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Effective M-Commerce Models for Bill Payments: Bangladesh Perspective

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Abstract: M-commerce is one of the most important application domains for mobile devices, enabling users to perform commercial transaction at anytime and wherever they go. As a low cost wireless communication system we could use m-commerce for socio-economic development of Bangladesh. In this study, we proposed two m-commerce models for the development of m-commerce in Bangladesh, especially for the payment of electric bill, gas bill and water bill in an easy way. With the existing availability of the mobile phones and present socio-economic condition, our technique may be implemented for the payment in urban area and most of the rural area.

Key words: E-commerce, m-commerce, prepaid subscribe, postpaid subscriber, wireless communication and SMS-banking

INTRODUCTION

The advent of wireless and mobile technology has created both new opportunities and new challenges for the business community. The present state of m-commerce can be viewed as an extension of conventional Internet based e-commerce, which adds mobility to the end user and accommodates different end users' characteristics. However, if the predictions stating that mobile and wireless computing will dominate the Internet industry is the future (Vetter, 2001) materialized, the e-commerce and m-commerce could become a singular blended entry. M-commerce stands for conducting commercial transaction via a mobile telecommunications network using a Communication, Information and Payment (CIP) device such as a mobile phone or palmtop unit.

The potential impact of m-commerce is impressive. There are numerous applications are available for consumers, business organizations and government. These include deposit amount, withdraw amount, bill payment, cash in/out etc.

Moreover, all peoples of Bangladesh in urban area especially in metropolitan city area almost every house hold have to pay electricity bill, gas bill and water bill. To pay the bill a person from every house hold have to go to the bank, maintain a queue with a long time delay, then pay the bill amount, which is very time consuming and disgusting.

In this study we proposed two models of m-commerce that will eliminate the above encumbrance. This will save both valuable time and travel cost. Over the last few years, e-commerce and m-commerce are the most attractive areas among researchers. A lot of proposed models are already been devised to improve the e-commerce use in Bangladesh. Mahfuz *et al.* (2003) analyzed the problems faced by small and medium size enterprise in implementing e-commerce strategies. They proposed a STELLA model to solve the problems. (Imrul *et al.*, 2003) analyzed present infrastructures, policy and constrain of e-commerce and gave few suggestions for affordable, secured and profitable e-commerce policy in the future of Bangladesh. Later Geaur *et al.* (2004) proposed a novel frame work for developing an agent-mediation e-commerce environment for mobile shopper. Shahidul *et al.* (2004) investigated the m-commerce strategy for Bangladesh and proposed an m-commerce model. They also proposed an m-commerce model for electronic payment.

CHARACTERISTIC OF MOBILE COMMERCE

The mobile user does not necessarily need to use wireless interfaces and wireless interfaces do not

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necessarily support mobility (Upkar and Vetter, 2000). For example, a user can browse through a store with hand-hold device scanning items for inclusion into a wedding-registry database. After the information transferred into the database the user finishes the browsing and handover the device to the store clerks, in this case the user is mobile but no wireless network is used. On the other hand a user can use wireless network as part of his Internet connection sitting in his own house.

Moreover, mobility is on of the key factor of mobile network. Another key factor is the capability to keep track of the location. The technologies that satisfy these factors are progressing at an amazing pace in the form of Wireless Local Area Networks (WLANs), satellite based networks, Wireless Local Loops (WLL), mobile Internet Protocol (IP) and wireless Asynchronous Transfer Mode (ATM) networks (Upkar and Vetter, 2000). However, just the extension of basic cellular phone usage is a good enough indicator of the magnitude of wireless potential. Already, the cellular subscribers in Europe, the U.S. and Asia are far greater than the users of the Internet (ITU).

In addition to mobility and the ability to be tracked, m-commerce applications have the ability to achieve a high degree of personalization of the interaction with the customer. For example, as an addition to a web database, an m-commerce engine can contain a real time personalization engine that will contain the personal profile of the individual, the preferences location marks for home or office and secure online payment details (Patricia, 2001). There are various kinds of m-commerce models are available. Some of them are as follows:

Model with financial service provider: It is an SMS-based m-commerce technology that turns a cell phone into an electronic wallet. With this system subscribers can easily and conveniently send and receive cash and make payment through SMS. Services of this model are merchant payments, phone to phone fund transfer, domestic money transfer and international remittance etc. In this model the financial provider have partnership with various companies and banks for money transfers with merchant stores nationwide. The merchant process the order received from consumer and sends a digital bill to financial service provider. The financial service provider pay the bill to the merchant, the financial service provider then sends a monthly bill to consumer. The consumer pays the bill amount directly to service provider's account or through his own bank account.

