A Comparative Study of Mobile Banking in Specific Parts of Bangladesh

Md. Toukir Ahmed, Md. Niaz Imtiaz & Abdulla All Kauser

Abstract:
With the rapid improvements of technology worldwide, systems are getting modernized and digitalized. Traditional and time-consuming systems are replaced by efficient computerized, time-saving ones. Human Computer Interaction (HCI) based approaches are paving the way for many of these efficient models and systems, making users' life easier day by day. One of the most ancient and impactful economic systems is Banking. We also cite out some security issues regarding the transactions using mobile banking. We confine our scope within some specific parts of Bangladesh (Pabna and Chuadanga) and analyze the issues from users, bank managers and agents of this field during doing the work. We also cite out the best service offered to both users and agents by different mobile banking agencies, based on some Artificial Intelligence (AI) and machine learning techniques and also a comparison is also shown among different techniques. Moreover, an android application is also developed to show the summarization of the total work.

Keywords: Agent, Dealings, H.C.I, Mobile Banking, Security.

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1. INTRODUCTION

Mobile banking is an innovation that could become one of m-commerce's value-added applications and could have a huge economic impact. It is defined as "A channel" whereby the customer interacts with a bank via a mobile device, such as a mobile phone or Personal Digital Assistant (PDA) (Barnes, 2003). Despite the overall low enthusiasm for m-commerce, people are moving willing to embrace mobile banking (Bangjun Wang, 2013). Human-Computer Interaction (HCI) is a multidisciplinary field of study focusing on the design of computer technology and in particular the interaction between humans (the users) and computers (Rahman, 19 February 2010). While initially concerned with computers, HCI has since expanded to cover almost all forms of information technology design (Cooke, 1863). Mobile banking is a system that allows customers to conduct a number of financial transactions through a mobile device such as a mobile phone or personal digital assistant (Islam, Mobile Banking: An Emerging Issue in Bangladesh, January–June, 2013). Mobile banking differs from mobile payments, which involve the use of a mobile device to pay for goods or services either at the point of sale or remotely (Van, 2009). Mobile device enable secure, convenient authorization of e-banking, retail payment, brokerage, and other types of transactions (RG, May 2003). "In Bangladesh, e-commerce is growing faster and we hope this market will find a strong position in world perspective also after USA, China and India," said Quazi Zulquarnain, Kaymu Bangladesh's deputy managing director (The Daily Star, Friday, February 22,2019). With the rapid growth of ICT adoption in the Global South, crimes over and through digital technologies have also increased. Consequently, governments have begun to undertake a variety of different surveillance program, which in turn provoke questions regarding citizens' privacy rights (Nicola Dell). A model is used to test the causalities in the proposed model is known as SEM model. The result of this model indicated strong support for the validity of proposed model with 72.2% of the variance in behavioral intention to mobile banking (Ja-ChulGu, November 2009). In Bangladesh, currently, 7 private and public banks are providing mobile banking services. Those are respectively DBBL mobile banking (Rocket), bKash, U cash, M Cash, Ok mobile banking, Sure Cash and T-cash. Firstly, DBBL Mobile Banking (Rocket) started their operations in May 2011 where bKash beginning July, 2011 (The Rise, Progress, and Present Condition of Banking in India). Another study in user interfaces for mobile money-transfers explores whether or not electronic access to complex money services is enough to bring formal money services to the unbanked, and, if thus what kind of interface is best (Shaikh, 2015). HCI provides some steps to solve the particular problem that includes: Fixing the problem, design process including interaction design basics, design rules, evaluation technique and gathering information from stakeholders, models and theories and lastly groupware, ubiquitous, computing and augmented realities that defines our summery and result (ALAN DIX, 2003).

2. REVIEW OF THE LITERATURE

Nowadays mobile phones are getting more and more advanced. People can't live without gadgets and companies do their best to make different innovative apps (Indrani Medhi, 2009). Banks know that society is evolving so they have to adapt to changes and make it easier for customers to control their savings (Niina Mallat, May 2004). In fact, mobile banking offers many advantages but still is surrounded by stereotypes. Mobile banking has simplified the lives of many people and given them the option to send money, receive money, check account balance, pay bills, etc. using their mobile phones (Arya, 2009). Banks provide mobile banking services to their clients mainly in three ways: Mobile Banking over Wireless

Application Protocol (WAP), Mobile Banking over SMS (also known as SMS Banking) and Mobile Banking over Unstructured Supplementary Service Data (USSD).These mobile banking services have been discussed in details below:

2.1 Mobile Banking over Wireless Application Protocol (WAP):

The customers can download the mobile application of the concerned bank on their smartphones and then use it to avail various services provided by the bank. They need to register for mobile banking separately and receive their login credentials to use mobile banking applications, simply known as mobile apps. Most banks provide mobile apps for iOS and Android devices.

