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Did Mobile Payments Make Difference in "Unbanked" Rural Communities? Empirical Evidence from the Electronic Money Transform System of the Bangladesh Post Office

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Did Mobile Payments Make Difference in "Unbanked" Rural Communities? Empirical Evidence from the Electronic Money Transform System of the Bangladesh Post Office

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Abstract: This study illustrates that a technologically less sophisticated e-government application can be successful as long as it has a proper fit of task and technology. A mobile payment service EMTS of the Bangladesh Post Office reported a dramatic increase in the number of electronic money orders issued and amount of money transferred through the system. As expected, EMTS shortened the money order delivery time from several days to a day. Commission earning from money order business has increased and became BPO's major source of earning in 2011. However, EMTS has limited success in assisting the unbanked citizens in rural areas because of a smaller number of post offices that support EMTS. Authors suggest that e-government be viewed as a collection of individual online information and services applications each of which is examined depending on task-technology fit.

Introduction

M-PESA in Kenya has been known as a most successful mobile financial service for its innovative way to introduce the e-money concept and marketing strategy to attract citizens who are difficult to access traditional financial services (i.e., bank and credit card services) in rural communities and thus want person-to-person remittance service (payment service) to send money from one place to the other, and who use many mobile phones in their life (Hughes and Lonie 2007; Mas and Ng'weno 2010). A total of 8.6 millions of M-PESA customers in 2009 cashed in and cashed out from 14,800 agents, deposited and withdrew USD 650 millions per month, transferred USD 320 millions or 10 percent of Kenyan GDP per month among individuals (Mas and Ng'weno 2010: 3)

Like Kenya, Bangladesh encountered the similar circumstance. About 75 percent of population lives in rural areas where bank branches are rarely available and about 60 percent of

population uses mobile phones (Bangladesh Bureau of Statistics 2010; International Telecommunication Union n.d.b). And there are about 10,000 post offices across the country that can be used as financial service agents. Taking this task environment into account, Bangladesh Post Office introduced the Electronic Money Transfer System (EMTS) in 2010 to provide a mobile payment service to the "unbanked" citizens with heavy mobile use. Both M-PESA and EMTS employed simple message service (SMS), a basic mobile service, to make mobile payment easy even for less educated citizens and do not require bank accounts.

These two cases raise two questions to e-government research. First, "Are existing e-government models are really valid and correct?" Coursey and Norris (2008) argue that e-government models are speculative and normative and then criticize their linear, stepwise, and progressive development of e-government. Existing e-government models implicitly suggest "more sophisticated technology and more integrated e-government, the better." M-PESA and EMTS indicate that such technology oriented assertion is not likely to work in reality. Second question is if EMTS really made difference in providing payment services to "unbanked" citizens in rural areas. While M-PESA is run by a commercial company Safaricom in market, EMTS is developed and run by a government Bangladesh Post Office under bureaucratic settings. It will be interesting and valuable to examine if the public mobile payment service was as successful in vitalizing rural communities as its commercial counterpart.

This paper first reviews e-government models and then argues for task-technology fit. The next section introduces Kenya's M-PESA and Bangladesh's Electronic Money Transfer Systems and explains potential of mobile payment services in rural communities. Then, a description of data and methods is followed by findings from data analysis. Finally, the paper concludes with discussion of major findings and suggestions.

E-Government Development Model and Task-Technology Fit

Baum and Di Maio (2000) propose the first e-government model with four phases, which serves as a prototype for other e-government stage models. The *presence* phase is the simplest level, where basic information is provided on government Web sites. Citizens on the *interaction* phase are able to conduct search, download documents, and email to government officials. *Transaction* moves forward to make entire transactions available online. On the most advanced *transformation* phase, service delivery is redefined and the relationship between governments and citizens is reshaped. As a phase goes up from presence to transformation, cost, complexity, time, and legal protection requirement also increase.

The United Nations (UN) and American Society for Public Administration (ASPA) (Ronaghan 2001: 8-14) suggest five stages of e-government development on the basis of e-government content and services available. The emerging presence and enhanced stages are similar to the presence phrase, while the final seamless and fully integrated services in a "unified package" are equivalent to the transformation phrase in Baum and Di Maio's (2000) model. Hiller and Bélanger's (2001: 14-16) five stages of e-government include information dissemination, two-way communication, transaction, integration (portals), and political participation. Based on two dimensions of complexity and integration, Layne and Lee (2001) suggest four stages among which last vertical and horizontal integration for "one-stop shopping is transformative. West (2004) begins with billboard stage, moves to partial-service-delivery and portal stages, and then reaches interactive democracy with public outreach, where e-government "move[s] beyond a service-delivery model to system-wide political transformation" (p.17).

Table 1. Stages and Phases of Electronic Government Development

Baum/Di Maio (2000)	UNPAN/ASPA (2001)	Layne/Lee (2001)	Hiller/Belanger (2001)	West (2004)
Presence	Emerging	Cataloguing	Information	Billboard

	Enhanced			
Interaction	Interactive		Two-way communication	Partial Service Delivery
Transaction	Transactional	Transaction	Transaction	Portal Stage
Transformation	Seamless/fully integrated	Vertical Integration Horizontal Integration	Integration	
			Participation	Interactive Democracy

E-government models predict linear, stepwise, and progressive development of e-government (Coursey and Norris 2008: 524-525), reflecting technological sophistication and integration of electronic services (Irani, Al-Sebi, and Elliman 2006). These models imply that e-government begins with a basic stage (e.g., Web presence and cataloguing) and moves stepwise through each higher stage one by one; a later stage is more technologically sophisticated and functionally integrated than previous one; and thus a higher stage is better than the lower one. Coursey and Norris (2008: 532-533) argue that existing e-government models are just normative and speculative "guesswork" that was created in a vacuum.

There is no rule that the interaction phase must be followed by transaction one, which is then followed by the transformative e-government, "e-government nirvana" of Coursey and Norris (2008). A stage does not replace other stage but oftentimes overlaps each other. Furthermore, an online service application in the interaction stage is not necessarily inferior to that in the transformation stage. Technological sophistication itself does not tell if an application is better than the other since each application has its own purposes and tasks. Simply cataloging static information may be as valuable as renewing vehicle registration and paying income tax as long as it can achieve its designated goals successfully. Conversely, it is not necessary to use cutting-edge technology or integrate all government functions across states in order for citizens to read latest news on a public event.

