UNIFORM PAYMENT SYSTEM FOR BANKING INDUSTRIES: A CASE STUDY IN BANGLADESH

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Abstract - National Payment Switch (NPS) is an approach to offering financial services that combines banking with Automated Teller Machine (ATM), Point of Sale (POS), Mobile Banking (MB) and Internet Banking (IB) which enables for users to execute banking transaction. It is new term in Bangladesh. Most of the people in Bangladesh live in rural areas and the services of banks are being increased through ATM, POS, IB and MB day by day. Almost all banks are trying to provide financial service to maximum customers through these delivery channels and some of them are becoming popular. So a common platform is needed for inter bank transaction through different delivery channels. NPS is such a system for interbank transaction in Bangladesh. Already several banks have connected with NPS successfully in Bangladesh. The main purpose of this paper is to provide present condition of NPS, and related services (ATM, POS, MB, IB) in Bangladesh and technical architecture of NPS. We also showed prospects and limitations of NPS in Bangladesh.

Keywords - NPS; mobile banking; internet banking; Bangladesh

I. INTRODUCTION

In Bangladesh, payment switches of all banks are going to be connected to a central switch named National Payment Switch (NPS). The switch is expected to create a single, integrated and effective platform for setting interbank electronic payments derived from different channels. E-commerce activities are expected to be safer, faster, sophisticated and reliable through the electronic settlement of all financial transactions. NPS will be considered as a Central switch in the country. It will connect all the switches in place in the state own bank and private sector bank. This will also connect the e-payment gateway of Public Accounts Department (PAD) of Bangladesh Bank [1]. All the commercial banks within the territory of the country connect to all the international gateways e.g. VISA, Master Card, and Maestro etc. through NPS.

Every interbank networks provider takes a charge from banks. If NPS can perform as a gateway for communicate interbank transaction then local bank can avoid delivery card of foreign interbank network (example: visa plus). NPS is still new in Bangladesh and this paper aims to capture its early development and learn lessons. The main objectives of this paper are:

- To study the technical and business model of National Payment Switch in Bangladesh
- To identify prospect of NPS in Bangladesh
- To detect problems of NPS in Bangladesh
- To compare services through ATM, POS, MB of different banks.
- To make suggestions on the basis of findings

A. Automated Teller Machine (ATM)

An automated teller machine or automatic teller machine (ATM) is a computerized telecommunications device that enables the clients of a financial institution to perform financial transactions without the need of cashier, human clerk or bank teller [2]. Using an ATM, customers can access their bank accounts in order to make cash withdrawals, cash advances, transferring funds between accounts, and check their account balances as well as purchase pre-paid mobile phone credit. An ATM is a safety-critical and real-time system that is highly complicated in design and implementation [3]. ATMs are placed not only near or inside the premises of banks, but also in locations such as shopping centers/malls, airports, grocery stores, petrol/gas stations, restaurants, or anywhere...
frequented by large numbers of people. ATMs rely on authorization of a financial transaction by the card issuer or other authorizing institution via the communications network. This is often performed through an ISO 8583 messaging system. Many banks charge ATM usage fees. In some cases, these fees are charged solely to users who are not customers of the bank where the ATM is installed; in other cases, they apply to all users.

ATM can be considered to be a discontinuous revolutionary innovation. ATMs required a bank’s customers to dramatically change their behaviors in order to obtain benefits in terms of faster, more convenient banking. Instead of going to a bank branch, filling out a transaction form and interacting with a human teller, these customers could log on to the bank’s network and conduct a variety of transactions on a machine. The Technology Adoption Life Cycle (TALC) can be applied to ATMs in order to understand the business strategies adopted by various banks at different stages of ATM evolution [4].