Model without financial service provider: In this model no financial service providers exits. The consumers' account holder bank performs all financial transactions. All the facilities of first model are available here. The addition facility of this model is SMS-banking. The merchant processes the order that is received from customer and send a digital bill to the bank directly. The account holder bank of the customer directly pays the amount using SMS-banking.

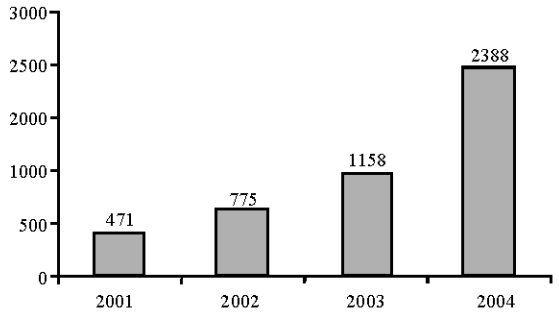

Fig. 1: Grameen phone subscribers

EXISTING MOBILE FACILITIES

The mobile telecommunication service providers in Bangladesh are Teletalk, Grameenphone, Aktel, Citycell and Banglalink. As all are competitors of each other, every provider trying for the better service for the subscribers and to attract new customers. Some new companies are coming soon.

The current demand of public mobile service is growing exponentially. Here we present a statistics that describe the growing rate and present demand of mobile services. The following Fig.1 shows the growing rate of Grameen Phone subscribers in Bangladesh (2004) (Fig. 1) The total numbers of mobile subscribers are 14 millions (The Daily prothom Alo, 2006).

PROPOSED M-COMMERCE MODELS

In the existing models, some of them need internet facility with all necessary requirements of e-commerce. All the existing models need financial service providers.

In the present socio-economic condition, the people of Bangladesh are not habituated with the e-commerce and m-commerce system. As a developing country, the earnings of average people are limited. The average people feel burden of the interest of the financial service provider. For this reason the m-commerce and e-commerce are not growing in the desired rate in Bangladesh.

In this study we proposed two models of m-commerce. In these models no financial service providers are needed. The average people can handle the system easily. The proposed models are especially

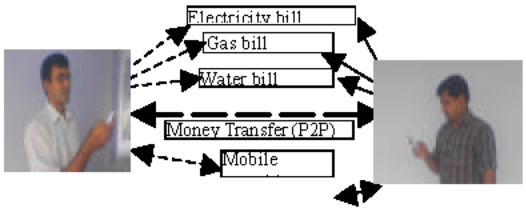

Fig. 2: Propsed first model

suitable for all kinds of house-hold bills payment. The system may also be used for all kinds of m-commerce transactions.

First model: Most of the mobile subscribers of Bangladesh are prepaid subscribers. Every prepaid subscriber has an account in the server of the mobile service provider. The subscribers recharge his account or spend from his account according to his need. In this model the only financial service provider is the prepaid account.

If a subscriber wants to pay bill from his mobile phone, he just send a message to the special number that is preserve by the mobile service provider for the bill recipient company. Before that the subscriber must be registered for the purpose. The message contains all information of the consumer and the bill. The information contains bill ID including area code, meter number, month, bill amount, due date of payment etc. When the server receives a message in the special number, it decodes all the information then process and finally put into a database. At the same time the server deducts the bill amount from the subscriber's prepaid account and sends a conformation message to the subscriber. If the bill amount is greater than prepaid account balance then server discards the message and reports the subscriber. The Fig. 2 shows the model.

The whole process is shown by a procedure as follows:

Procedure 1

1 Register for bill payment
2 Send a message with bill information
3 If the subscriber is a prepaid subscriber then proceed, else send a message "service is not available" and to
4 Decode the message and process the bill
5 New prepaid account balance of the subscriber = old balance-bill amount
6 Put all information into a database
7 Send confirmation message to the subscriber
8 Exit

Finally, the mobile service provider pays all bill amounts in the database to the bill recipient company on monthly basis.