Speculative and normative e-government models do not consider so called task and technology fit because they view e-government as an integrated entity rather than as a collection of individual online information and services. Task-technology fit says that success or good performance is predicted by the degree of appropriate match between a task and a technology used to perform the task (Gebauer and Ginsburg 2009; Goodhur and Thompson 1995; Zigurs and Buckland 1998). This taxonomic or contingent approach catalogues characteristics of each task (e.g., complex versus less complex) and technology (e.g., one-way versus two-way, interactive versus transacting, and wired versus mobile) and then look for ideal profiles or "viable alignments of task and technology" that are likely to enhance performance (Zigurs and Buckland 1998: 314, 323). Chat room or online forum, for instance, requires interaction technology, while vehicle registration and renewal service needs transaction technology. These matches maximize performance and are cost-effective. Both online services may not be supported properly by "cataloguing" technology and do not need any transformative and integrating technology. E-government models appear to, at best, categorize technological characteristics (functionality and sophistication) in the task-technology fit.

Finally, existing e-government models are *service provider-oriented* as opposed to client-oriented. They suggest evolving e-government services stepwise with a motto of "more technology is better" (Coursey and Norris (2008: 523, 525) and without considering what citizens want. The fundamental question is not how to develop a technologically sophisticated e-government (application), but how e-government can satisfy clients (i.e., government employees and citizens) by assisting them to do their job efficiently and effectively.

E-government needs to ask such questions as "Are online information and services what citizens want to get (necessity)?" "Are we delivering right information and services (relevancy,

completeness, accuracy, and reliability) to the right audience (target) at the right time (timeliness) and in the right format (simplicity and easiness)?" "Can citizens access and use the information and services in a reasonable manner (availability, accessibility, and usability)?" and "Are the technologies used in online applications cost-effective (e.g., security and efficiency)?" Hence, e-government should be functional and content-driven for the general public rather than just fancy and technology-driven only for tech-savvies, who have enjoy watching such e-government benchmark races as Darrell West's global e-government rankings.

This paper introduces a case where a technologically less sophisticated e-government application in a developing country has provided public services (i.e., financial services). Like Kenya, many developing countries have a large portion of citizens, especially in rural areas, who do not have bank account and thus suffer from the lack of financial services, payment service specifically, who tend to be less networked and educated than those in urban areas, and who, however, have mobile market potential of using many mobile phones for their daily life (Pope et al. 2011: 97, 100). Market (bank industry) fails to provide such public services to disenfranchised segment of citizens. The case illustrates how government steps in this market failure circumstance and provides alternative payment service using money order from a client-oriented approach considering citizens needs and their task environment first.

Mobile Payment Services

Mobile financial services enable mobile device users to transfer money from one person to the other or pay for goods and services like ticketing and tax payment (mobile payment or mobile money transfer), and to check their account information, transfer money from one account to the other, or conduct other financial services (mobile banking) (Mallat, Rossi, Tuunainen 2004). Mobile phone-based payment or m-payment, which appears after online

payment system like PayPal, often employs short message service (SMS) and wireless application protocol (WAP) as in remote remittance, or proximity-based near field communication (NFC) method that requires merchant's point-of-sale terminal to read signals from mobile handset (Pope, et al. 2011: 88-90). These mobile payment and banking have security and convenience advantages over computer-based online transactions that require account-holder authentication by the payment systems (Herzberg 2003).

M-PESA in Kenya

Mobile payment finds its niche where banking services are limited and mobile penetration is high, and where low-value and high-frequency transaction is necessary (Hughes and Lonie 2007; Jack, Suri, and Townsend 2010; Smith 2008). Hughes and Lonie (2007: 65, 69) describe the niche segment as, "where the infrastructure is poorly developed and where very few people have or even want bank accounts. … We were specifically targeting the unbanked." and Jack et al. (2010: 85) as, "where networks of both fixed line communication and physical transportation infrastructure are often inadequate, unreliable, and dilapidated. While mobile phone calling rates remain high by world standards, …" Similarly, Pope et al. (2011: 97) identify "the market potential associated with India's vast unbanked population who do not have access to traditional financial services. However, a majority of the unbanked does rely heavily on mobile phone."

The most successful mobile financial service is Kenya's M-PESA ("Mobile-Cash") that is a joint product of the public-private partnership. The U.K. Department for International Development provided the Financial Deepening Challenge Fund (FDCF); Vodafone Group developed, host, and own the M-PESA system; local mobile operator Safaricom who runs the M-PESA; and central and commercial banks contributed to float balancing or liquidity management

(Hughes and Lonie 2007; Jact et al. 2010; Mas and Ng'weno 2010). This short message service (SMS)-based mobile banking and payment system enables individuals not only to deposit, withdraw, and send money using their mobile handsets but to pay for goods and services as well (Hughes and Lonie 2007: 78).

M-PESA introduced a concept of "e-money" that mirrors or exactly matches the real money in a bank account (Hughes and Lonie 2007: 69-70). A customer first needs to visit a Safaricom agent and then open his or her M-PESA account. When a customer deposits cash, an agent deposits the cash into M-PESA's bank account and buy "e-money float"; M-PESA (Safaricom) transfers the e-money to customer's M-PESA account that is linked to his or her mobile phone; Then the customer transfers his or her e-money to recipient's account using his or her mobile phone; M-PESA transfers the e-money from recipient's account to the designated agent's one; The recipient visits the designated agent and requests withdrawal of cash; the agent withdraws cash from M-PESA's bank account and pays to the recipient; and then the agent reduce its e-money float (Hughes and Lonie 2007: 71, 75). The M-PESA account are free but senders (not recipient) pay transaction fee depending on the type of transaction and the amount of money to be transferred when e-money is cashed out (Hughes and Lonie 2007: 77; Jack et al. 2007: 86).