B. Point of Sales (POS)

The term is applicable to a retail shop or store, the checkout or cashier counter in the store, or a location where such transactions can occur. It can also apply to the actual POS hardware and software including but not limited to electronic cash register systems, touch-screen display, barcode scanners, receipt printers, scales and pole displays. POS systems are utilized in many different industries, ranging from restaurants, hotels and hospitality businesses, nail/beauty salons, casinos, stadiums, and let's not forget - the retail environments. In the most basic sense, if something can be exchanged for monetary value - a POS system can be used. Different bank networks are connected to these POS and debit or credit cards are used in POS machines for payments. Europay, MasterCard and Visa (EMV), known as “Chip and PIN”, is the leading system for card payments worldwide for debit and credit card payments with more than 1.34 billion cards in use worldwide [5]. EMV cards contain a smart card chip and are more difficult to clone than the magnetic-stripe cards that preceded them.

C. Mobile Banking (MB)

Mobile Financial Services (MFS) is an approach to offering financial services that combines banking with mobile wireless networks which enables users to execute banking transactions. This means the ability to make deposits, withdraw, and to send or receive funds from a mobile account. Often these services are enabled by the use of bank agents that allow mobile account holders to transact at independent agent locations outside of bank branches. MFS is still new in Bangladesh. Access to formal financial services can help households to better plan and manage their lives. It offers the opportunity to build another channel beyond the bank branch and ATM network to enable millions to have easier access to the formal banking system. Bangladesh Bank aims to build a commercially viable, competitive and safe MFS market.

D. Internet Banking

Internet banking (or I-banking) means any user with a personal computer and a browser can get connected to his bank’s website to perform any of the virtual banking functions. In Internet Banking system, the bank has a centralized database that is web-enabled. All the services that bank have permitted on the internet are displayed in menu. Any service can be selected and further interaction is dictated by the nature of service. Once the branch offices of the bank are interconnected through terrestrial or satellite links, there would be no physical identity for any branch. It would a borderless entity permitting anytime, anywhere and anyhow banking. The delivery channels include direct dialup connections, private networks, public networks, etc. With the popularity of computers, easy access to internet and World Wide Web, Internet is increasingly used by banks as a channel for receiving instructions and delivering their products and services to their customers. This form of banking is generally referred to as I-banking, although the range of products and services offered by different banks vary widely both in their content and sophistication. So I-Banking is the electronic virtual bank that provides the financial service for the individual client or user by means of internet.

In traditional system, every time user needs to go to bank and perform the necessary actions, which may not be so feasible all time. It may be a hard-hitting task for the users and the bankers too. I-banking system has been developed for overcoming certain problems of traditional banking system. I-banking captures all activities performed by different roles in real life banking which provides enhanced techniques for maintaining the required information up-to-date, which results is efficient. I-banking may include creating new user, viewing and updating user profile, registering accounts, balance enquiry, PIN request, change PIN, fund
transfer from one account to other in the same bank or different bank, generating account statement and administrating the user activities, enable and disabling user, view PIN request, supplying, blocking and unblocking PIN, viewing cheque book and stop payment request by administrator.

II. BACKGROUNDS

There are 47 scheduled banks [6] are running in Bangladesh. Currently every commercial bank provides ATM service to their customer by their own or share ATM. Only nine banks has sufficient machines but most of the bank share others bank ATM. For this purpose, they provide their customer VISA or Master card. Almost every bank support VISA network, some of Bank use OMNIBUS network. There are 160 million people in Bangladesh. Out of them 87% didn’t have a bank account and most are living in rural areas [7].

Half of the adult population in the country is unbanked in terms of deposit accounts held at banks. Adopting a multidimensional approach to financial inclusion such as using ATMs will make a significant difference in serving the unbanked population. This represented a huge untapped market for commercial banks. However, establishing bank branches across rural area is not an option because of the costs and of regulatory constraints of the central bank. They only grant only maximum 15 new branches in a year. ATM is a very useful service for every bank to their customer because it can drive its operation 24 hours 7 days. So customer can perform transaction all time. It can be situated at any rural area where a bank branch is not available. Without cash taka, transaction is not possible in most of area that why ATM service is very popular. It is increasing day by day. There is one alternative comes which is mobile banking, but it cannot reduce the necessity of ATM. It is not possible to give money all day night to customer by mobile banking: it is only possible by a machine. So mobile banking cash withdraw service is also related with ATM. Bangladesh Bank (BB) has opened 'national payment switch' aiming at facilitating faster economic growth through expansion of business activities across the country. The new payment system will help give a new momentum in the economy through expansion of business activities. The new payment system will be cost effective and transparent. Under the payment system, clients will be able to withdraw cash, inquire about their account balance and get mini statements from the ATM booths initially. Fifteen commercial banks and two third-party processors have already been selected on the basis of their necessary up gradation and customization of existing switching solution to join the NPSB.

