



Working Paper 2006-02

Payment Systems Department

December 2006

Strategy and system to facilitate e-payment services (ITMX):

Thailand's recent experiences and the role of central bank

By Sayan Pariwat & Rungsun Hataiseree

Keywords: payment strategy, electronic-payment services, Thailand national ITMX, efficient payment systems, infrastructure

EXECUTIVE SUMMARY

This paper deals with Thailand's recent experiences in the move towards a greater use of electronic-payment (e-payment) with special emphasis on the role of the Bank of Thailand (BOT) in fostering such a move towards a more effective and efficient payment system. Evidences provided in the paper tend to suggest that there have been an increasing use of e-payment in Thailand over the past decade or so, as reflected in major part to the substantial increase in financial transactions via the BOT's payment services. As pointed out, every form of e-payment services operated by the BOT has shown a remarkably upward trend over the past decade, particularly those of the BAHTNET and SMART systems. Significant increase in the use of other e-payment channels offered by commercial banks and non-banks can also be seen for the cases of credit/debit cards, credit transfer, direct debit, payment channels related to mobile phones, and internet.

Empirical results in the paper also suggest that the degree of e-payments penetration in Thailand tends to be in a better position when compared with the peer-group in ASEAN. However, Thailand seems to lag behind in the e-payments usage when compared with the best practice-group countries (e.g. Finland, Denmark, the USA, the UK, and Australia).

Also included is a discussion of the BOT role in fostering the move towards a more effective and efficient payment system, including in particular its roles as facilitator and catalyst in fostering the establishment of certain types of e-payment infrastructure of the so-called BAHTNET, SMART, ECS, and the like. The BOT's role in supporting the setting up of newly created payment gateway in the form of Thailand national ITMX has been viewed as a milestone development in the move toward the reaching of a more perfectly e-payment stage.

The evidence in this paper points out certain factors deemed to be contributed to successful establishment of the ITMX system in the case of Thailand. Particular importance in this regard can be attributed to the role played by the central bank in putting in place a host of proper "National E-Payment Strategies" and the BOT's utmost collaboration with the country's "Payment Industrial Body" and the banking industry.

The paper also sheds light on certain types of the ITMX features which tend to contribute to a promising success of the system at time when the system opens up its actual operation in April 2007. Of particular importance in this regard include the provision of a wide coverage of payment services with multiple channels and the existing of a variety of appropriate mechanisms for risk control. The paper concludes with a brief discussion of some key success factors behind the establishment of ITMX, together with the discussion of certain issues that might have exerted some important influences on the future shape of the country's ITMX system in general and "National E-Payment Strategy" in particular.

Strategy and system to facilitate e-payment services (ITMX):

Thailand's recent experiences and the role of central bank

Table of contents

EXECUTIVE SUMMARY	i
Table of figures	ii
1. Introduction	1
2. Existing e-payment systems in Thailand and some international comparison	3
2.1 Existing e-payment services in Thailand	3
2.2 Some international comparison of the degree of e-payment penetration	9
3. BOT's role to support the e-payment and the establishment of Thailand national ITMX	12
3.1 BOT strategy for supporting e-payment development	12
3.2 The development of e-payment gateway and the nature of national ITMX	16
4. Salient features and current status of the national ITMX	18
4.1 Some salient features of Thailand national ITMX	18
4.2 Current status of the national ITMX	23
5. Concluding Remarks	25
References	28

Table of figures

Figure 1	Existing e-payment services in Thailand	3
Figure 2	Payment System operated by the BOT	4
Figure 3.1	BOT's e-payment services (Value of transactions)	5
Figure 3.2	BOT's e-payment services (Volume of transactions)	5
Figure 4	Financial transactions via payment services operated by the BOT	5
Figure 5	Distribution of the number of cashless payments instrument in Thailand	6
Figure 6	Value and volume of transactions through ORFT service	7
Figure 7	ATM Transaction Volume	8
Figure 8	E-payment usage across countries (2004)	9
Figure 9	Value of card payments relative to GDP	10
Figure 10	Countries sort by level of penetration of Mobile phone and Internet use	11
Figure 11	BOT's Payment Road Map for 2004	13
Figure 12	Collaboration of BOT & Industry Payment Body	14
Figure 13	Setting up Payment System Infrastructure and Standards (Agenda 4)	14
Figure 14.1-14.2	ITMX Conceptual Model	16
Figure 15	Successful innovations of Thailand National ITMX : some crucial criteria	19
Figure 16	ITMX Functional Requirements	20
Figure 17	Settlement Risk Management	21
Figure 18	Tentative Time Plan for ITMX implementation	23
Figure 19	Cross border ATM Linkages with ITMX	24
Figure 20	Likely factors affecting future direct of the ITMX and National E-Payment Strategy	26

**Strategy and system to facilitate e-payment services (ITMX):
Thailand's recent experiences and the role of central bank***

*Sayan Pariwat
Rungsun Hataiseree*

1. Introduction

The use of electronic payments (e-payments) has spread rapidly in recent years thank to technological innovation and falling costs in computing and telecommunications. The spread of e-payment usage has been more varied across countries, due partly to differences among countries in factors such as the quality of the regulatory frameworks and the readiness of the telecommunications infrastructure. New payment services based on the internet and mobile phones tend to have been increasingly offered in most advanced economies. The use of e-payments for making retail payments has become much more common in advanced countries with extensive network of telecommunication infrastructure. Nevertheless, the pace for such e-payment applications appears to be less clear in the case of some emerging economies.

As has been argued in many circles, Thailand's financial and infrastructure development has reached a point where e-commerce and e-payment systems are both technologically feasible and are required to remain globally competitive. It has been increasingly agreed that there is an increasing need to respond to rapidly changing market conditions and to use newly developed technologies to enable both e-commerce in general, and e-payments in particular. Setting up the new e-payment gateway of the so-called Thailand national ITMX (Inter-bank Transaction Management and Exchange) in July 2005 represents a promising starting point in this regard. The establishment of ITMX has been viewed as a milestone development in the move toward the reaching of a more perfectly e-payment stage in this country, as it reflects a full recognition of the need to put in place a common infrastructure able to attract a critical mass of business using the newly created platform with high standard.

This paper deals with Thailand's recent experiences in the move towards a greater usage of e-payment services and the role of the Bank of Thailand (BOT) in fostering such a move towards a more effective and efficient payment system. In particular, we would like to share our experiences with respect to the setting up of the country's e-payment gateway in the form of national ITMX. The exposition will be carried out against the background of our "National E-Payment Strategy", especially

* This is a revised version of the paper presented at "the 5th Meeting of Directors of Payment and Settlement Systems in the Asia-Pacific Economies" in Bangkok, Thailand (30 November-2 December 2006). The authors are respectively Senior Director and Payment Systems Expert of Bank of Thailand's Payment Systems Department. The authors wish to thank Khun Jitra Boonsiri for providing excellent research assistance. The views expressed herewith are those of the authors and do not necessarily reflect those of the Bank of Thailand with which the authors are associated.

on the issues related to the role of the BOT in supporting the establishment of national ITMX. The remainder of this document is structured as follows.

We start, in section 2, with a succinct description of the existing e-payment systems in Thailand, with particular reference to e-payment systems operated by the BOT and the ORFT (Online Retail Funds Transfer) service. We then move on to discuss the relative degree of e-payment penetration between countries in the best-practice group and those in the peer group. Section 3 turns to the discussion of BOT's role in supporting e-payment services and the establishment of the national ITMX system. We then move on to the clarification of the nature of ITMX and the rationales behind the setting up of the national ITMX.

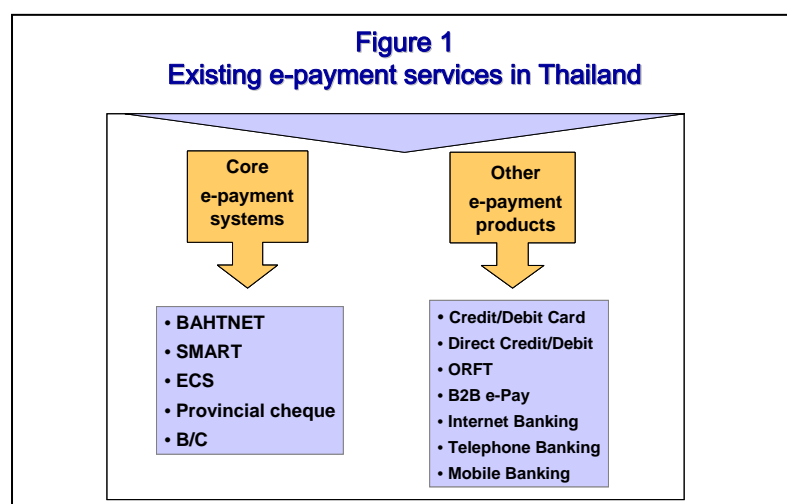
In section 4, we discuss certain salient features and the current status of the national ITMX. As will be discussed later, ITMX system has been carefully designed in order to address a host of important issues, ranging from a wide coverage of business services to the existing of efficient mechanisms to address the risks involved. We conclude, in Section 5, with a brief discussion of some key success factors behind the establishment of ITMX, together with the discussion of certain issues that might have exerted some important influences on the future shape of the country's ITMX system in general and "National E-Payment Strategy" in particular. Particular importance in this regard, as will be discussed in subsequent sections, can be attributed to the role played by the central bank and the BOT's utmost collaboration with the country's "Payment Industrial Body".