M-PESA needed many retail outlets across Kenya where customers deposit cash into or withdraw from their M-PESA account. M-PESA uses broad and dense network of Safaricom's airtime resellers or dealers as its agents (Hughes and Lonie 2007: 70; Jact et al. 2007:84). These M-PESA agents receive commission from Safaricom through master agents (i.e., head office and aggregators). Each agent, who is required to operate in at least three locations, is coordinated by head offices, agent aggregators, or super agents (bank branches) who manage cash and e-money

balance or make such transactions (Jact et al. 2007: 91-95; Mas and Ng'weno 2010: 8-14). The number of M-PESA agents has increased from 355 in April 2007 to 10 thousands in 2009 and 28 thousands in 2011, respectively, as the number of customers has jumped from 53 thousands to 6.5 millions and 14 millions during the same periods.[1]

As of November 2009, M-PESA has 8.6 millions of registered customers who can cash in and cash out from 14,800 agents (Mas and Ng'weno 2010: 3). USD 650 millions were deposits and withdrew per month and USD 320 millions or 10 percent of Kenyan GDP were transferred among individuals (person-to-person transfer) per month (*Ibid*). Safaricom earned USD 7 millions of monthly revenue. Mas and Ng'weno (2010) attribute M-PESA's success to building trust through branding, building an extensive channel of agents to achieve network effects, and building favorable customer pricing and agent commission structure. However, M-PESA was not built on a cutting-edge technology but on quite basic ("certainly not the sexiest") mobile technology (i.e., SMS) to meet customers' demands (Huges and Lonie 2007: 66).[2]

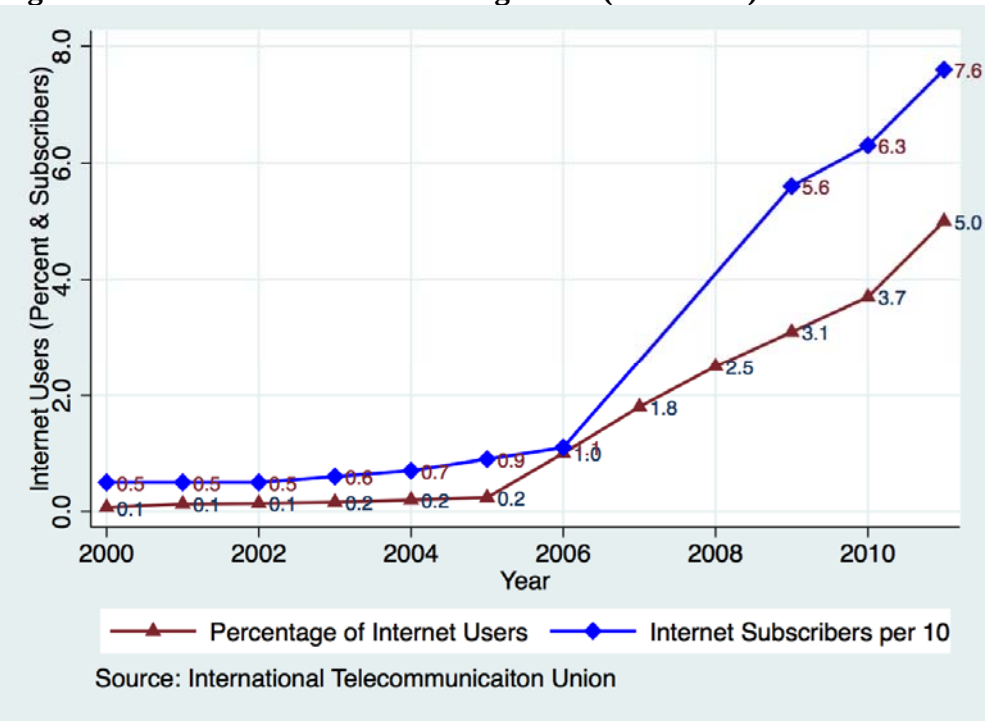
Demographical and Technological Environment in Bangladesh

Bangladesh administrative units consist of 7 divisions, 64 Zilas, 6 city corporations, 309 municipalities and 483 Upazilas as of 2010 (Bangladesh Bureau of Statistics 2011:31). The total population was estimated at 139.3 millions (112. 5 millions or 81% in rural areas) and the number of households estimated was 31.7 millions (25.5 or 80% in rural areas) in 2011 (BBS 2012: 19). Statistical metropolitan areas of Dhaka, Chittagong, Khulna, and Rajshahi account for 76.4 percent of population and 51.7 percent of households (pp.20-21). Rural areas account for 75 percent (38.3 millions) of total employed population of 51 million in 2009 (BBS 2010: 6).

[1] Retrieved from http://www.safaricom.co.ke/images/Downloads/Personal/M-PESA/m-pesa_statistics_-_2.pdf.
[2] Similar mobile payment services are available in Uganda, Tanzania, Philippine, and other countries.

While the rate of listening to radio was 3.92 percent and does not show any big difference between urban and rural areas (4.13% and 3.88%, respectively), the rates of watching TV, reading daily newspaper, and using the Internet show big difference between urban and rural areas (BBS 2012: 26). The 39.07 percent of rural residents watched TV (68.92% in urban areas) and only 12.74 percent read daily newspapers (25.8% in urban areas). Among 1.5 millions of Internet users, 33 percent (.5 millions) live in rural areas and only .45 percent of rural residents used the Internet (3.88 % in urban areas) (*Ibid*). The literacy rate of citizens aged 7 and above was 56.1 percent in 2011, showing significant difference between urban and rural areas (70.0% versus 52.8) (p. xiii).

Figure 1. Internet Penetration in Bangladesh (2000-2011)



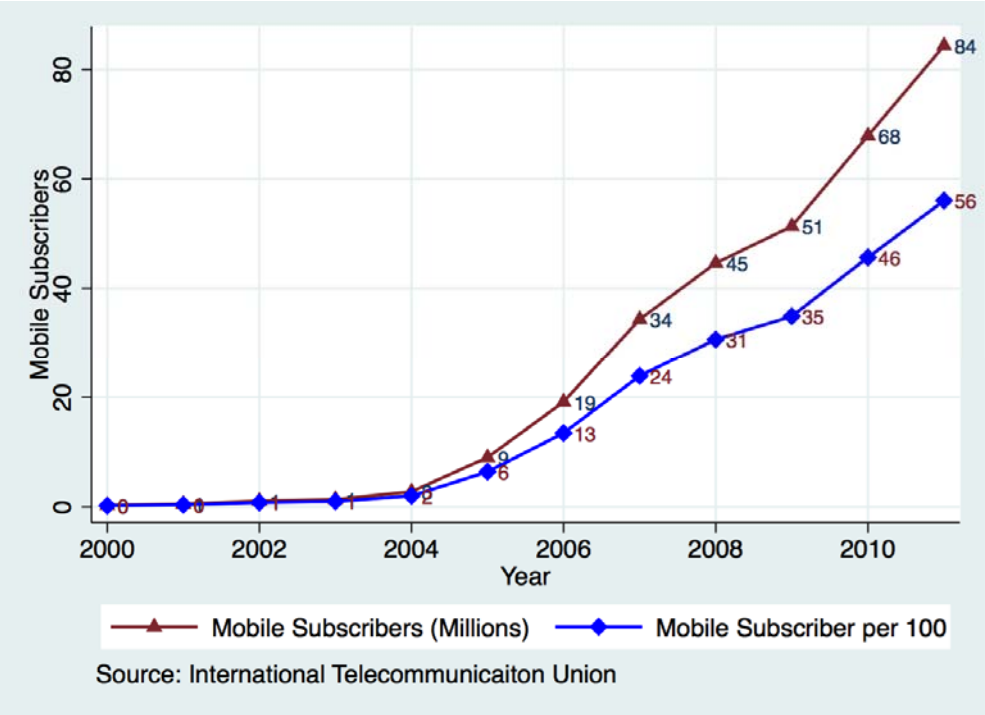
Bangladesh has remained far behind in the Internet and e-government (Bhuiyan 2011: 57-58), being ranked 113th in World Economic Forum's Networked Readiness Index and 150th in United Nations' E-government Development Index in 2012. The Internet penetration rate, as