There are different types of research have been done in different countries on mobile banking, internet banking, ATM etc. Possibilities, challenges and securities of mobile banking in different developing countries in Indian sub-content are researched [10]-[12]. Customer satisfaction is a big factor for internet or mobile banking. There are few banks in Bangladesh focused their customer more compared than general customers. Many researchers worked on banking behavior and customer satisfactions for their banking industries [13]-[17]. There are some factors [18] that affect the merchants’ intention to adopt online payment gateway are identified. The research trends of online banking from 1998 to 2006 are described [19]. Evaluation of online banking in Bangladesh by utilizing Data Envelopment Analysis (DEA) during 2001- 2006 was done. They found that the individual efficiency level of banks is increasing [20] day by day. There are a lot of softwares for using in bank. Reference [21] was shown the status of software application used in all banks in Bangladesh.

III. METHODOLOGY

Methodology is not a formula but set of practices. The study was conducted to identify the problems and prospects of National Payment Switch in Bangladesh (NPSB). Necessary data were collected from selected different banks and analyzed in terms of the objectives set for the study. This study was based on field level data. There were several methods of collecting this basic information. The data for this study were collected by the survey method. Survey is a research technique in which information is gathered from a sample of people by use of a questionnaire or interview. It is a method of data collection based on communication with a representative sample of individuals. The main reason is preferred to cost:

- Survey through sacrificing a certain details, enables quick investigation of a large number case.
- Survey entails much less cost
- Surveys provide quick, less expensive, and efficient

Moreover, we have collected data from bank’s websites and leaflets; we also collected data from Bangladesh Bank (central bank of Bangladesh)
IV. FINDINGS

A. Interbank ATM Transaction

It is a general practice to provide VISA card to customer for withdrawing money from any bank’s ATM. For example, if a customer of bank ‘A’ wants to withdraw money from an ATM of bank ‘B’ then the customer needs a VISA card. For this communication, VISA takes a charge. That’s why a lot of money is transferred to offshore as a charges. If NPS implemented then this kind of charge can be saved by host country and only those transaction goes to outside which is foreign bank card. So central bank can trace the total transaction history. It will be helpful for handling antimony laundering, money smuggling etc. This switch will be as a border or boundary for all switch of the country. If a policy by central bank declare (possibly it will be declare soon) that no switch can be directly communicate with others country switch, and this order can strictly monitor. Then it will be very helpful for country to prevent money smuggling. Otherwise it will be very hard to control of flow money from a country to another country.

B. National Payment Switch in Bangladesh

The main objective of NPSB is to create a common platform for payments originating from different delivery channels and existing shared switches in order to facilitate inter-bank electronic transactions. Figure 1 shows the architecture of NPS in Bangladesh where;

1. Bank X will send transaction request ISO message to NPSB.
2. NPSB will route the request ISO message to Bank Y channel.
3. Bank Y channel in NPSB will route the request ISO message to Bank Y.
4. Bank Y will authorize based on PAN and PIN and debit the respective account.
5. Bank Y will send response ISO message regarding the transaction bank to NPSB.
6. NPSB will forward the response ISO message to the Bank X channel.
7. Bank X channel will just forward the response ISO message to Bank X.
8. NPSB will create and send settlement file to BB Core Banking.
9. NPSB will create and send settlement file to Bank X.
10. NPSB will create and send settlement file to Bank Y.

The NPSB will facilitate expansion of the card-based payment networks substantially and promote e-commerce, m-commerce and paperless transaction throughout the country.