2. Existing e-payment services in Thailand and some international comparison

2.1 Existing e-payment services in Thailand

Like in many other countries, payment systems in Thailand have undergone significant changes for over two decades. Significant changes in this regard include the move toward the increasing reliance on the use of newly developed technologies to enable both e-commerce and e-payments. On the part of the BOT, it has over the last decade introduced the e-payment systems as the basis for financial transactions and financial settlements.

As one can see from Figure 1, the current e-payment systems in Thailand can be broadly grouped into two main categories: (i) core e-payment systems and (ii) other e-payment products. Basically, the core e-payment systems refer to the systems operating by the BOT. The systems include, for instance, BAHTNET¹ (Bank of Thailand Automated High-value Transfer Network), SMART (System for Managing Automated Retail Funds Transfer), and ECS (Electronic Cheque Clearing System). For other e-payment products, they refer to the systems operating by the private sector, including Credit/debit cards, Direct Credit/Debit, ORFT (Online Retail Funds Transfer), Internet banking, Telephone banking, and Mobile banking.



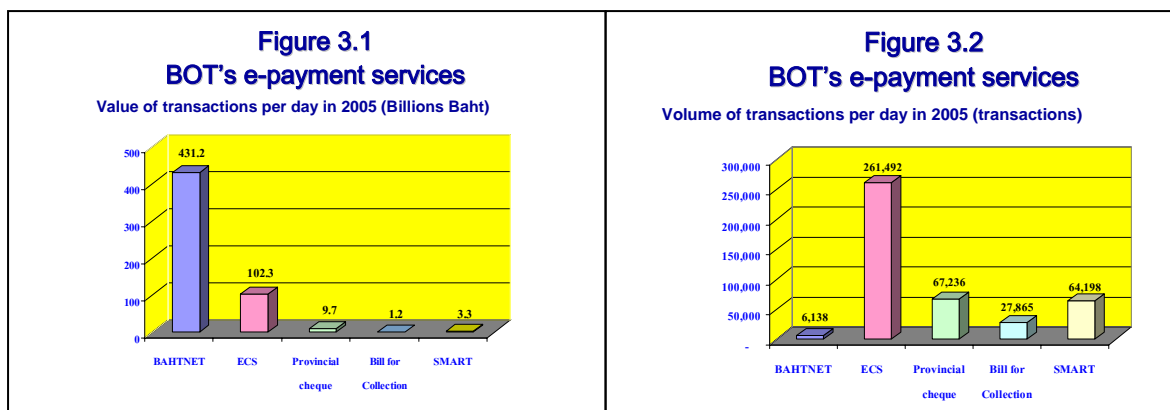
¹ For more detailed description and analysis related to BAHTNET system, interesting readers are advised to read the following documents: (i) Sayan Pariwat and Rungsun Hataiseree (2004), “**The Evolution of Large-value Funds Transfer System in Thailand: Causes, Changes, and Challenges**”, Payment Systems Working Paper, April. and (ii) Sayan Pariwat and Rungsun Hataiseree (2003), “**Managing payment and settlement system reform: a Thai perspective**”, Payment Systems Working Paper, September. (www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)

Figure 2 provides more detailed information with respect to the nature of e-payment system operated by the BOT as well as the year the respective system has been put into operation. As one can see from the figure, in the year 1995, 1996 and 1997, the BOT launched three major types of payment systems of BAHTNET, ECS and SMART systems, respectively. The primary objective is to accommodate the national economic expansion through the more convenient, quick and safe systems. In particular, BAHTNET system has been specifically designed for handling large-value financial transactions on the RTGS (real-time gross settlement) basis.

Figure 2		
Payment Systems operated by the BOT		
Type of services	Major features	Period in operation
<ul style="list-style-type: none"> • BAHTNET (Bank of Thailand Automated High-value Transfer Network) 	A large-value electronic funds transfer system (inter-bank, Third Party) with RTGS transactions	May 24, 1995
<ul style="list-style-type: none"> • ECS (Electronic Cheque Clearing System) 	The system for electronic data presentment and clearing of inter-bank cheques in Bangkok and the metropolitan areas	July 16, 1996
<ul style="list-style-type: none"> • SMART (System for Managing Automated Retail funds Transfer) 	A small-value inter-bank funds transfer system	January 16, 1997
<ul style="list-style-type: none"> • Provincial Cheque Clearing 	The system for collecting inter-bank cheques within the province	September 15, 1997
<ul style="list-style-type: none"> • B/C (Bill for Collection) 	The system for collecting inter-bank cheques across the provinces	February 14, 2003

Source: Compiled from data base of BOT's Payment Systems Department.

It should be noted in this connection that e-payment transactions through the BAHTNET system has gained the highest share, followed by ECS. As is clearly seen from Figure 3.1, the value of transaction per day via BAHTNET and ECS accounted for around 431.2 and 102.3 billions baht in 2005, respectively. However, such a sequence of ordering appeared to have changed significantly in case one makes comparison by basing on the volume of transaction per day. In the later case, as shown in Figure 3.2, financial transactions through ECS gained the highest share when compared with other channels.



Source: Calculated from the data base of the BOT's Payment Systems Department

For a longer perspective, financial transactions via the BAHTNET system have, over the past decade or so, recorded the highest share when compared with some other types of the BOT's payment services. As characterized from Figure 4, the daily average value of transactions via the BAHTNET system accounted for around 78.7 percent of the total value of transactions through payment services channels operated by the BOT. Second in importance in this regard is related to the financial transactions via ECS, accounting for about 18.7 percent.

Figure 4
Financial transactions via payment services operated by the BOT

(Billion Baht per day)

Systems	2000	2001	2002	2003	2004	2005
BAHTNET	260.39 (70.39)	288.21 (80.69)	273.86 (77.87)	316.36 (77.68)	302.00 (74.43)	431.16 (78.73)
ECS	102.56 (27.73)	61.71 (17.28)	69.33 (19.71)	81.00 (19.89)	92.00 (22.68)	102.30 (18.68)
SMART	0.49 (0.13)	0.75 (0.21)	1.12 (0.32)	1.60 (0.39)	2.30 (0.57)	3.29 (0.60)
Provincial Cheque	6.47 (1.75)	6.52 (1.83)	7.40 (2.10)	7.80 (1.92)	8.30 (2.05)	9.68 (1.77)
B/C	- -	- -	- -	0.50 (0.12)	1.10 (0.27)	1.24 (0.23)
Total	369.91 (100.00)	357.20 (100.00)	351.70 (100.00)	407.26 (100.00)	405.70 (100.00)	547.66 (100.00)

Source: Calculated from the data base of BOT's Payment Systems Department

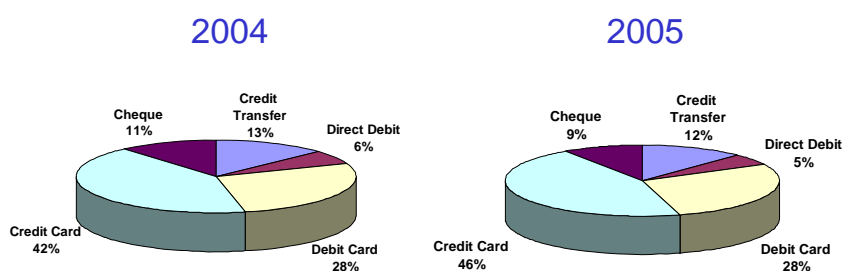
Apart from e-payment channels provided by the BOT, there have been significant increases in the use of other e-payment channels offered by commercial banks and non-bank companies. Chief among these include (i) credit cards, (ii) debit cards, (iii) payment channels related to mobile phones and internet. According to the

internal figures collected by the Payment Systems Department of the BOT, the total number of cashless transactions amounted to nearly 1 billion in 2005, 22.3 % higher than those in the previous year. Of this total amount, e-payment transactions accounted for around 90% of the total number of cashless transactions in 2005. Cheque transactions, the major form of paper-based payment instruments, accounted for the remaining 10%, equivalent to around 114.5 million in 2005.