2.2 Mobile Banking over SMS:

Most banks offer mobile banking services over SMS. The customers need to sign up for this service, known as SMS Banking, by registering their mobile number. Then, they can send SMS to the bank to inquire about their account balance, check the mini account statement, etc. The bank then replies with an SMS that contains the information requested by the customer. The customers do not need to own a smartphone or internet access to avail SMS banking services.

2.3 Mobile Banking over USSD:

Banks offer mobile banking over USSD service to people who do not own a smartphone or have access to the internet. They can simply use USSD codes provided by the banks to avail banking services. The customers dial a prefix code and click send. Then, they receive a menu containing the banking services such as balance enquiry, mini account statement, etc. that they can avail using their phone.

3. RESEARCH METHODS

3.1 Regions and Stakeholders:

To do the study, we selected two places to gather information: Pabna Sadar and Chuadanga Sadar. In every district headquarters, few different areas have been selected for collecting information. Among them are busy city area, terminals, schools and colleges, markets, towns and villages and remote areas. The stakeholders of the study were: Mobile banking users, Agents and lastly Bank managers.

3.1.1 Mobile Banking Users:

A total of 11 customers in various categories and different occupations have been provided their information. Firstly, most college and school students enjoy any mobile banking facility. Most of them are used in bKash and rocket. Professionals take precedence over development. However, the students of the school college used Sure Cash and M Cash to withdraw scholarship money. The lowest number of people are from lower middle class. There is a matter of concern among the people is that, the money can be withdrawn from the account without one's concern.

3.1.2 Agents:

The role of agents in mobile banking is immense. Information from various places in schools, colleges, markets, terminals, universities, scheduled areas have been provided by the agent. Most agents are engaged in some other profession. In the city-centric areas, the agents are almost 30-35 years old, but fewer cities or rural areas have many agents who are under 20 years of age.

3.1.3 Bank Manager:

Either public and private mobile bank manager or staff seems to work hard, is noticed during study. Upon asking for information, we did not get any directly from them, but they asked to contact to the helpline or website to collect any information. According to them, no

information related to mobile bank security is provided as such. But they are ready to solve any problems of personal mobile banking users.

3.2 Questionnaires:

In the first phase of our study, we prepared questionnaires for different stakeholders of the study. Our aim was to collect the data logically so that we can analyze it and use it swiftly for future study.

3.2.1 Questionnaires for Agents:

To do the study in logical manner, we prepared a question set for the agents. The set included these questions: Full name of Agent, What kind of service offered by him?, The duration of engagement in this Profession, Are there any transaction complains received from users?, Which agency provides best services for security purposes and why?, Which mobile banking gives better additional services?, How much money is transacted in a day? We collected the answers of the agent for the above questions.

3.2.2 Questionnaires for Users:

We prepared questionnaire set for users too. This questionnaire also included questions for the users. The questions were: Full name of the mobile banking user, Which mobile banking account is used?, Since when it is being opened?, Since when is it being activated?, How much money is traded in month?, Is Mobile banking application used?, In the overall consideration of 10, how much ratings to be given? Some stakeholders were not willing to answer the questions properly and some avoided the questions. It was really a tough job to extract the answers from the users.

## 3.3 Weka Implement & Classifier:

Weka could be a assortment of machine learning algorithms for data processing task. The algorithms will either be applied on to a dataset or known as from Java code. Weka contains tools for information pre-processing classification, regression, clustering, association rules, and visualization. It's additionally well- suited for developing new machine learning schemes. A classifier is an algorithm that maps the input data to a specific category. Perception, Naive Bayes, Decision Tree, Logistic Regression, K-Nearest Neighbor, Artificial Neural Networks/ Deep learning, Support Vector Machine. There are also ensemble methods as Random Forest, Bagging etc.