shown in Figure 2, stayed below 1 percent before 2006 but showed a sharp increase from 1.1 percent in 2006 to 5 percent in 2011 (ITU n.d.a).[3] Similarly, the number of Internet subscribers per 100 inhabitants increases from below .03 before 2006 to .1 and .76 during the same period (Ibid). One reason for this phenomenon is because electricity is not sufficiently provided in rural areas (even in some places in the capital city). A big digital inequality in Internet use (.45% versus 3.88%) implies that citizens in rural communities are extremely difficult to access the Internet and use Web-based online banking services.

However, Bangladesh has relatively higher mobile phone penetration rate with relatively smaller difference between urban and rural areas. Mobile phone subscribers increased from 19 millions in 2006 to 84 millions in 2011 (ITU n.d.b) and about 60 percent of the total 139 million population are using mobile phone as of 2011 (Figure 3). Similarly, the number of mobile subscribers per 100 inhabitants increased from 13 and 56 during the same period (Ibid).

Figure 2. Mobile Phone Penetration in Bangladesh (2000-2011)

[3] 2007-2008 data are not available.



Money Order in the Bangladesh Post Office

Bangladesh Post Office is the largest government organization that has 37 thousands employees in 9,886 post offices. There are 322 (3%) Extra Departmental Sub Offices (EDSO) in sub-districts and 8,138 (82%) Extra Departmental Branch Offices (EDBO) in rural areas (Islam 2012: 14).[4] This disproportional distribution implies the potential role of post office in public service delivery especially in disenfranchised rural communities.

Money order service enables citizens to transfer money. This payment service has played an important role especially in rural areas where bank branches are not available. According to Bangladesh Bank, 4,426 (57%) out of a total of 7,772 bank branches of 47 banks are located in rural areas, while 86 percent (8,460) of post offices are scattered into extreme rural areas without any bank branch (Islam 2012: 16). Many employees work in garment industry and they send

[4] Each EDSO and EDBO has three non-government employees who work four hours per day to get monthly honorarium from government.

their salaries to their family members who live in rural areas. Majority of rural residents do not have any bank account due to difficulty to access bank branches. Hence, money order becomes a popular and important remittance method for those who want to send money to rural communities.

In order to send money using the ordinary money order, 1) a customer visits a post office and fills out a money order form requiring information about sender, receiver, and amount of money; 2) a operator receives money and send the money order form to the designated post office by mail, which takes 2-7 days to reach; 3) the cash post office passes the form over to a disburse post office; and 4) a postman in the disburse post office delivers the money to the receiver (Islam 2012: 9-10). This remittance, although popular in rural communities, has suffered from two chronic problems (pp.11-12). First, it takes a long time to complete transaction largely due to time spent for money order form reaching the cash post office. Second, ordinary money order does not have a systematic way to keep records and monitor transactions. Some employees were punished for withdrawing money with fake money order they issued and misappropriating money to be delivered to recipients. In some cases, a money order was paid more than once. In order to figure out these problems, the Bangladesh Post Office introduced electronic money order systems.

Electronic Money Transfer System

The Electronic Money Transfer System (EMTS) is a short message service (SMS)-based money transfer system that enables mobile phone users to send money (electronic money order) up to BDT 50,000 at post offices without relying on formal banking systems.

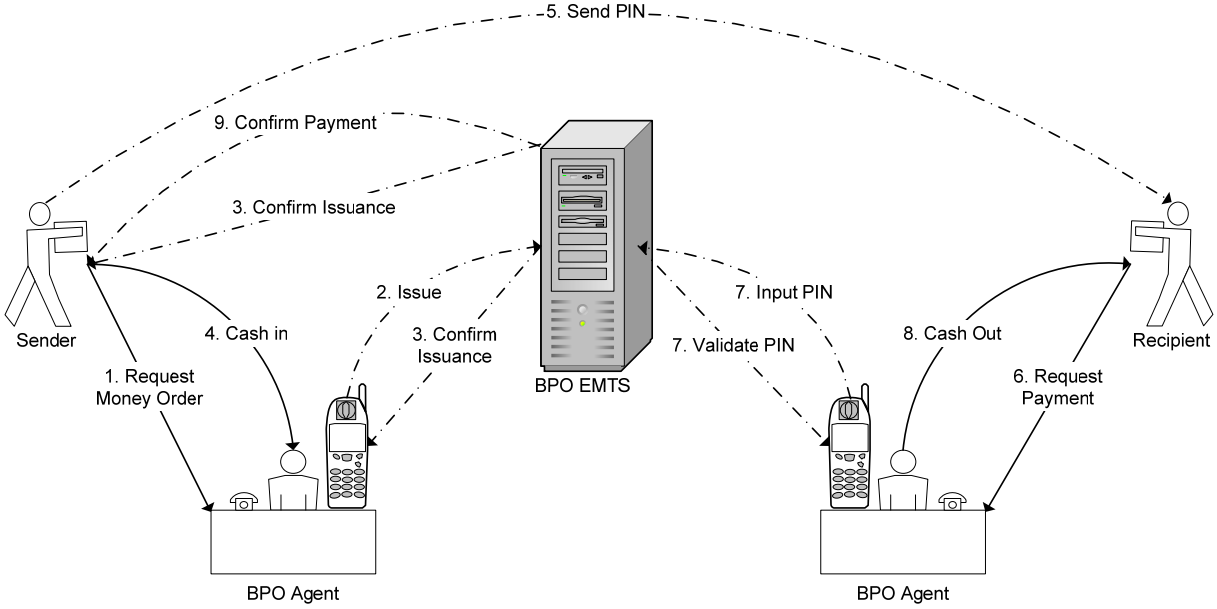
This mobile payment system was developed by the public-private partnership of Bangladesh Post Office, software consultants, and a private mobile phone operator (Banglalink).[5] Post office and private consultants jointly built the system, while Banglalink provided mobile phones to all employees in post offices including EDSO and EDBO. Post office staffers were trained to feel comfortable working with the EMTS and a support team of engineers, programmers, system analysts, and others at the call center helped customers use EMTS smoothly (Isalm 2012: 13-14). Prime Minister inaugurated the EMTS on March 2010 that was opened to the public two months later. The EMTS started its' service in 100 post offices in urban areas on May 2010 and expended service areas to 2,225 post offices as of January 2012 (Islam 2012: 2). Although more demanded in rural areas, EMTS began with metropolitan areas and started providing services to rural communities later. EMTS won the mBillionth Award South Asia in m-business and commerce/banking in 2011 (http://mbillionth.in/).