Figure 5 demonstrates the breakdown of different payment methods in the total number of transactions in the last two years. As is evident from the figure, credit card has the leading position of instrument share. It accounted for around 46 percent of the total transactions of the cashless payments in 2005. Second importance in this regard is debit card, representing around 28 percent of the total.

It is interesting to note that the share of credit card in the total cashless payment tended to have increased from around 42 percent in 2004 to 46 percent in 2005. This rise in the credit card share appeared to come up with the expense from certain types of payment instruments, especially cheque (reducing from 11% to 9%) and credit transfer (reducing from 13% to 12%). As will be discussed in more details in subsequent sections, some of these new types of payment services have experienced a reasonably high growth rate over the past many years. This has, to some certain extent, contributed to a wide spread usage of e-payment in Thailand when compared with some of its peer-group countries in the SEACEN region.

Figure 5
Distribution of the number of
cashless payment instruments in Thailand

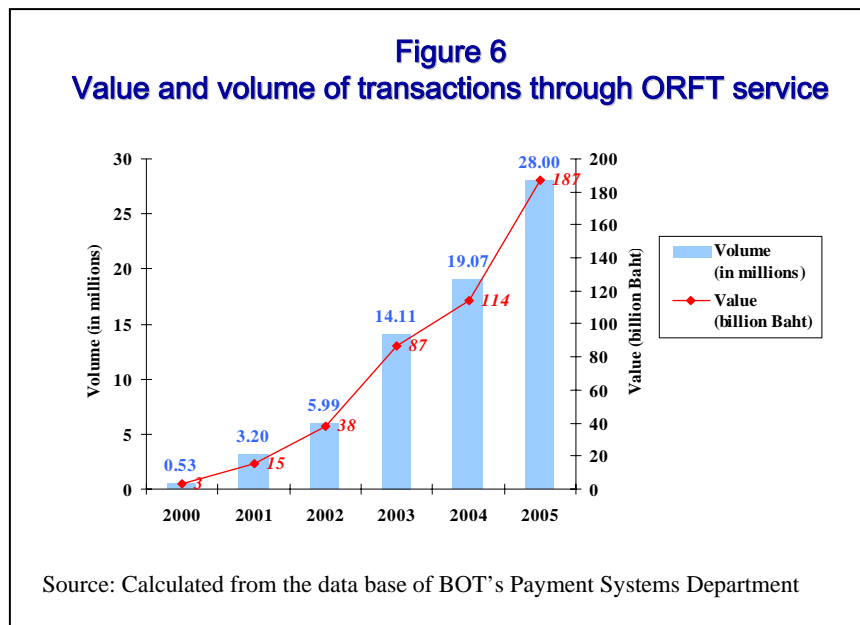


Source: Calculated from the data base of BOT's Payment Systems Department

It is perhaps useful in this connection to shed some light on Thailand's experience in the use of ORFT service (Online Retail Funds Transfer) via ATM networks. Basically, ORFT is a further development of the ATM system in which inter-bank retail funds transfer can be performed through an inter-bank network using the ATM platform. It is developed by the Thai Bankers' Association (TBA) on advice

of the BOT. ORFT enables a customer of one commercial bank to make retail-level funds transfer to a transferee at another bank on an online basis.

Since the inception in 2000, ORFT has grown remarkably both in term of volume and value. As one can see from Figure 6, the ORFT transaction volume in 2005 was 28 million transactions, increasing from the year 2004 by 46.8 percent. Total value was 187 billion Baht in 2005, increasing from last year by 64.0 percent.

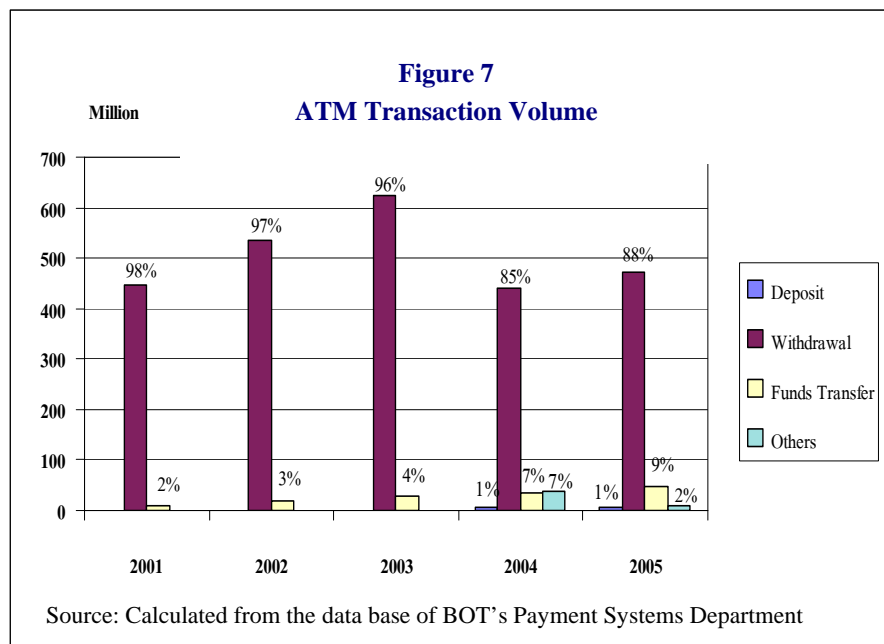


More importantly, since December 2005, ORFT service has been enhanced to cover inter-bank funds transfer service via commercial banks' counters. The customers can use this service at any branches of the participating banks all over the country. The maximum amount of funds transfer is capped at 50,000 Baht per transaction. This service is easy, quick and safe because the transactions will be confirmed by sending banks, which will provide immediate effects on the funds receiving accounts through the online real-time system.

Interesting enough, the volume of ORFT transactions via commercial banks' counters has grown more than 10 folds between December 2005 and May 2006. Specifically, the volume showed an increase from an approximate amount of 18,638 transactions in December 2005 to 202,908 transactions in May 2006. The new services seem to suit for customers' needs, as reflected in the substantial increase in the volume of transactions. From December 2006 onwards, the maximum amount per transaction will be extended from 50,000 Baht to 100,000 Baht.

A closer look at data on ATM transactions also provides very interesting observations in relation to the ORFT service. As one can see from Figure 7, although more than 85% of ATM transactions were in the form of cash withdrawal, the ratio of

retail funds transfer via ATM machines has been on a consistently upward trend, rising from around 2% in 2001 to 9% in 2005. Such an increase in the ratio seems to suggest a possibility of higher electronic funds transfer via ATM cards. It is important to point out in this connection that inter-bank funds transfer (Online Retail Fund Transfer-ORFT) has been viewed as the most important component of retail funds transfer via ATM networks. The remainder components are internal funds transfer and funds transfer for good and service payment via ATM machines, including bill payments and filling of funds for prepaid cell phone systems.



2.2 Some international comparison of the degree of e-payment penetration

In this connection, it would be interesting to shed some light on the degree of importance of e-payment usage among countries which have different stages of economic and payment systems developments. As pointed in Hataiseree and Boonsiri (2006), using e-payment person as an indicator for making comparison, the degree of

e-payment penetration of Thailand seems to be lag far behind when compared with best-practice countries like the USA, Finland, Denmark, and Australia.

However, as is evident from Figure 8, Thailand tends to perform reasonably well when compared with its peer-group countries such as Malaysia, Indonesia. As one can see, using e-payment per person as the benchmark for cross- country comparison, the average volume of e-payment per person for Thailand appeared to be around 11 transactions per person per year. This tended to be relatively higher when compared with the corresponding figures in some of the ASEAN countries.²

Figure 8
E-payment usage across countries (2004)

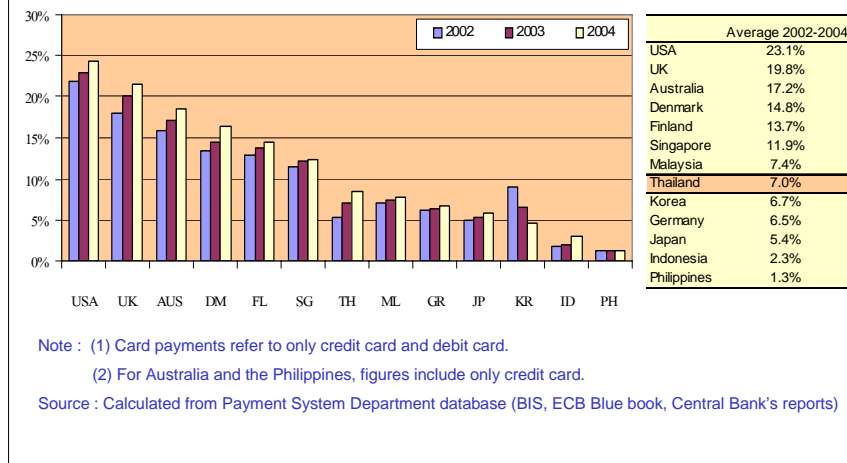
	Cash&Coin/ GDP	Checks per person	E-Payments per person*
Finland	8.9%	0.2	349.7 (1)
Australia	3.7%	26.5	228.2 (2)
Germany	6.2%	1.4	204.0 (3)
Denmark	3.6%	5.6	194.6 (4)
USA	6.4%	118.5	179.3 (5)
UK	3.4%	35.1	178.3 (6)
Korea	3.2%	26.7	118.9 (7)
Singapore	8.4%	20.5	85.9 (8)
Japan	16.3%	1.2	29.7 (9)
Thailand	11.3%	1.4	10.9 (10)
Malaysia	6.4%	6.9	6.4 (11)
Indonesia	5.5%	0.3	0.4 (12)