![Figure 1: Typical architecture NPS in Bangladesh](image-url)
C. ATM networks of different Banks

Bangladesh has 3,500 ATM booths across the country; more than one-third was installed by his company. Table 1 and 2 are shown the number of ATM, POS and charges of different banks in Bangladesh for using VISA or Master card. According to the Bangladesh Bank, the number of ATM per 0.1 million people increased from 0.09 in 2005 to 1.43 in 2010. Nearly 60 percent ATM established by DBBL [8]. A number of fees can be associated with a single transaction at a foreign ATM: an interchange fee (that the cardholder’s bank pays to the ATM owner); a foreign fee (that the cardholder pays to his own bank); and a direct fee (that the cardholder pays directly to the ATM owner) [9].

<table>
<thead>
<tr>
<th>Name of the Bank</th>
<th>No. of ATM(on 04/02/13)</th>
<th>No. of POS (on 04/02/13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dutch Bangla Bank Ltd</td>
<td>2299</td>
<td>4179</td>
</tr>
<tr>
<td>Islami Bank Bangladesh Ltd</td>
<td>253</td>
<td>Nil</td>
</tr>
<tr>
<td>Brac Bank Ltd</td>
<td>300 +</td>
<td>Acceptance at 8,500+ other bank POS terminals and 1,500+ BRAC Bank POS terminals</td>
</tr>
<tr>
<td>Prime Bank Ltd</td>
<td>137</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>AB Bank Ltd</td>
<td>222</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>One Bank Ltd</td>
<td>28</td>
<td>Nil</td>
</tr>
<tr>
<td>South East Bank Ltd</td>
<td>45(also supports 3000+ of DBBL, BRAC, and Omnibus)</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>Jamuna Bank Ltd</td>
<td>80(total 1500+ shared)</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>Sonali Bank Ltd</td>
<td>18,37 is under process, (supports: 1152, of which Q-Cash:170, DBBL:682, BRAC:300)</td>
<td>Support: 4700, of which Q-Cash:2200, DBBL:1000, BRAC:1500</td>
</tr>
<tr>
<td>Janata Bank Ltd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The City Bank</td>
<td>163(also supports 500+ Visa ATMs 24/7/365 all over the country)</td>
<td>Supports all Visa supported POS</td>
</tr>
<tr>
<td>NCCBL</td>
<td>47(also support all visa logo ATM and 147 DBBL ATM)</td>
<td>Supports 600 DBBL POS</td>
</tr>
<tr>
<td>Mutual Trust Bank Ltd</td>
<td>150</td>
<td>Not mentioned</td>
</tr>
</tbody>
</table>
TABLE 2: Charges FPR Visa card for different banks in Bangladesh

<table>
<thead>
<tr>
<th>Name of Bank</th>
<th>For Cash Withdrawal</th>
<th>For Balance Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Bank of Ceylon</td>
<td>ATMs that accept VISA Cards : BDT 12</td>
<td>ATMs that accept VISA Cards : BDT 2.5</td>
</tr>
<tr>
<td>DBBL</td>
<td>Own ATM: Free</td>
<td>In DBBL ATM: Free</td>
</tr>
<tr>
<td></td>
<td>ATM in the same Network or in the agreement with DBBL: BDT 10</td>
<td>In other Visa logo ATM: Free</td>
</tr>
<tr>
<td></td>
<td>ATM in another Network in BD: BDT 150 or 2.50% whichever is higher</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATM abroad: BDT 150 or 2.50% whichever is higher</td>
<td></td>
</tr>
<tr>
<td>NCC</td>
<td>In NCCBL ATM: Free</td>
<td>In NCCBL ATM: Free</td>
</tr>
<tr>
<td></td>
<td>In Q-Cash network ATM: BDT 10</td>
<td>In Omnibus/Brac Bank ATM: BDT 10</td>
</tr>
<tr>
<td></td>
<td>In Omnibus/Brac Bank ATM: BDT 20</td>
<td>In DBBL ATM: BDT 10</td>
</tr>
<tr>
<td></td>
<td>In other Visa logo ATM: BDT 125</td>
<td></td>
</tr>
<tr>
<td>BRAC</td>
<td>BDT: 2.5% or 150 (whichever is higher) + VAT</td>
<td>Not mentioned</td>
</tr>
<tr>
<td></td>
<td>USD: 3% or 5$ (whichever is higher) + VAT</td>
<td></td>
</tr>
<tr>
<td>Sonali bank</td>
<td>In 22 Q-Cash Member Banks = Tk 11.50</td>
<td>Not mentioned</td>
</tr>
<tr>
<td></td>
<td>In Omnibus Network (Brac Bank) = Tk 17.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dutch Bangla Bank = Tk 34.50</td>
<td></td>
</tr>
<tr>
<td>The City Bank</td>
<td>City Bank ATM – Free</td>
<td>Not mentioned</td>
</tr>
<tr>
<td></td>
<td>Q-Cash ATM – BDT 10</td>
<td></td>
</tr>
</tbody>
</table>