4. EMPIRICAL RESULTS

During survey in main town, some information is collected that an agent transit money approximately 1 lakh taka through Bkash and less than 15 to 20 thousands taka through Dutch- Bangla mobile banking or others in a day. On the other hand in railway station and bus stand area of Pabna, we got same information like they don't have any fixed amount of transaction of money. But they informed that, sometimes they transit more than 50 thousands taka and sometimes they don't. In University area of Pabna, we did not found any mobile banking service center that was very sad for any University student. Students often go nearest bazar or town to transact money. Most of the college or university students use bKash account but some told they prefer DBBL account because in DBBL service, 18 taka is cut upon cash out of one thousand taka, where bKash cuts 20 taka per thousands. When surveying on CNG drivers or auto-rickshaw drivers, most of people do not know about mobile banking system. Upon talking with 8 drivers, it was found that, only one among them used bKash.

Upon asking their reluctance to use mobile banking systems, they replied that they do not trust any types of mobile banking system as they lack the knowledge about it and they are concerned for unauthorized transactions.

Figure. 1 Flow Chart of Mobile Banking Procedure
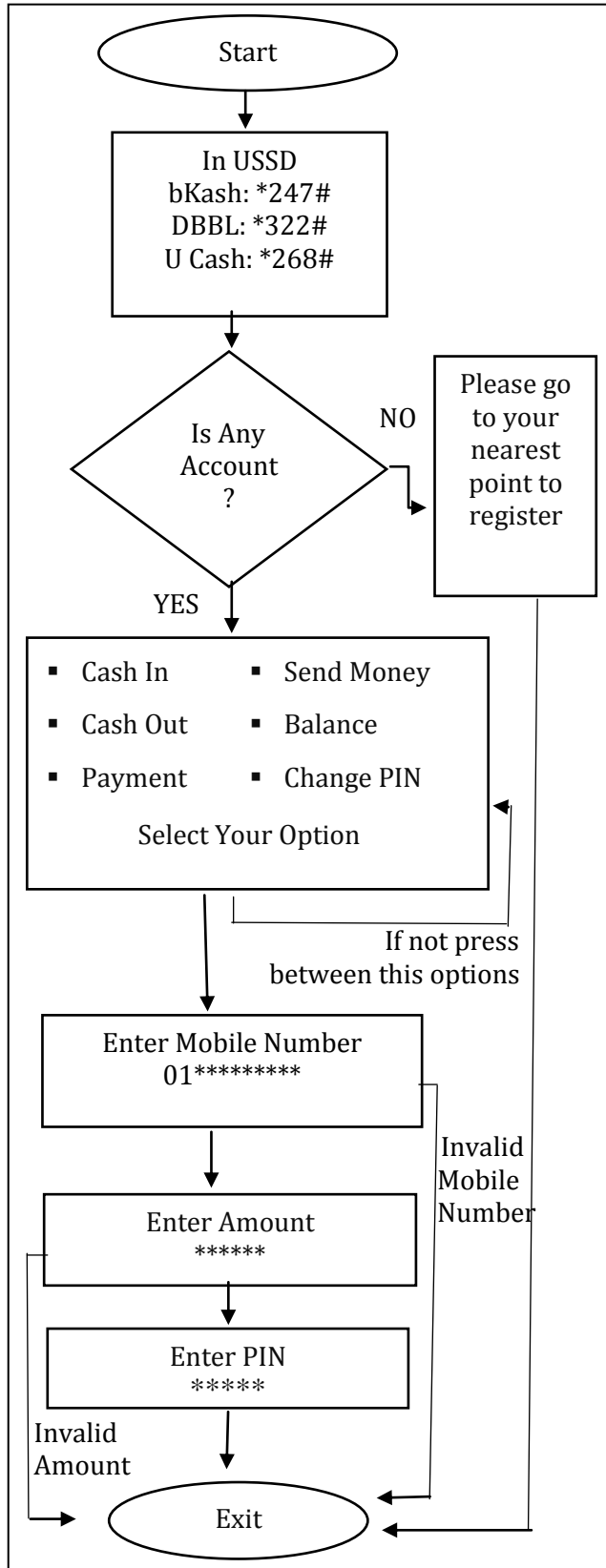
4.1.1 Transaction Money by Users:

When I survey to collect data, I notice that most of the mobile banking users are school, college or university student. They transaction money between 4k to 5k taka. Another occupation user transaction money more than 5k to 50k taka per month.
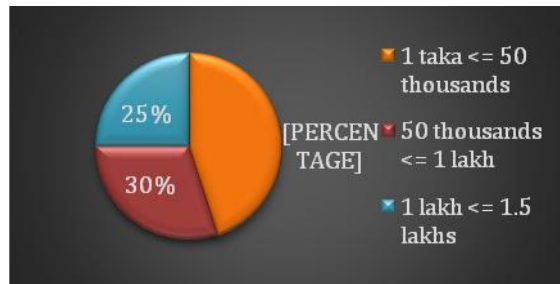

Figure. 2 Transaction Money by Users

4.1.2 Security by Users:

Security is the most important topics in mobile banking system. Everyone worry about the security if there account secure or not.
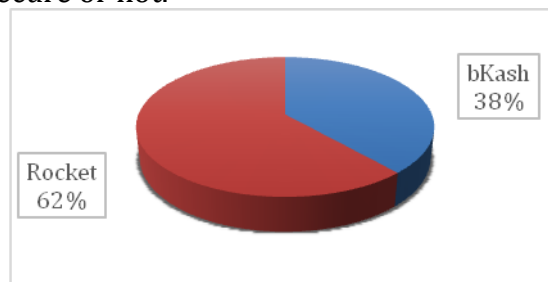
Figure. 3 Mobile banking user ratio

After survey, we got a result that 62% mobile banking users prefer to use Dutch-Bangla (DBBL) because they provide more security than other mobile banking system. They provide extra digit through transaction money. bKash stands in second position getting 38%.

4.1.3 Better Services:

In this section Rocket or DBBL provide better service. They ensure user account security and that's why most of the people wish to use DBBL. They establish more Booth everywhere such as market, university area, hospital, bus stand, rail way station etc. We can see the following figure, Rocket provide 60% better service, where bKash provide only 32%. The main reason is most of fraud use bKash mobile banking system to hack user account.
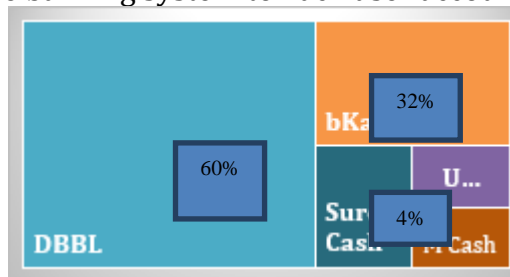

Figure. 4 Security provided by Mobile Banking Agencies

4.1.4 Problem Faced among Different Mobile Banking System

Most mobile banking agent give information that they face multi time in fraud group. Some agents lost more than 15 thousands taka. Not only agent, but also mobile banking users also face this kind of problem. bKash provide a problem through transaction money. Sometimes it cannot show transaction message. or sometimes it occurs in network problem.
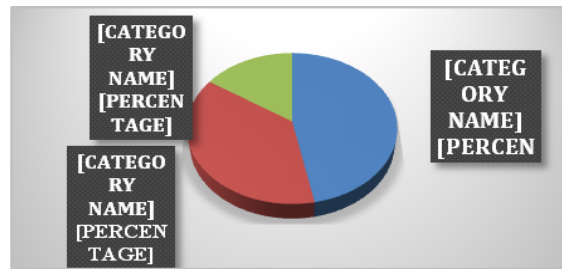
Figure. 5 Problem Faced through Different Mobile Banking

4.1.5 Rating of Different Mobile Banking User:

Most of them did not give me exact information and they did not want to give their mobile banking account rating. Some mobile banking users gave their rating and most of them gave 8 points out of 10.
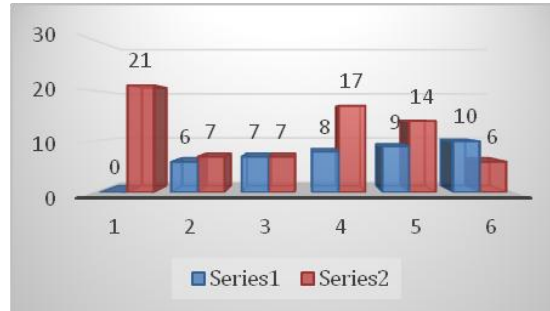