Note : * Includes credit/debit cards, credit transfer/direct debits and EFTPOS.
 No EFTPOS data for other countries, except Finland, Australia, Germany, Korea and Singapore.
 No credit card data for Singapore, no direct debit data for Japan and Malaysia.
 Data for Indonesia are 2003.
 Source : Calculated based on Payment System Department database

It is perhaps interesting to point out that similar conclusions can be made when certain types of indicators are used as the benchmark for making such comparison. As one can see, using “value of card payments relative to GDP” as the benchmark for making cross-country comparison, Thailand still performed reasonably well when compared with some of the ASEAN countries. As is evident from Figure 9, the ratio of card payment to GDP for Thailand’s case was about 7%, which is relatively higher than certain countries in the ASEAN region.

² In that paper, the authors have resorted to a variety of indicator for the measurement of the degree of e-payment usage among 13 countries in the sample groups. These include, for instance, (i) the ratio of card payments relative to GDP, (ii) mobile penetration (iii) degree of internet usage, to name but a few. For more detailed account on the issue of e-payment penetration, please see the recent paper by Rungsun Hataiseree and Jittra Boonsiri (2006), “**Current status of e-payment penetration in Thailand: salient indicators and international comparison**”, BOT’s Payment Systems Department Discussion Paper, (www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)

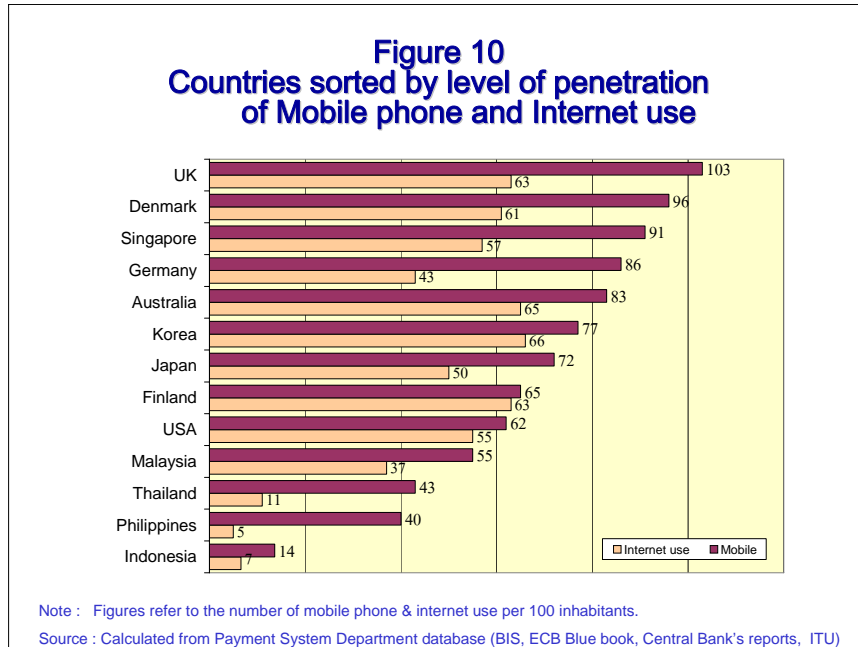
Figure 9
Value of card payments relative to GDP



Similar conclusion can be made when using “mobile phone and internet usage” as the basis for making such comparison. As one see from Figure 10, mobile phone penetration is high in most advanced countries. In 2004 the number of mobile subscribers per 100 inhabitants for UK, Denmark and Singapore were recorded at the respective amount of 103, 96 and 91. For Thailand, the degree of internet and mobile phone penetration tends to be lower when compared with those in certain advanced countries.

It is perhaps useful to note that, however, the number of mobile subscribers per 100 inhabitants was about 43 in 2004. The corresponding figure for the year 2005 tended to show sign of an upward trend. The latest figure showed that it amounted to around 50. Judging from the tendency that people are becoming more comfortable with using electronic technology in their daily lives, and to some extent in their

Internet-based payment, it is likely that the figure of the kind would continue to increase in the years to come.



3. BOT's role to support the e-payment and the establishment of Thailand national ITMX

3.1 BOT strategy for supporting e-payment development

It has been widely accepted that the establishment of efficient payment infrastructure would contribute significantly to the move toward a more efficient payment systems of the country in question. This would, in turn, lead to the greater contribution of the successful development of the country's economic performance. As in many other countries, discussion on the issue of the setting up of e-payment gateway has long been received increasing attention from BOT's policy makers responsible for the conduct and implementation of payment system policy as well as from leading persons in Thailand's payment industries.

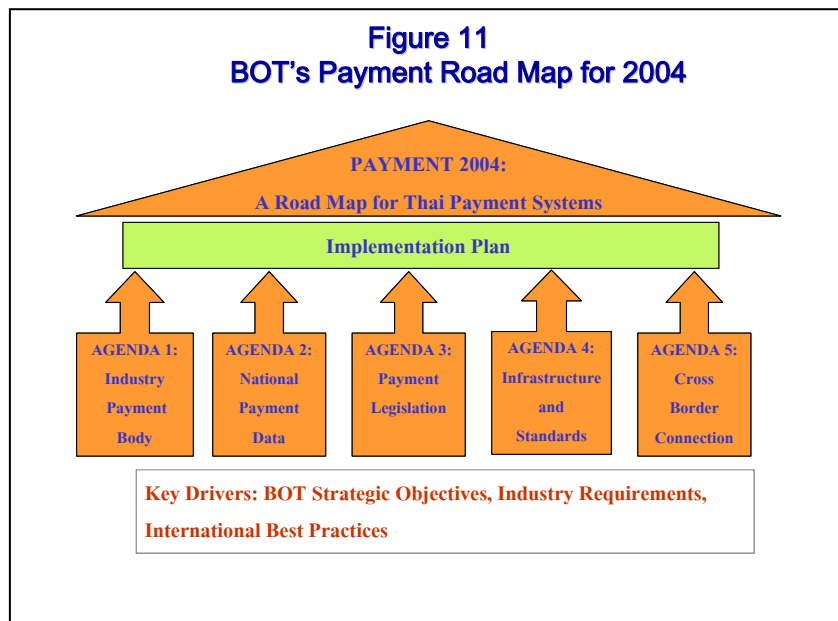
Although the e-payment systems provided by the BOT, as mentioned in Section 2, have been viewed as important gateways (open network structure) in inter-bank connections, the BOT has found it necessary to further develop e-payment platforms that can fully serve all activities relating to e-commerce and make sure that the system is complied with the BIS Core Principle.

- 3. BOT's role to support the e-payment and the establishment of Thailand national ITMX**

 - 1. Joining regional and international initiatives on payment issues :**
 - APEC, EMEAP, SEACEN, BIS
 - 2. Restructuring IT systems and Data Linkage between BOT and FI :**
 - BOT's IT strategy, FI DMS, Interbank Payment Systems Development toward E-FITS
 - 3. Implementing the BOT Strategic Objectives for the year 2003-2007 on the issue relating to e-payments by;**
 - Facilitating the development of payment systems that can fully serve all activities relating to e-commerce and making sure that the systems are complied with the BIS Core Principles.
 - 4. Charting the payment strategic directions for 2002-2004 (Payment 2004 Project) as a road map for safe, sound, and efficient payment systems in Thailand which will greatly support e-payment.**
 - 5. Approving a guideline for payment fees setting among commercial banks to reflect actual costs of services, and to promote greater use of electronic media, with reduction in use of cheque and cash usage.**
 - The new payment fee structure among commercial banks has been in place since March 2006.

The BOT formulated Payment 2004 as a road map for developing the national payments system for the business sector, banks and related organizations between the years 2002-2004. The plan, as indicated from Figure 11, covers five major agendas as follows :

- (i) The establishment of a co-operative payment systems organization;
- (ii) The collection of data on payment systems;
- (iii) The drafting of a payment systems law;
- (iv) The setting up of payment systems infrastructure and standards;
- (v) The study on cross-border payment systems linkage.