In order to send money using the EMTS, 1) a customer visits a post office with EMTS available and provides sender and receiver's names, mobile phone numbers, addresses, amount of money to be sent in the money order form; 2) an operator issues electronic money order using the EMTS phone or Web; 3) the EMTS server sends a SMS message to the post office (EMTS mobile phone) and sender (mobile phone) to confirm the issuance of the money order; 4) the customer pay money to the operator; 5) the sender let the receiver know the amount of money and associated PIN using voice call or SMS; 6) the receiver visits a nearest post office and fill out the payment form; 7) a postal operator inputs the PIN to the EMTS server to check if the person is the right receiver; 8) the operator pays money to the receiver and then marks the money

[5] The server machine is Dell Power EDGE R710 running Microsoft Windows 2008 Server, Microsoft SQL server, and Apache HTTP Server (Islam 2012: 13).

order paid; 9) Finally, the EMTS server sends a SMS message of confirming disbursement to the sender (Islam 2012: 15-17). This process is illustrated in Figure 3.

Figure 3. Work Flow of the Electronic Money Transfer System



Agents (i.e., extra departmental sub post master and extra department agent) in EDSO and EDBO get commission up to 10,000 Taka for issuing and disbursing electronic money order depending on amount of money transferred (Table 2).[6] This incentive structure, grounded on the Circular Number 120 in 2011 and Ministry of Finance's order, motivates non-government employees in EDSO and EDBO to work more than four hours even after their office hour. After receiving a SMS message from the sender, for example, a receiver may visit agent's resident (as opposed to his office) any time and then ask him disbursement; The agent is eager to help his customer get the money disbursed.

Table 2: Commissions for Electronic Money Order (BDT)

[6] In order to transfer BDT 2,000, for instance, a sender needs to pay BDT 37 that is partitioned into 30 for commissions and 7 for electronics charge. Bangladesh Post Office will get 21 of commission and agent will receive 9 for issuing and disbursing money order.

Amount of Money Transferred	Commission for BPO	Commission for Agent		Commission Total	Charge for Electronics	Total Cost
		Issuance	Disbursement			
100 ~ 1,000	14	2	4	20	7	27
1,001 ~ 2,000	21	3	6	30	7	37
2,001 ~ 3,000	28	4	8	40	7	47
3,001 ~ 4,000	35	5	10	50	7	57
4,001 ~ 5,000	42	5	13	60	7	67
5,001 ~ 6,000	49	5	16	70	7	77
6,001 ~ 7,000	56	5	19	80	7	87
7,001 ~ 8,000	63	5	22	90	7	97
8,001 ~ 9,000	70	5	25	100	7	107
9,001 ~ 10,000	77	5	28	110	7	117

Source: Bangladesh Post Office (2012)

Data and Methods

This research analyzes two sets of data. First, the information of ordinary money order delivery was also obtained but its time span is a day for Dhaka GPO or five working days for Head Post Office (Islam 2012: 19). Second, the transaction data were drawn from the EMTS server in early 2012 with a time span of 22 months from its inception (Ibid). EMTS data include such attributes (variables) as sender's cellular phone number, address, amount of money to be sent, data and time when the electronic money order was issued, six digits of branch post office code where the money order was issued and disbursed, receiver's phone number, address, delivery data and time, amount of commission involved in the transaction, and delivery status (delivered, in process, and canceled). Phone numbers were used to differentiate individual payments from bulk or volume money orders used by universities and army. Service delivery time is calculated from dates and times when the money order was issued and delivered.

In order for comparison, branch offices were classified into four groups using six digit post office codes: metropolitan, district, sub-district, and rural areas (Islam 2012: 20-22). Metropolitan includes Dhaka whose six digit codes begin with 1000, 1100, and 1201-1236, Chittagong with 4000, 4100 and 4201-4226, Rajshahi with (6000, 6100, and 6201-6207), and

Khulna with 9000, 9100, and 9201-9210) each of which has four General Post Offices (GPO). There are 64 districts whose first two digits are 13 through 94 and remaining four digits are all zeros (0000). Barisal, Sylhet, and Rangpur are also classified into districts. All head post offices are located in districts. Sub-districts consist of about 500 Upazila Post Offices (UPO) and Sub Post Office (SPO). UPO has 12 through 94 in the first two digits; 1 through 9 in the third digit; and all zeros in the last three digits (e.g., 157000). SPO is similar to UPO but has 0 in the third digit or 1 through 9 in the fourth digit (e.g., 150700). Upazila Post Office and Sub Post Office supervise their branches in rural areas: Extra Departmental Sub Office (EDSO) and Extra Departmental Branch Office (EDBO). EDSO and EDBO have the same four digits as their supervisor UPO and SPO, but their last two digits range from 01 to 19.

In order to avoid unintended misunderstanding, two types of odd transactions were excluded for their exceptional behaviors when calculating service delivery time. There were bulk payments made by firms and universities who received money from or pay to a large number of individual customers. Their delivery time tend to be longer than individuals' transactions, exaggerating the overall service delivery time. The other type of odd observations is money order that was not delivered for a long time for some reasons. Assuming most of money orders are delivered within a month, this paper analyzes EMTS data up to December 2011.

Findings

The numbers of money orders issued and delivered per month are very similar, ranging from 2 thousands in its start-up to 140-153 thousands in January 2011 and 344-376 thousands in December 2011 (Figure 4).[7] On average 242 thousands money orders per month or 8 thousands

[7] There were 6,017 money orders issued for universities and army since March 2011. Due to relative small portion, this volume issuance does not influence the overall figures significantly.