Figure. 6 Rating of Different Mobile Banking Users

4.1.6 Different Mobile Banking Application Usage:

Though most of our people use internet but they do not want to use mobile banking application because of insecure problem. Only School, College or University student prefer to use mobile banking application.
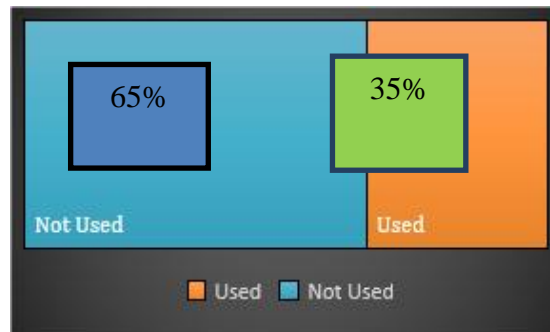

Figure. 7 Mobile Application Usage

4.1.7 Mobile banking Statistics by Agent

In figure 8, we can see, 37% people prefer to use Rocket Banking service where as 44% people use bKash and last 19% people prefer use other mobile banking service such as U cash, M cash, Sure cash etc.
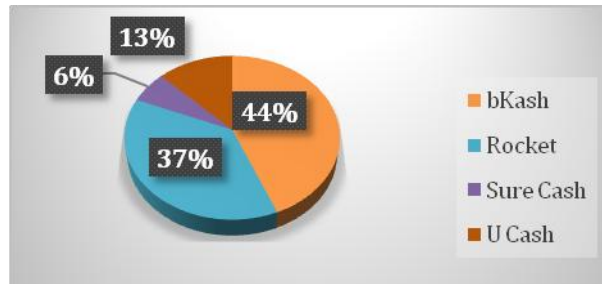

Figure. 8 Mobile banking Statistics by Agent

4.1.8 Usage of different Mobile banking by users
Most users and agents do not know how to transmit money through Mobile banking Application. The bank manager or field area manager does not give any proper advice or the importance of Mobile banking Application.
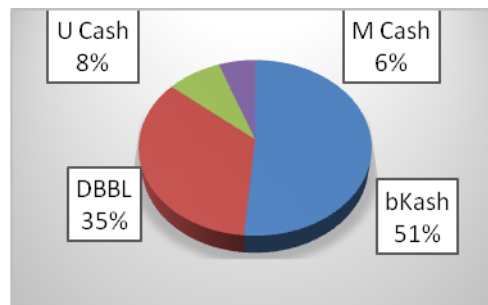

Figure. 9 Usage of different Mobile banking by users

4.2 For Mobile Banking User (in Weka):
Table 1 Accuracy of Classifier using Cross Validation 5 folds of 6 attributes dataset of User

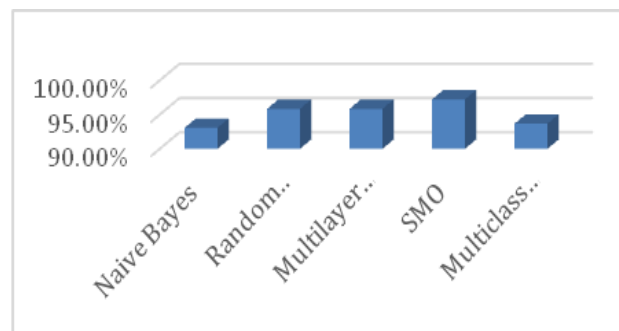| Classification Technique	Correctly Classified (%)	Incorrectly Classified (%)
Naive Bayes	93.0556%	6.9444%
Random Forest	95.8333%	4.1667%
Multilayer Perceptron	95.8333%	4.1667%
SMO	**97.2222%**	**2.7778%**

Figure. 10 Accuracy of Classifiers using Cross Validation 5 folds of 6 attributes dataset of User

It can be noticed that SMO gives the best accuracy 97.2222% and Naive Bayes gives the worst accuracy 93.0556%

Table 2 Comparison of Different Classifiers of Mobile Banking User

Classifiers	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area
Naive Bayes	0.931	0.026	0.934	0.931	0.929	0.909	0.977
Random Forest	0.958	0.012	0.959	0.958	0.959	0.945	0.997
Multilayer Perceptron	0.958	0.021	0.961	0.958	0.958	0.941	0.996
SMO	**0.972**	**0.009**	**0.972**	**0.972**	**0.972**	**0.963**	**0.987**
Multiclass Classifier	0.917	0.039	0.914	0.917	0.914	0.884	0.995

4.3 For Mobile Banking Agent (in Weka):

Table 3 Accuracy of Classifier using Cross validation 5 folds of 6 attributes Agent dataset.