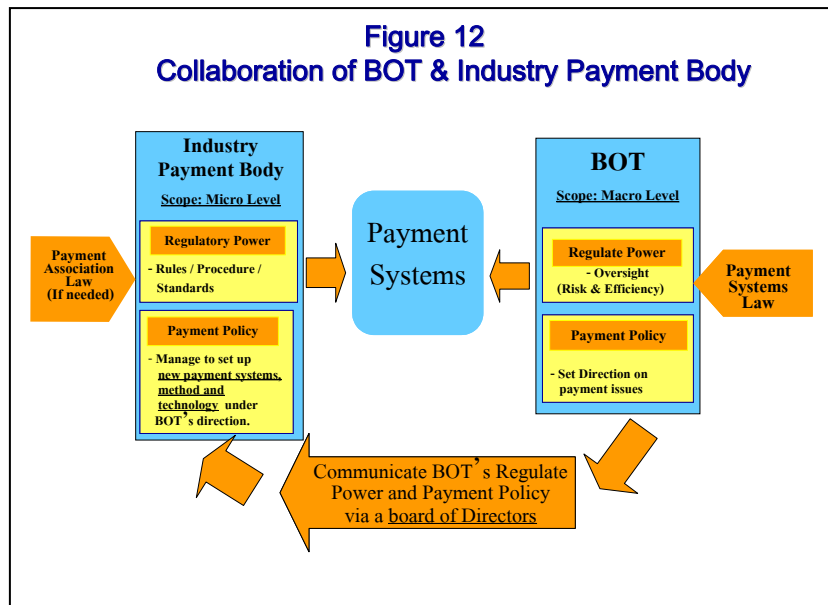


The Payment 2004 project, as has been discussed elsewhere, has been seen as an important premise to help support the e-payment, as it mainly focuses on the fundamental level of payment systems which is separated into 5 agendas;

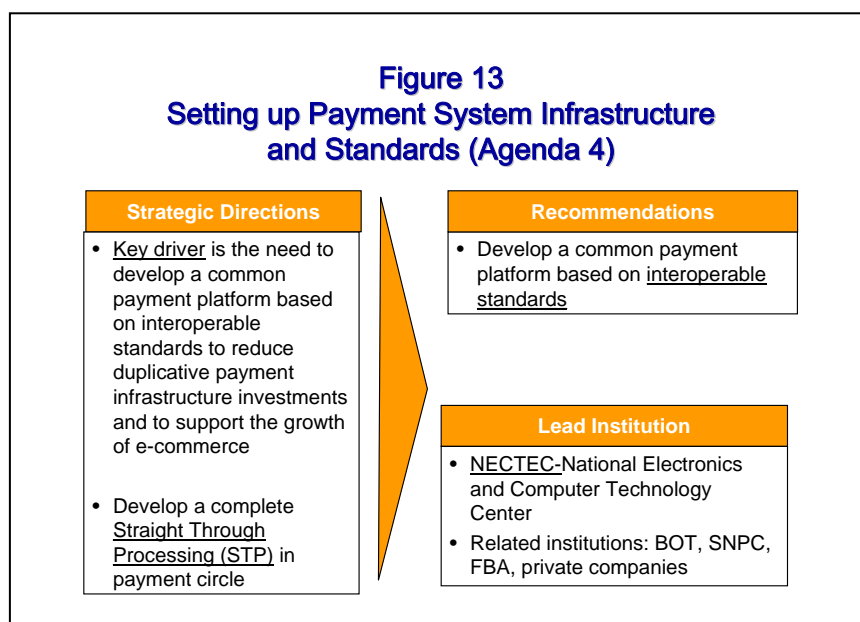
Agenda 1: Industry Payment Body The current payment environment needs a role change between BOT and other stakeholders in the payment industry especially commercial banks. As BOT has to focus more on oversight role to guarantee safety and soundness of payment systems, it needs to let private sector take a prime responsibility to develop payment systems, payment tools, and related technologies. In addition to the role change, these stakeholders also need to value the importance of collaboration. And this is the rational behind a setting up of the Industry Payment Body which is destined to be a key driver to the e-payment stage.

Agenda 2-5 are National Payment Data, Payment Legislation, Infrastructure and Standard, and Cross-border Connection, respectively. The work of agenda 2-5 will later on become the primary tasks of agenda 1.

In addition to Payment 2004, BOT has the BOT Strategic Objectives for the year 2003-2007 on the issue relating to e-payments which facilitate the development of payment systems that can fully serve all activities relating to e-commerce and make sure that the system is complied with the BIS Core Principles.



Under Payment 2004 – A Road Map for Thai Payment Systems, the BOT and the National Electronics and Computer Technology Center (NECTEC) jointly established the Committee on Payment Infrastructure and Standards² that comprised of experts and representatives from related organizations in the public and private sectors. The committee's duty is to set the objectives and guidelines for the project to reduce duplicate investments, to support payment across institutions in current and future payment networks, and to serve the electronic commerce transactions widely (Figure 13).



² The Committee on Payment Infrastructure and Standards comprises of 13 institutional representatives from the private and public sectors. The BOT and the NECTEC are co-chairs. Developing payment infrastructure and standards forms part of Payment 2004 – A Road Map for Thai Payment Systems. See further details at www.bot.or.th.

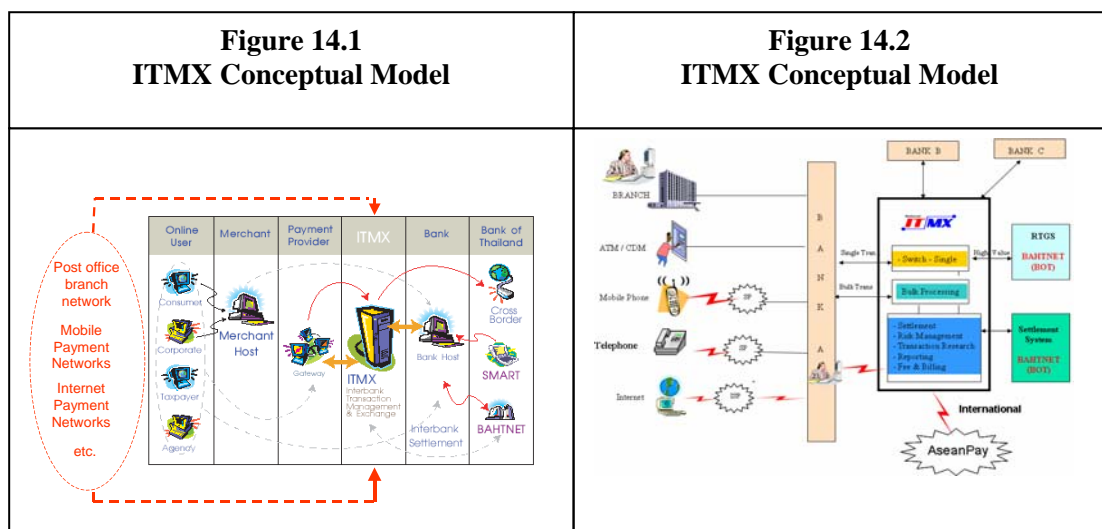
As is widely agreed, the majority of e-payment systems at present tend to serve payment initiators and recipients who have accounts at a common bank or within a group of banks who have membership in a payment system. Funds transfer and payment services across different banks or across non-members have not yet provided. The aforementioned committee therefore proposed an ITMX conceptual model to serve as the core structure with interoperable standards for the Payment Systems Committee³ (PSC) to consider, and was approved for further implementation since 15 October 2002.

In 2005, there was a close consultation between the Subcommittee and the Thai Bankers' Association (TBA) concerning an establishment of a central company, with shares being held by TBA members in order to provide payment services among member banks and other domestic financial institutions. This is to ensure a standard payment system for the whole country. The system is required to operate with high efficiency, together with convenience, swiftness and safety. Apart from these, the operating cost is required to maintain at an appropriate level, reducing duplicated investment among member banks. In addition, it will promote expansion of electronic commerce of country, in accordance with a key policy of the PSC. It will greatly facilitate consumers in using payment services of all banks all over the country, 24 hours a day, when the company fully operates in 2007. It is expected that Thailand will be in a better position to provide excellent services for consumers. National ITMX Co., Ltd. has been registered since July 2005. Currently, it has completed the selection process of solution vendors for inter-bank funds transfer and payment services.

³ The Payment Systems Committee (PSC) was established in 2001 to supervise policy issues concerning payment systems of the country, considered significant matters comparable to monetary policy of the whole nation. PSC also stipulated that local financial institutions dispatch some experts to represent in the committee, which, in turn, signaled a start of concerted effort to engineer the uniform payment systems to enhance effectiveness of national economy in general.