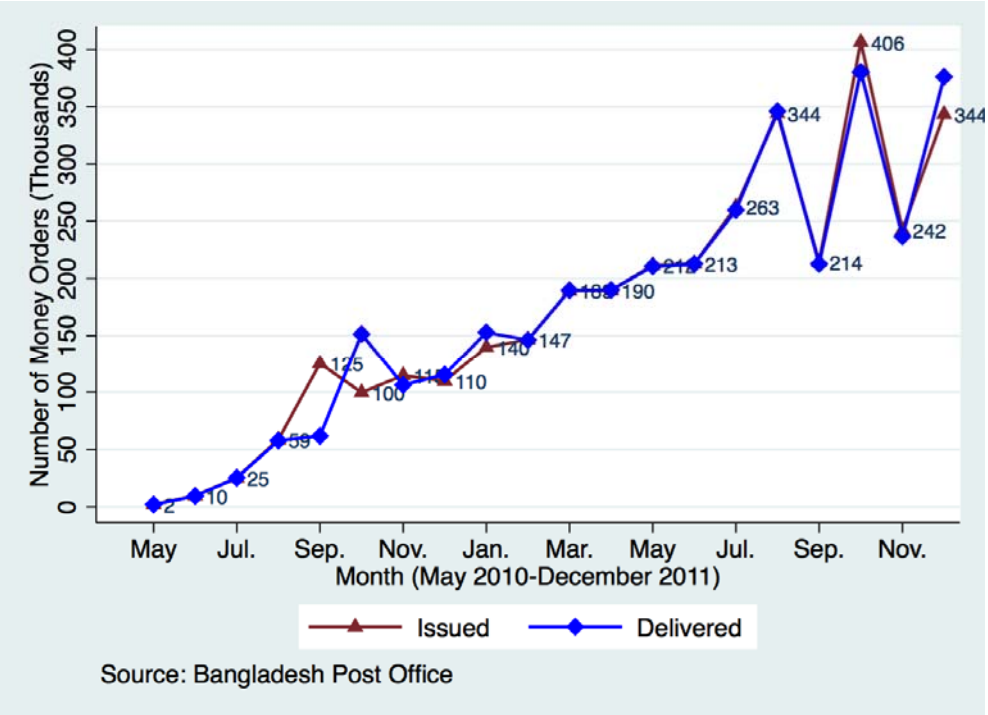
per day were issued and delivered during 2011. This monthly figure is about 2.5 times large than that of ordinary money order during the same period (Islam 2012: 26).

Table 3. The Number of Money Orders Transferred by Four Areas (2011)

	Metropolitan	District	Sub-district	Rural	Total
Metropolitan	11,069	98,649	465,654	21,111	596,483
	(1.86%)	(16.5%)	(78.1%)	(3.5%)	(20.6%)
District	51,843	101,848	312,608	17,798	484,097
	(10.7%)	(21.0%)	(64.6%)	(3.7%)	(16.7%)
Sub-district	224,685	346,275	1,037,219	75,817	1,683,996
	(13.3%)	(20.6%)	(61.6%)	(4.5%)	(58.0)
Rural	15,237	25,777	87,966	7,739	136,719
	(11.1%)	(18.9%)	(64.3%)	(5.6%)	(4.7%)
Total	302,834	572,549	1,903,447	122,465	2,901,295
	(10.4%)	(19.7%)	(65.6%)	(4.2%)	

Most money orders were issued in sub-district (1.7 millions per year, 140 thousands per month, or 58% of the annual total 2.9 millions) followed by metropolitan (21%) and district (17%) areas during 2011, whereas only 11 thousands per month (4.7%) were sent from rural areas (Table 3). Similarly, 66 percent (159 thousands per month) of money orders were delivered to sub-district areas followed by district (20%), metropolitan (10%), and rural (10 thousands per month or 4%) areas. This result shows that money orders are delivered largely to district and sub-district areas rather than to rural areas, indicating a limited impact of EMTS on rural communities.

Figure 4. The Number of Money Orders Issued and Delivered



The monthly amount of money transferred by electronic money orders has increased from .1 billion Takas in May 2010 to 6 billions in January 2011 and 18 billions in October of the year despite fluctuation after September 2011 (Figure 5). Sub-district accounts for about 58 percent (7 billions) of issuance and 63 percent (8 billions) of delivery during 2011, while rural areas hold only less than 5 percent (Table 4). The amount of value per money order is larger in metropolitan and district areas than sub-district and rural area. Most amount of money was transferred within each area, but cross-area transfer occurs largely from metropolitan to district and sub-district areas.

Figure 5. Amount of Money Transferred (Billion Taka)

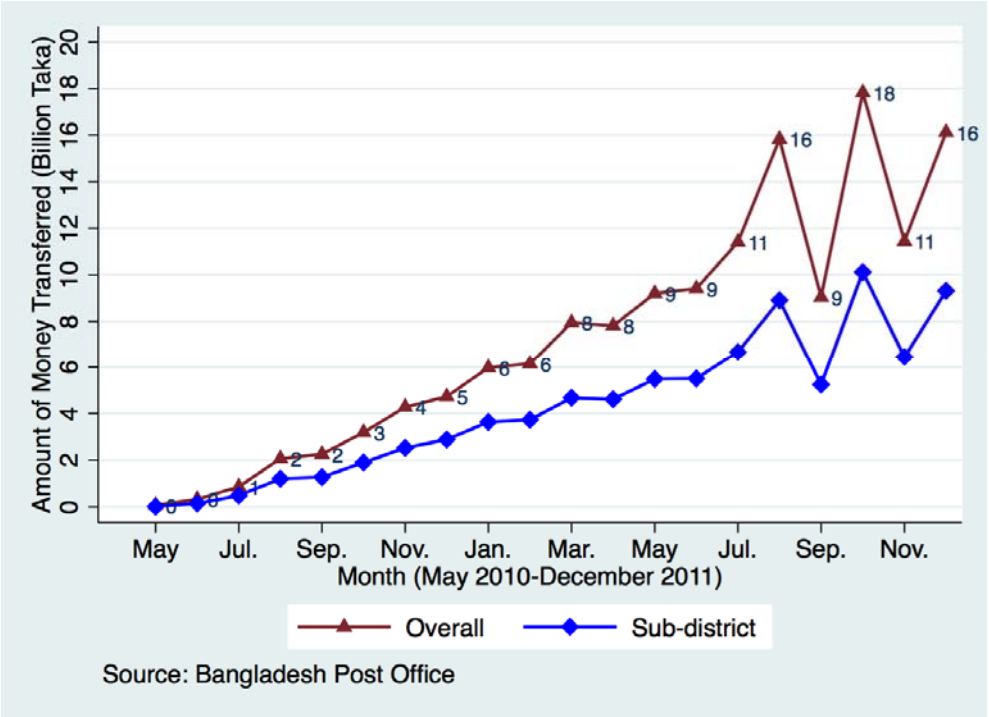


Table 4. Amount of Money Transferred by Four Areas (Taka in 2011)