D. **Benefits of NPSB**

Necessary of NPS is not only for banking industries but also for strength of country economy and some of the facilities of NPS are given below:

- Transparency of the transactions in inter-bank will be increased under the new payment system.
- Customers will be able to use their cards to transact at any ATM and POS terminals under the payment system.
- This will reduce the cost of transaction as banks will not require paying network fee to the Visa or Master Card. Ultimately banks can reduce fees to be paid by the customers to the banks.
- After implementation of the NPSB, use of cash will be reduced significantly and thus the circulation of fake notes will be decreased.
- It will help to be more prudent in supervision and policy formulation.
- Foreign remittance will be increased due to easy transfer from foreign bank to local bank.
- International Internet Payment gateways like PayPal, Money booker can be integrated to local banks through NPS. Thus, young IT entrepreneurs and freelance professionals will be paid easily and foreign currency will be increased.
- E-commerce will be more popular for easy payment system.
Interbank ATM transactions and POS transaction will be easier and countrywide independent ATM network will be established. Customer can use any ATM booth or POS with little charge or free.

International ATM cards providers like VISA, MasterCard, Maestro, and American Express will be connected with NPS instead of connection banks switching. So charges to these card providers will be reduced and foreign currency will be saved.

Money transfer between local and foreign bank will be traced easily.

Flexible account access allows clients to access their accounts at their convenience [2].

E. Challenges

There are some challenges for developing sophisticated NPS are:

- **Power Issue**: Continuous power supply is one of the main challenges for ATM machines. Though Backup Power supply is available in all ATM booths, power interruption increases the payment disputes. Moreover backup power increases the cost of the ATM operations. Power related dispute mitigation is comparatively difficult.

- **Bandwidth problem of connection provider**: Bandwidth is a vital issue for transaction. Every transaction has a time limit for complete full cycle. For low bandwidth many request is time out.

- **Cash Jam**: cash jam occurs for the torn notes and low quality of bank notes. It requires handling physically to solve the cash jam problem.

- **Quality of Paper**: Common operational problems of ATMs are lying with shabby or torn bank notes, which increase the possibility of jams and reduce the availability of ATMs to the users.

- **Implementation and Maintenance cost and its outcomes**: For Implementation of NPS it will take a large Fund and it is proved that technology change rapidly. If the implementation cost does not withdraw by gathering its facility in time definitely it will be a lost project. This day is not so far when another sophisticated technology will knock at the door. So it is very needful to implement it in time as soon as possible and takes it full flavour.

- **Fake Note Detection**: If any fake note is found in inter bank transaction; it will be tougher to resolve the issue.

- **Dispute Management**: Any disputes found in inter bank transaction will be tougher than intra-bank transaction. Thus, the customer harassment may be increased.

- **24/7 support Facility**: Employee and support team will be needed to overcome any problem any time. Because transaction in future will be operated in 24 hours.

- **Public Awareness about E-commerce**: To make the maximum use of NPS and to make it profitable; it is required to make involvement of maximum mass people. Public awareness is required to use e-Payment, ATM cards, mobile banking and E-Commerce.

- **Security for online transaction**: Security at various stages of transaction still is a concern.

V. CONCLUSION

The adoption of ATM, POS, MB, I-banking in all banks for financial transaction keeps growing their up word trends and people have realized the convenience for using it. The research shows that customers are much comfortable with the electronic banking system including ATM, POS; Mobile Banking is just a segment out of various services of e-banking. The usage of NPS is increasing although security threat is ascending.

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