One main problem of the process that the mobile service provider has no benefit although bill amount is deducted from the subscribers' prepaid account. To make the service provider benefited the bill recipient authority imposes a service charge to the consumer per bill basis or percentage basis. Then the 5th step of the procedure will be changed as follows:

- New prepaid account balance of the subscriber = old balance --- (bill amount + service charge)

The customer willingly agrees to pay some charge. Because at present system the customer has to pay travel cost and waste the valuable time.

The bill recipient company may also pay the service charge to the mobile service provider. It is an alternative solution. It will not burdensome to the recipient company because at present the company receives money from consumer through bank and the recipient company have to pay service charge to the bank.

One main problem in this model is that only prepaid subscribers get the facility. This problem is solved in second model.

Second model: In the first model only the prepaid users get the facilities of the m-commerce. But many of the mobile subscribers of Bangladesh are postpaid subscribers. For all registered subscribers (prepaid or postpaid) the provider maintains separate accounts, here we call m-account (other than the prepaid account of a prepaid subscriber) for m-commerce. The server can be used for all authorized service provider, i.e., the same facility can be used for all subscribers of different service provider. All m-payments other than the mobile phone call take place from the m-account. The subscribers should have a separate option to recharge the m-account using special kind of prepaid card. The new procedure is as follows:

Procedure 2

1 Register for bill payment
2 Send a message with bill information
3 For each subscriber do the following steps
4 Decode the message and process the bill
5 New m-account balance of the subscriber = old

balance-(bill amount + service charge)

6 Put all information into a database

7 Send confirm message to the subscriber

8 Exit.

In all of the above 2 models the users must provide some degree of freedom of canceling a paid bill within a limited time sending message form the mobile.

EXPERIMENTAL RESULTS

The existing bill payment system is an M/M/k queuing system. Consider the following definition:

λ = Average no. of arrivals per unit time

μ = Average no. of customers served per unit time

k = no of servers

$\rho = \frac{\lambda}{k\mu}$ = utilization

Average time an arrival spends in the system

$$W_s = \frac{\mu(\lambda/\mu)^k}{(k-1)!(k\mu-\lambda)^2} P_0 + \frac{1}{\mu}$$

$$\text{Where } P_0 = \left[\sum_{n=0}^{k-1} \frac{(k\rho)^n}{n!} + \frac{(kp)^k}{c!(1-\rho)}\right]^{-1}$$

Total cost involvement per bill payment in traditional system = customer traveling cost (to go and return with cost of time) + cost of spending time in the system.

Total cost involvement per bill payment using m-commerce = SMS charge + service charge + confirmation SMS charge.

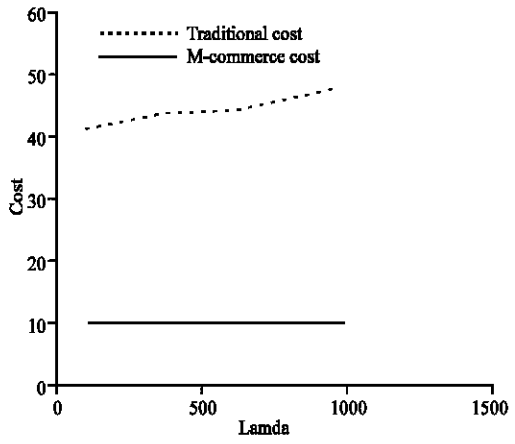

Fig. 3: Compartive study

Let us consider, customer travel cost = 40,
SMS charge = 2 and
Service charge per bill payment = 6

For m-commerce the total cost per bill payment is fixed and 10. For traditional bill payment the cost varies. Figure 3 shows the comparative study.

CONCLUSION

As a developing country, people do not get much more internet facility. But mobile facilities are almost available in our country. So, the urban as well as the rural people of Bangladesh can easily and fruitfully use the model.

There are certain success factors in Bangladesh e.g., a large number of mobile phone users including low income house-holds who are familiar with text message. Therefore mobile-commerce or m-commerce is good not only for rich people but every people

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