	Metropolitan	District	Sub-district	Rural	Total
Metropolitan	47M	487M	2,010M	82M	2,626M
	(4,197)	(4,931)	(4,308)	(3,903)	(4,395)
District	264M	491M	1,360M	69M	2,184M
	(5,097)	(4,819)	(4,339)	(3,900)	(4,505)
Sub-district	1,200M	1,640M	4,320M	280M	7,440M
	(5,340)	(4,736)	(4,161)	(3,696)	(4,415)
Rural	69M	116M	366M	28.5M	579M
	(4,522)	(4,482)	(4,160)	(3,684)	(4,234)
Total	1,579M	2,734M	8,056M	460M	12,830M
	(5,215)	(4,773)	(4,226)	(3,761)	(4,417)

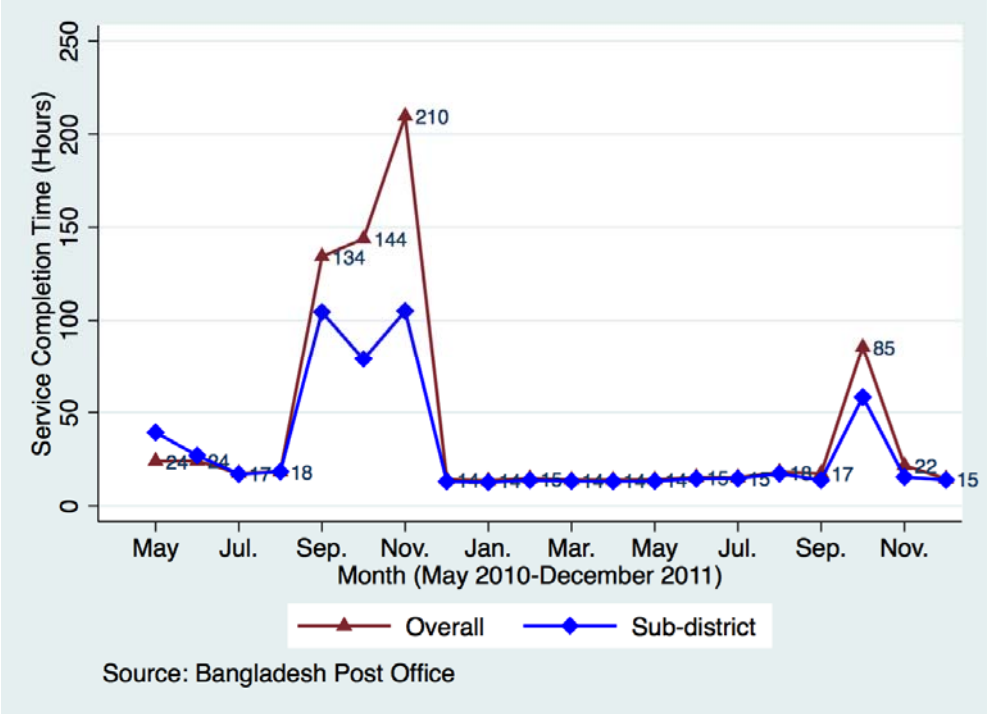
* Amount of money per money order in parentheses

The average money order delivery time (service completion time) for 20 months was 38.6 hours and 25.6 hours for only 12 months in 2011 (Figure 6 and Table 5).[8] When ignoring the peak in October, the average delivery time becomes only about 15 hours during 2011 (Figure 6). Some odd behaviors in data from September through November 2010 pulled up the service

[8] This calculation includes only individual money orders (as opposed to volume issuance) that have delivered.

completion time by 13 hours. EMTS has shorter service completion time than ordinary money order (26 hours versus about 100 hours) (Islam 2012: 26).

Figure 6. Service Completion Time (Money Order Delivery Time)



Metropolitan and sub-district areas have shorter delivery time (28.9 and 20.3 hours) than those of district and rural areas (38.4 and 31.7 hours) during 2011 (Table 5). It is surprising that service completion time in highly populated metropolitan areas was not shorter than other area and that the district area reported the longest delivery time (38 hours and 69 hours for money orders issued and delivered in districts, respectively). When excluding odd money orders that took longer than 2 weeks, money order delivery time becomes quite stables to have shortest 12.9 hours for money orders issued in sub-district and longest 17.6 in rural areas.[9]

Table 5. Average Service Completion Time by Areas (Hours in 2011)

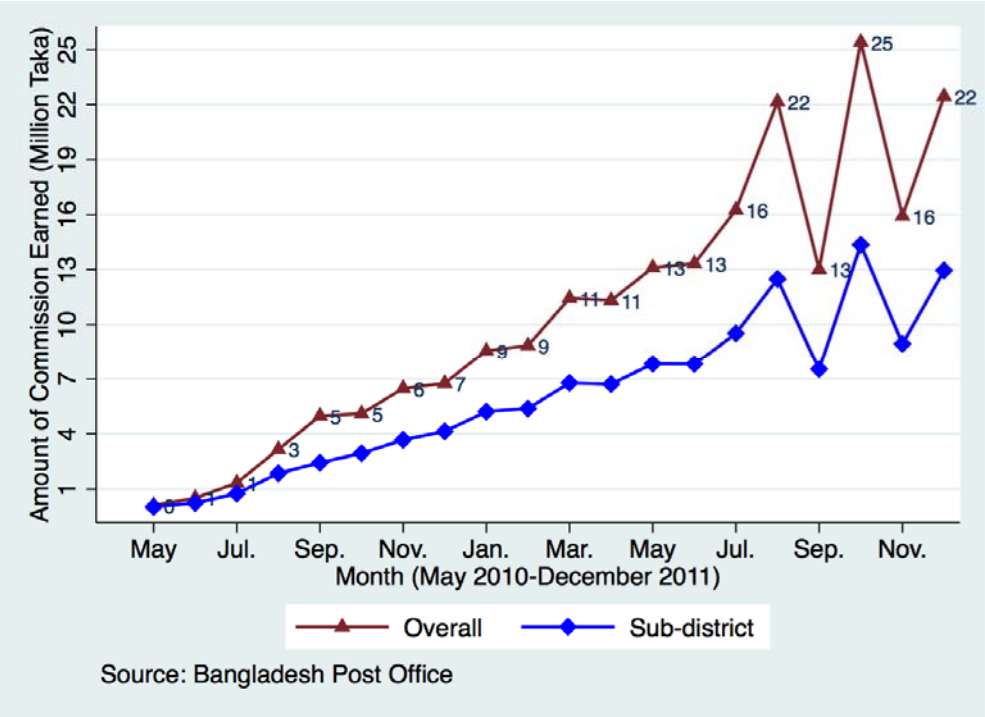
[9] The server is supposed to lock money orders that were not disbursed within two weeks. However, EMTS data show that some money orders took very long time (e.g., 8,571 hours or about an year) and become influential odd observations.

