We sent this form to only few selected people for the feedback and their experience and we were able to identify and fix many issues.

We also identified that keep the forms circulating is important when it comes to the snowballing. Since the approach is to ask other closed groups to circulate it among themselves after few moment people stops sharing, so it is a good idea to find other similar groups and keep on pushing the forms rather only doing it at the beginning.

This study conclude that factors such as gender, occupation and convenience of the banking application does affects the usage of online banking application in the context of Sri Lanka. Being in urban areas does not affect someone using online banking application.

We can also see that living close by to the ATM and bank branches, Infrequent banking access and basic banking needs as some of the characteristics of non online banking users. This explains that as long as users still have limited need for banking service it is convenient for them to keep on using traditional methods to access banking services. We were also able to understand some of the concerns of non internet banking users towards the banking applications such as high transaction fees, poor user experience and lack of confident towards the online banking applications.

Due to the lack of time we were not able to collect more data and lack of data became a major challenge when it comes to hypothesis testings. For some testings we need at-least 10 entries form each category. This made breaking the categories

finer to get more finer insights difficult. running this survey for a longer period and reaching to more closed group will allow us to identify more interesting patterns.

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