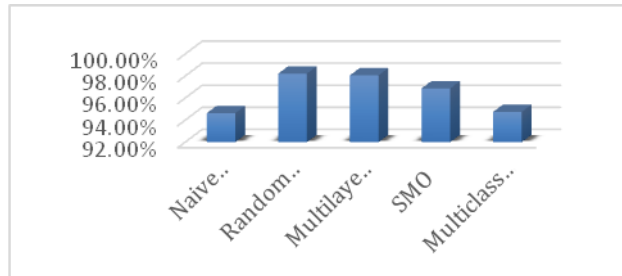| Classification Technique	Correctly Classified (%)	Incorrectly Classified (%)
Naive Bayes	94.625%	5.375%
Random Forest	**98.2222%**	**1.77778 %**
Multilayer Perceptron	98.0654%	1.9346%
SMO	96.875%	3.125%
Multiclass Classifier	94.75%	5.25%

Figure. 11 Accuracy of Classifiers using Cross Validation 5 folds of 6 attributes Agent dataset

It can be noticed that Random Forest gives the best accuracy 98.2222% and Naive Bayes gives the worst accuracy 94.625%.

Table 4 Comparison of Different Classifiers of Mobile Banking Agents

Classifiers	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area
Naive Bayes	0.938	0.160	0.943	0.938	0.935	0.852	0.999
Random Forest	**0.933**	**0.017**	**0.959**	**0.750**	**0.857**	**0.851**	**0.983**
Multilayer Perceptron	0.913	0.037	0.833	0.913	0.955	0.864	0.990
SMO	0.969	0.080	0.970	0.969	0.967	0.926	0.992
Multiclass Classifier	0.906	0.015	0.924	0.906	0.911	0.838	0.990

5. DISCUSSIONS & IMPLICATIONS
5.1 Android Studio Project
We created an android application in android studio which depicts the summary of the outcome of our work. The main features of our application includes: Main page of our project. Some animations and brief information are added and also dark or night mode option available.
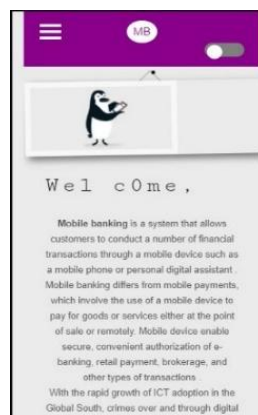

Figure. 12 Main page of the Android App (Link of the app : App Link)

Types of Mobile Banking: In this section we added four main mobile banking systems: bKash, Rocket, Sure Cash, U cash and other option. Then next page is Questionnaire, in this page we included definition of questionnaire and based on agents that contains different questions. Also, we included questionnaire based on mobile banking users which also contains individual questions. Then there is a page named 'At a glance': This is also main part in our android project. Here we included survey results in detail and also included a google link where all survey file and audio records are attached.
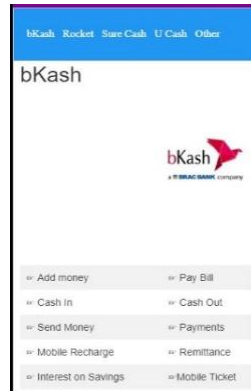

Figure. 13 Page from android app

To summarize the survey result for the mentioned areas, we conclude our result section with following analytical remarks: Most of the agents considered bKash as first choice, Rocket as second choice. They get extra benefit from DBBL where this company gives 7% commissions where   others like bKash, U cash, Sure cash gives 4% commissions. In security purpose bKash has a large amount of drawbacks. A group of fraud harsh people calling in different disguises like Bank Officer, Pir baba etc. In our calculation, around 45-50 % agents transit money form 50 thousands to 1 lakh taka daily. Among 33.33% agents became victims in different situations. Rocket provides extra one digit benefits in account number than others. The bank managers or agent offices do not take any proper necessary steps. For the agents, it is very common problem to get fraud call or harassment, even sometimes risks for getting attacked and being snatched.

6. CONCLUSION
With the touch of improvements and modernization, banking systems have become user friendly too. People can now make payments, pay electricity bills, send money and now in some cases pay bills through mobile banking. The system is both time consuming and safe for many cases. Different mobile banking companies are trying to lure clients by giving benefits and advertising. But, in our study we have found that, total percentage of people using this system is still not praiseworthy. Many people still do not trust this system and are concerned for their faulty transactions or frauds. Besides, many people have almost no knowledge about the most advanced features of mobile banking (Apps).

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