	Metropolitan	District	Sub-district	Rural	Overall
Metropolitan	53.2	96.0	14.7	13.8	28.9
	(19.5)	(15.0)	(14.0)	(12.4)	(14.2)
District	16.4	126.7	14.8	13.2	38.4
	(13.5)	(20.2)	(14.1)	(11.8)	(15.1)
Sub-district	13.3	43.5	14.8	12.0	20.3
	(11.8)	(11.7)	(13.6)	(11.2)	(12.9)
Rural	16.9	87.3	18.8	21.3	31.7
	(15.2)	(19.2)	(17.8)	(14.5)	(17.6)
Overall	15.4	69.2	15.0	13.1	25.6
	(12.5)	14.0	(14.0)	(11.7)	(13.8)

* Service completion time without money orders taking longer than 2 in parentheses

Like Figure 5 above, the amount of commission earned by BPO has increased from.1 million Takas in May 2010 to 9 million in January 2011 and 25 million in October of that year (Figure 7). The earning from EMTS during 2011 was 182 million Takas that was equivalent to BPO's overall earning (Islam 2012: 33-34). Most commission earning came from sub-district (105 millions or 58%), followed by metropolitan (37), district (31), and rural (8 millions) areas during 2011. Average commission that customers paid per money order fairly flat, ranging from 60 to 63 Takas, depending on areas that money orders were issued. Again rural communities do not appear to play a major role in EMTS.

Figure 7. Amount of Commission Earned by Bangladesh Post Office (Million Taka)



Discussion and Conclusion

Bangladesh Post Office (BPO) introduced the Electronic Money Transfer System (EMTS) as an effort for "Vision 2021" in order to make money order payment easier and faster. This EMTS was supposed to be most useful and effective in sub-district and rural areas where bank branches are rarely located, but many residents (about 60%) are using mobile phones in Bangladesh.

The analysis shows a dramatic increase in the number of electronic money orders issued and amount of money transferred through EMTS (Figure 4 and 5). Both number of issuance and amount of money transferred have outnumbered corresponding figures of ordinary money orders since the end of 2000 (Islam 2012: 26, 30). As expected, EMTS shortened the money order delivery time from several days (100 hours) to a day (26 hours) although some odd transactions were observed in the EMTS data (Figure 6). Commission earning from money order business has increased and became BPO's major source of earning in 2011 (Figure 7).

However, the impact of EMTS on rural communities appears to be limited. About 60 percent of the money order issuance and delivery, amount of money, and amount of commission earning came from sub-district and rural areas accounted for less then 5 percent in these three dimensions (Table 3, 4, and 5). While most money orders were issued and disbursed within areas, cross-area transfer occurred largely from metropolitan and district to sub-district (Table 4). Unlike in Kenya's M-PESA, there are not many citizens yet in EMTS who are working in rural areas and send their salaries to their family members who live in sub-district or rural areas. One plausible explanation is that EMTS is not fully implemented across country yet and not many post offices in rural areas support EMTS.

Nevertheless this EMTS case has great implications for e-government policy and management. Unlike M-PESA, EMTS is a mobile-government application (as opposed to m-commerce application) that is initiated by government unit, Bangladesh Post Office, under the public-private partnership framework (Table 6). EMTS was intended to renovate existing money order service, figure out chronic problems, fix market failure in financial services, and eventually provide public services to disenfranchised citizens despite the limited success yet.

Table 6. Comparison Between M-PESA and EMTS

	Kenya's M-PESA (Since March 2007)	Bangladesh's EMTS (Since May 2010)
Service Provider	Mobile operator, Safaricom (Private)	Bangladesh Post Office (Public)
Financial Services	Mobile payment and banking	Mobile payment
Role of Banks	Engaged for liquidity	N/A
Media	E-money	Electronic money order
Technology	Short message service (SMS)	Short message service (SMS)
Connectivity	Safari agents (Private)	Post offices (Public)
liquidity	Head office, aggregator, super agent	Post office
Incentive	Commission	Commission
Payer	Sender	Sender and recipient

Second, more importantly, both M-PESA and EMTS employed relative basic mobile technology to provide services to unbanked citizens who want financial services and show a

higher mobile penetration rate. This “promising market for mobile payment” (Pope et al. 2011: 100) illustrates how task-technology fit works in e-government project. Both applications appear to be designed and developed on basis of prior customer’s needs or task environment (Hughes and Lonie 2007: 80). M-PESA and EMTS identified specific needs (payments of the unbanked and many accessible outlets or agents) and chose a basic mobile technology, SMS (as opposed to highly sophisticated technology) (Table 6). EMTS shows that existing e-government models are speculative without any linkage to empirical evidence, and that such normative models are *technology-oriented* (as opposed to client-oriented) without consideration of task-technology fit.

Current EMTS data appear to have some problems as briefly mentioned in the analysis section. Data do not have valid phone numbers and delivery date/time in some money order transactions. Suspicious were money orders that took long time to be disbursed or were never disbursed. These odd money orders influenced calculation of service completion time significantly. Also the data do not include information about how EMTS reduced misbehaviors such as misappropriation. Since the date include money orders during only first 20 months, it would be better to examine longer time span before making a decisive conclusion.

Finally, I suggest that e-government be viewed as a collection of individual public information and service applications rather than a single entity. Each application has its own purposes and target audience, and thus requires a proper fit between task and technology. It appears to be more productive to investigate the impact of an individual e-government application on its designated goal (e.g., efficiency, responsiveness, and openness) rather than play with e-government benchmark rankings.

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