3.2 The development of e-payment gateway and the nature of national ITMX

A broad nature of ITMX will be a standard switching and inter-banking payment transaction management system with the responsibility for comprehensive, efficient and effective database management. The ITMX system design is carried out in such a way that it is reasonably flexible to allow for easy development to respond to the rapidly changing needs of the market. Basically, as characterized from Figure 14.1-14.2, the ITMX would provide e-payment services to business, individuals and local and international banks using IT infrastructure, so that they could do business using e-payment systems and mobile phones.



Apart from these, the present design of the ITMX system has been carried out in such a way to provide inter-banking payment services for member banks through single transaction, bulk transaction, and e-commerce transaction processing with the following added functionalities:

- Multiple types of transactions, i.e., B2B, B2C, B2G and P2P.
- Single and batch processing.
- Multi-channel capabilities.
- Grouping of transactions based on unique bank code, service type, channel type and customer type.
- Online upload and download transactions with a single standard format 24 x 7 availability.

It is worth noting in this connection that, however, the setting up of Thailand national ITMX is intended to serve *multiple purposes*. For one thing, it is intended to facilitate electronic payment transactions and conduct business in accordance with the framework and policies of the central bank and the supervision of the bank's payment system committee. For another, it will be served as a switching centre for business and payment transactions, both business-to-business and business-to-customers.

Apart from these, the national ITMX will allow easy electronic transfer of money by business. It will instill confidence in companies and those in the private sector wanting to conduct business over the network.

It is perhaps useful to outline some sort of “Process Flow” underlying the ITMX system. According to Figure 14.1-14.2, “Process Flow” appears to be as follows:

- Customers of the member banks transact through banking channels as usual. When the bank receives a transaction, it will confirm its accuracy before sending it to ITMX in the accepted standard format.
- When ITMX receives the transaction, it will check its accuracy before proceeding with the exchange of the transfer order or payment order between its member banks.
- The system must be able to generate return codes for every transaction whether the operation is successful or not.
- A real-time net position of each member bank with transaction details must be available for online inquiry.
- A net position summary must be sent to BAHTNET via the Central Settlement System (CSS) of the Bank of Thailand for settlement.

Before delving into more detailed discussion about the main features of the national ITMX in next section, it is worth pointing out certain aspects of the National ITMX Co., Ltd. Chief examples in this regard are as follows:

(i) The PSC agreed to allow the Subcommittee on National Payment Co-operation and the Committee on Payment Infrastructure and Standards to jointly consider the procedural details in establishing the company. Such a newly created company is assigned to implement the ITMX system. The BOT is in a position to play a regulatory role to create security confidence among users. In particular, the BOT has issued the so-called “*BOT directive on rules, procedure and condition in operating business under the ITMX system*” in April 2004. This kind of BOT directive is seen as an important tool on the part of the BOT to exercise its regulatory and supervisory roles to oversee the national ITMX in the conduct of business activities in line with guidelines set forth in “National E-payment Strategy”. This is to ensure a smooth achievement of a more effective and efficient retail payment system.

(ii) The ITMX was renamed ATM Pool Co., Ltd. on July 8, 2005 together with appointment of the Board of Directors and Management.

(iii) Broadly speaking, the “business policy” of the ITMX is carried out in such a way that it is in line with the country’s National Payment Roadmap. This seems to be the case, due in part to the fact that there is a representative from the BOT in the ITMX board.

(iv) Services to be available in the ITMX system would include ATM, SMART Credit, SMART Debit, Direct Credit, Direct Debit, ORFT via ATM, inter-bank counter funds transfer service via ATM, and services via e-channels such as mobile phones and internet.

4. Salient features and current status of the national ITMX

4.1 Some salient features of Thailand national ITMX

It has become quite clear at this point that the BOT has played an important role in the setting up of the national ITMX. In a similar vein, as it can be claimed, the BOT has also played an important part in the process of designing product features of national ITMX. This is to ensure the smooth operation of the ITMX system and, more importantly, bring about a more effective and efficient payment system. As mentioned earlier, under Agenda 4 (Payment Infrastructure and Standards) of the Road Map for Thai Payment Systems, the BOT has made it clear that a common platform based on interoperable standards, named ITMX, needs to be set up to support inter-bank transactions, inter-bank e-payments, and e-commerce payments across banks as well as cross-border payment linkages.

In particular, the BOT has encouraged commercial banks to own and development the system following key features:

- Being interoperability and scalability standard, for banks and non-banks, to reduce duplicative payment infrastructure investment;
- Able to support e-commerce payment transactions;
- Able to provide bulk payment services, both debit and credit transfers, with the better or at least the same capability as compared to SMART;
- Convenient to access.

With the minimum requirements, which consist of:

- Standard for message exchange and protocol;
- Standard for system/network security and reliability;
- Standard for business management and risk management.

In what follows, we will outline some of the important features that have been incorporated into Thailand National ITMX. Of particular importance in this regard include the following main features:⁴

- (i) Providing transfer services (both debit and credit) for single payments or bulk payments (batch files) including services that may cross international boundaries;
- (ii) Providing the ability to handle payments from ATMs, Internet banking, and other banking channels;
- (iii) Including financial and operational risk protection mechanisms and tools that meet standards for risk management and security;
- (iv) Serving as a switching for inter-bank payments with efficiency and data reliability for both domestic and international transactions;

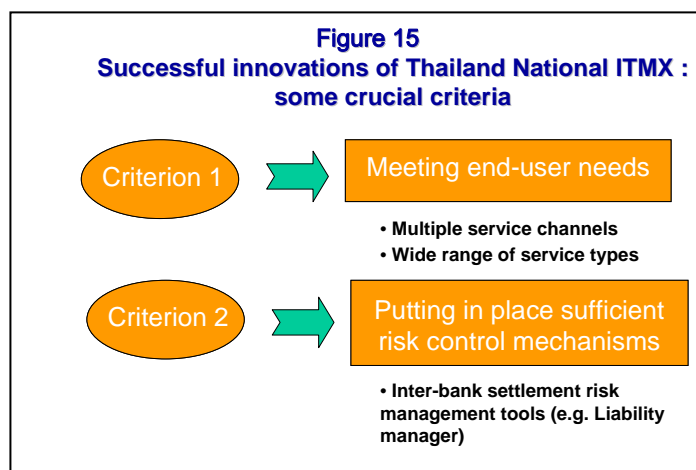
⁴ It is worth pointing out in this connection that the features cited above are only for illustrative purposes and should not be considered as an exhaustive list of all features related to Thailand National ITMX.

- (v) Supporting payment transactions, specifically e-commerce, using internet protocol or other open source technologies;
- (vi) Creating and utilizes a common standard with the flexibility to interface with other systems at commercial banks;
- (vii) Utilizing a flexible design that is sensitive to the changing needs of the marketplace;
- (viii) Including comprehensive processing recovery as well as full-fledged disaster recovery;
- (viiii) Operating on a variety of open platforms including Unix, Linux and Windows;
- (x) Utilizing a scalable architecture both vertically (features) and horizontally (constituents) to ensure future growth.

It is quite natural, however, that we cannot provide a detailed discussion of all of the mentioned aspects related to the national ITMX features in this section. We, instead, find it more reasonable to concentrate our discussion on certain aspects of the national ITMX deemed to be crucial for the successful innovations of this newly developed payment infrastructure in the years to come. In our view, as characterized in Figure 15, the successful innovations must satisfy at least *two* criteria.

(i) One of such criteria is whether, and to what extent, the newly created payment infrastructure has put in place reasonable scope of channels and types of business to meet end-user needs.

(ii) Another criterion is whether, and to what extent, the newly created payment infrastructure has put in place mechanisms and tools that provide sufficient control over risks.



With respect to the first criterion, we are of the view that the newly developed system of national ITMX has been designed to handle different service types through multiple service channels. As one can see from Figure 16, services to be available in the ITMX system would include ATM, SMART Credit, SMART Debit, Direct Credit, Direct Debit, Online Retail Funds Transfer (ORFT) via ATM, inter-bank counter funds transfer service via ATM, and services via e-channels such as mobile phones and internet.

Figure 16 : Functional Requirements

	Service Options					
	Branch	ATM	Mobile Phone	Fixed Phone	Internet	CDM
Single Transactions						
Transfer (Credit)	✓	✓	✓		✓	✓
Bill Payment (Credit)	✓	✓	✓	✓	✓	
Deposit (Credit)	✓					✓
Withdrawal (Debit)		✓				
Inquiry		✓				
Bulk Transaction						
Transfer (Credit)	✓				✓	
Transfer (Debit)	✓					
Bill Payment (Credit)	✓				✓	
Bill Payment (Debit)	✓				✓	
ePayment/eCommerce						
EBPP, Payment Gateway (Direct Debit)					✓	

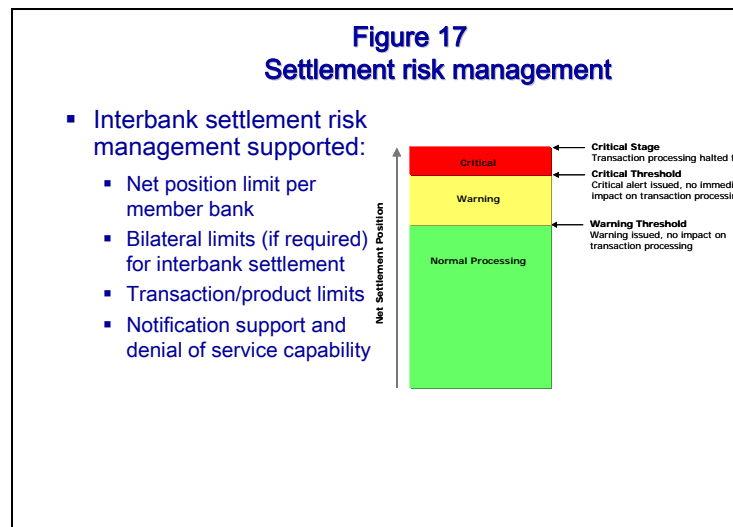
It is important to point out that the newly developed system of national ITMX has been designed to handle different types of transactions, ranging from (i) “Single or Individual Transaction”, (ii) “Bulk Transaction”, (iii) and “E-Payment/ E-Commerce Transaction”. As one can see from Figure 16, there are three main transactions that will be processed by the ITMX system:

- Single or Individual Transaction supports the sending or receiving of a single transfer, deposit, withdrawal, payment or inter-bank balance inquiry instruction. A member bank’s customer can perform any of these transactions through several banking channels, such as CDM, phone banking, ATM, mobile phones, internet banking, or branches.
- Bulk Transaction supports the bundling of several transfer or payment instructions into a single file in the predefined format. The processed file contains instructions to debit or credit an account to another customer account at a member bank. The system handles the routing of the transactions to the appropriate member bank. The file may be received through any of several banking channels, such as branches or internet banking.

- E-Payment/E-Commerce transactions are performed through the internet and are online real-time transactions. They may be electronic bill presentment and payments (EBPP) or e-payments. The service is available on a 24x7 basis. The system authenticates the user and is capable of enforcing a transaction limit to reduce the settlement risk.

Concerning the second criterion of adequate mechanism for risk control, the ITMX system has put in place standard for business management and risk management. The BOT has required the operator of national ITMX system to carefully monitor settlement risk involved. It can be seen from Figure 17 that inter-bank settlement risk management is designed to support the following main aspects:

- Net position limit per member bank;
- Bilateral limits (if required) for inter-bank settlement;
- Transaction/product limits;
- Notification support and denial of service capability.



Apart from the aforementioned mechanism for settlement risk management, the newly developed system of national ITMX has put in place some sort of the so-called “Liability Manager”. The primary functions of the “Liability Manager” are to:

- Monitor inter-bank bilateral settlement risk limits for single and bulk payment system transactions set by the member institutions;
- Send alerts to member institutions when risk limits are approached;
- Provide member institutions with real-time management options to manage bilateral settlement risk.

More importantly, the newly developed system of national ITMX has been put in place some sort of facility that is flexible enough to allow the settlement process to be carried out for more than one round a day. This sort of facility is considered to be of some help in reducing the potential risks in the system.

4.2 Current status of the national ITMX

To ensure a smooth transitioning to a full version of Thailand national ITMX system, it is naturally that plans to development the national ITMX system need to be divided into multiple phases. As one can see from Figure 18, the first phase of the project (Phase 1a) will concentrate on the provision of services related to SMART Debit, SMART Credit, Settlement, fee distribution, and back-office.

Figure 18
Tentative Time Plan for ITMX implementation

Phase 1a	SMART Debit & Credit Settlement / Fee & Back-Office July 17, 2006 – April 4, 2007
Phase 1b	Bilateral Risk Settlement April 1 – May 30, 2007
Phase 2	ATM Pool (Low Value) Channels: ATM & Counter & Internet & Mobile & ORFT & Payment Transactions April 13 – Aug 30, 2007
Phase 3	Counter (High Value) via RTGS Sep 1, 2007 ---->

Subsequent phase of Phase 1b will be dealt with “Bilateral Risk Settlement”. As planned, the actual commencement of Phase I will take place around early April 2007. For Phase 2, the national ITMX system will broaden its operating scope to include some other types of services, including “ATM Pool” (Low value) Channels: ATM & Counter & Internet & Mobile, ORFT & Payment Transactions. This is basically based on the so-called “single low-value transaction”. It is expected that the actual implementation of Phase 2 will take place in the period around August 2007.

In Phase 3, the provision of services of the ITMX system would be extended to include the so-called “single high-value transaction” via RTGS. However, it seems to be unclear at this stage that how quickly the national ITMX system could reach to Phase 3. For one thing, it depends partly on a closed consultation among various stakeholders. The present commitments on the part of the Vendors, for example, may need to be further reviewed to see whether, and to what extent, there is a need to adjust the scope of the present contract.

For another, it depends on the future outcome of feasibility study on issue related to the possible allowance of “single high-value transaction” to be settled via RTGS of the BOT. In relation to this, the BOT has closely monitored this sort of development and will help provide appropriate guidance to ensure that Thailand national ITMX system has operated along the line deemed to be effective and efficient for the country’s payment systems.

It is worth noting in this connection that, under the ASEANPay project on cross-border ATM linkages, the national ITMX has planned to establish the country's ATM linkage with those of Singapore (NETS) and Indonesia (Artajasa, Rintis, Alto) by mid 2007, apart from the already existence of the linkage between NITMX and MEPS in September 2006. At this stage, the actual implementation of cross-border ATM linkage among four participating countries⁵, to facilitate cross-border ATM ***cash withdrawal***, includes:

(i) the link between ATM operators of Malaysia (Malaysian Electronic Payment System: MEPS) and Indonesia (PT Artajasa Pembayaran Elektronik: Artajasa), established since June 2005;

(ii) the link between ATM operators of Singapore (Network for Electronic Transfers (Singapore) Pte Ltd: NETS) and Malaysia (MEPS), established since March 2006; and

(iii) the link between ATM operators of Thailand (National ITMX) and Malaysia (MEPS), established since September 2006.

Figure 19 provides more details about cross-border ATM linkages among the four countries. As one can see from the figure, much progress has been made in the case of funds withdrawal. However, this does not seem to be the case for funds transfer among the four countries.

Figure 19 Cross-border ATM Linkages with ITMX		
Linkages	Status	
<u>Cash Withdrawal</u>		
MEPS (Malaysia) & Artajasa (Indonesia)	Since June 2005	
NETS (Singapore) & MEPS	Since March 2006	
NITMX (Thailand) & MEPS	Since September 2006	
NITMX & NETS / Artajasa / Rintis / Alto		In discussion
<u>Funds Transfer</u>		
NITMX & MEPS / NETS / Artajasa / Rintis / Alto		In discussion

⁵ The four countries in question are Singapore, Malaysia, Indonesia, and Thailand.

5. Concluding Remarks

Evidences provided in this paper tend to suggest that there have been an increasing usage of e-payment in Thailand over the past decade or so, as reflected in part to the substantial increase in the value and volume of financial transactions via the payment services of the BOT. As already pointed out, every form of e-payment services operated by the BOT has shown a remarkably upward trend over the past decade, particularly those of the BAHTNET and SMART systems. Significant increase in the use of other e-payment channels offered by commercial banks and non-banks can also be seen for the cases of credit/debit cards, payment channels related to mobile phones, or internet.

In contrast to such the increasing trends in the use of e-payment services, the use of some sort of paper-based payment instruments has shown sign of declining trends. This is particularly so for the case of cheque usage which recorded a reduction of around 3% in the first ten month of this year compared with the same period of last year. The increase in the fee of cheque usage from 5 to 15 Baht in early March this year has been seen as the major factor attributing to such the declining in the use of cheque. Such a reduction in the cheque usage tends to be in line with our “National E-Payment Strategy” which aims to slow down the use of paper-based payment instruments in Thailand’s payment system.

The establishment of national ITMX can be also seen as an attempt on the part of the Thai authorities to move away from taking a “direct operational role” to performing a newly designated role as regulators of the country’s payment systems. It has become crystal clear that some forms of payment services, especially the SMART system, will be no longer under the direct operation by the BOT in the foreseeable future, especially when the national ITMX commences its actual operation in the period around April 2007 onwards.

Key success factors:

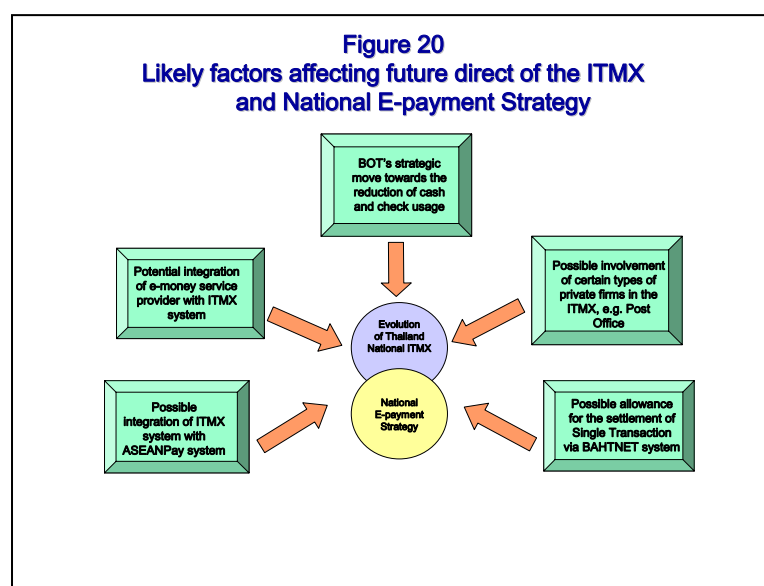
Against the background outlined above, we are of the view that the following three factors deemed to be contributed to successful establishment of the ITMX system in the case of Thailand. These include: (i) BOT’s leading roles in promoting, supporting and facilitating in any respects deemed appropriate and necessary; (ii) closed collaboration among key stakeholders; and (iii) recognition of each stakeholder’s new roles.

As discussed earlier, the BOT has an interest in putting in place a more efficient payment infrastructure for retail payments and payment instruments, but here it acts mainly as a catalyst – or rather, a facilitator – for their developments, particularly with regard to safety and efficiency. This catalyst role is performed via co-operation with other organizations and the markets, and in particular through the BOT’s utmost contacts and relationships with the banking industry, Industry Payment Body, and others to bring forward a proposal to facilitate inter-bank transaction and exchange. As discussed, the BOT has laid down rules and guidance to ensure that the

actual implementation of Thailand national ITMX is in line with the Bank's policy and the CPSS Core Principle.

Possible future direction:

Looking into the prospects over short (2007) and long time horizons, there are a number of issues needed to be carefully addressed in the move towards the greater fulfillment of the so-called "National E-payment Strategy" in general and the greater use of e-payment services in the form of ITMX services in particular.



One of such issues is how to integrate the less than 5% of e-money payments that are carried out by non-bank institutions⁶ with the 95% that are conducted by commercial banks. it remains to be seen as to whether, and to what extent, national ITMX are in the position to allow a direct linkage between a set of prospective non-bank firms and national ITMX. Here, it is like that the related issue of "payment fraud" will become even more critical as the ITMX system opens up. The institutions concerned must come with solution to address the payment fraud issue, which has become more sophisticated nowadays.

Another issue is related to the BOT's strategic move towards the reduction of cash and check usage in the near future. The BOT has approved a guideline for payment fees setting among commercial banks to reflect actual costs of services, and

⁶The term used here refers to some sort of private firms which are involved in the provision of payment services related to e-money business. These sorts of private firms are (i) True Money Co.Ltd, (ii) PaySbay Co.Ltd, (iii) Payment Solution co.,Ltd., (iv) Advance Mpay co.,Ltd., (v) Advance Magic Card co.,Ltd., and (vi) Thai Smartcard co.,Ltd. It therefore does not include the provision of payment services by certain types of non-banks, particularly those of VISA card, Master card, and the like.

promote greater use of electronic media, with reduction in use of cheque and cash usage. The new payment fee structure among commercial banks has been in place since March 2006. The use of fee structure has, in fact, been successful in many countries, moving the whole economy to increasingly rely on electronic payment systems. Apart from the newly approved fee structure, it remains to be seen as to whether, and to what extent, the setting up of Thailand National ITMX would contribute to a reduction of cash and check usage in the period ahead.

The third issue is related to the possible involvement of certain types of private firms, particularly non-banks such as Thai Post Company. For one thing, the business nature and practices of such a prospective new member of the ITMX may have been quite different from those of the present members of national ITMX which basically comprise of commercial banks. As one can see, for example, the operating system of post offices have been based on a Non-account based, which is in sharp contrast with those of commercial banks which is basically based on account-based.

The fourth issue is related to the possible allowance of the settlement of Single Transactions (high-value transactions) from the ITMX system to the RTGS system (BAHTNET system). Under the present arrangement for settlement, the ITMX has to send a net position summary of its member banks via the Central Settlement System (CSS) of the Bank of Thailand for settlement. However, plan is under way to add additional service of the so-called Single Transactions for high value and make the settlement of this new type of service through the RTGS system of the BOT. It remains to be seen as to whether, and to what extent, such a shifting of the settlement (process) to be conducted via the RTGS system of the BOT would contribute to the overall increase in the efficiency of Thailand's payment system.

The fifth issue is related to the possible integration of the ITMX system with those of ASEANPay system. It remains to be seen as to whether, and to what extent, such an integration of the ITMX system with those of ASEANPay system would contribute to the overall increase in the efficiency of the country's retail payment system.

Despite the many challenges associated with the issues we have mentioned, we are of the view that we can make adjustments, albeit with difficulty, to cope with such the changing environment facing our payment systems development. This is made possible by formulating our policy stance in consultation with, where appropriate, market participants. At this time of strategic change, we believe that a continued dialogue among payment system participants and users will help all of us identify potential sources of problems and come up with possible solutions in a balanced and thoughtful manner. Given our mission to support a more effective and efficient payments system, we therefore look forward to working with other stakeholders involved in the country's payment system, especially the banking industry, Industry Payment Body, and other related institutions in the field and continuing to help each other in the period ahead.

References

- Duisenberg, Willem F., “**Key issues for the ECB in the field of payment systems**”, Speech given by the G10 Committee on Payment and Settlement Systems conference on “Private and public sector challenges in the payment system”, Frankfurt, 12 June 2003.
- Economist Intelligence Unit (2005), “**The 2005 e-readiness rankings**”.
- EMEAP Working Group on Payment and Settlement Systems (2002), “**Payment Systems in EMEAP Economies**”, July.
- Payment System Department, Bank of Thailand (2003-2005), “**Payment Systems Report**”, June. (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/payment_e.htm)
- Payment System Department, Bank of Thailand (2002), “**Payment 2004 : A Road Map for Thai Payment Systems**”, January, (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/Highlight/Payment_Road_Map/E_ThaiPayment_Road_Map.htm)
- Rungsun Hataiseree and Jittra Boonsiri (2006), “**Current status of e-payment penetration in Thailand : salient indicators and international comparison**”, Payment Systems Working Paper, September. (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)
- Sayan Pariwat (2006), “How cashless payments will reshape Asian commerce” **Quarterly Journal, Central Banking**, August. (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)
- Sayan Pariwat and Rungsun Hataiseree (2004), “**Challenges to the reduction of cash usage : Thailand’s perspective**”, Payment Systems Working Paper, September. (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)
- Sayan Pariwat and Rungsun Hataiseree (2004), “**The role of CLS Bank in reducing foreign exchange settlement risk: new challenges and implications for the Thai payment system policy**”, Payment Systems Working Paper, August. (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)

- Sayan Pariwat and Rungsun Hataiseree (2004), “The Evolution of Large-value Funds Transfer System in Thailand: Causes, Changes, and Challenges”, **Chulalongkorn Review**, Vol. 16, No. 63, (April-June). (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)
- Sayan Pariwat and Rungsun Hataiseree (2004), “Managing payment and settlement system reform: a Thai perspective”, **Thammasat Economic Journal**, Vol. 22, No. 11, (March), pp.69-112., (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)
- Sayan Pariwat and Rungsun Hataiseree (2003), “The Use of Cash, Cheque and Electronic Payment Services in Thailand: Changes and Challenges for Efficiency Enhancement”, **Chulalongkorn Review**, Vol. 16, No. 61, (Oct.- Dec.), pp.46-109.(Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)
- Sayan Pariwat and Rungsun Hataiseree (2002), “Risk reduction in the payment system and the role of the central bank: Thailand’s recent experience”, **Bank of Thailand Quarterly Bulletin**, Vol. 42, No. 4, (December), pp. 59-95. (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)
- Sibporn Thavornchan and Rungsun Hataiseree (2004), “**Observance of the Core Principles for the RTGS System in Thailand: An Overall Review**”, Payment Systems Working Paper, October. (Also available via the Internet : http://www.bot.or.th/bothomepage/BankAtWork/Payment/E_payment_research_papers.htm)