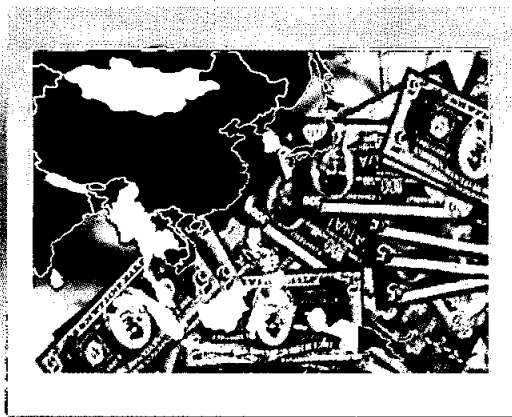


**IMPACT OF IT REVOLUTION ON  
THE FINANCIAL STRUCTURE OF  
THE SEACEN COUNTRIES:  
*CHALLENGES FACING  
CENTRAL BANKS***



**A. Farid Aulia  
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**KUALA LUMPUR, MALAYSIA**

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**Dr. A. Farid Aulia  
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## FOREWORD

We are all aware that the advance of Information Technology (IT) has impacted on all aspects of life and the economy. Driven by the IT revolution, financial institutions and economic agents around the world have been rapidly embracing IT. In the banking sector, this new technology has been implemented to take advantage of its speed and efficiency and also to create new products and services which are more cost effective.

Progressing from the use of plastic cards, we are now heading towards the “cashless society” through the use of electronic money (e-money), which is expected to replace “conventional money” in the future. Many experts predict that e-money could have a significant impact on the way we do business and on the structure of the financial system in general. It has also been predicted that e-money will become a new instrument in the payment system and it will have future implications and challenges to central banks. E-money is just one of the products of the IT revolution which could have an impact on the financial structure. There are many other IT products that are being used in many areas: for example, ATM (automated teller machine), home banking, Internet banking and so on.

Regarding this development, the SEACEN Centre has implemented a research project, undertaken by collaboration of Dr. A. Farid Aulia, Visiting Research Economist from Bank Indonesia, and Dr. Song Ouk-Heon, Senior Economist seconded from The Bank of Korea. The authors would like to express deep gratitude to Mr. William A. Barouski, Senior Vice President, Federal Reserve Bank of Chicago, who provided comprehensive and valuable comments on the draft report. They also wish to express their appreciation to all SEACEN member Banks for their useful comments and suggestions. The authors wish to acknowledge research assistance provided by Ms. Seow Yun Yee, Senior Research Associate in the SEACEN Centre. The views expressed in this paper are those of the authors and do not necessarily reflect those of member central banks, monetary authorities, or the SEACEN Centre.

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Executive Director  
The SEACEN Centre

Kuala Lumpur  
September 2002

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## EXECUTIVE SUMMARY

This project aims to analyse the impact of IT revolution on the financial structure and the policy responses of central banks in the SEACEN countries. Since IT revolution in the SEACEN countries is still under way, it is not easy to predict the outcome of its impact at the present time, but IT is expected to substantially influence the financial markets and economy in the future. There are several issues that the central banks in the SEACEN region needs to tackle with.

*First*, e-money is expected to have impact, in the long-run, on monetary aggregates, money multiplier and money demand, restricting the effectiveness of monetary policy. Thus, it would be necessary to develop new monetary aggregates and to analyse the monetary transmission mechanisms suitable for this new financial environment.

*Second*, as each company is exposed to more foreign exchange risks due to increase in cross-border transactions, central banks should find measures to reduce foreign exchange risks.

*Third*, since non-bank enterprises are not subject to prudential regulation and supervision, they have higher risks of failure and insolvency, and market participants are expected to be more responsive to a variety of information. Thus, central banks need to build up a safety net to safeguard customers and financial institutions.

*Lastly*, the SEACEN countries need to undertake the following general measures:

- (a) to foster closer regional cooperation on cross-border supervisory issues as well as on monetary policy;
- (b) to narrow the IT development gap among the SEACEN countries and improve related research;
- (c) to deepen the understanding of regional IT risks in handling payment and settlement.



## 1. Introduction

Knowledge and technology holds the key to improving the quality of life and is continuously being updated. This is borne out by history and is continuing to be borne out by present experiences. For example, the catalyst to the British Industrial Revolution was the invention of the Watt's steam engine. "With the power of steam, efficiency improved but it was still more expensive than water power. As time passed, this new technology was made cheaper and cut the price of power by half"<sup>1</sup>. As a result, production efficiency was dramatically enhanced. The discovery of electricity, invention of the internal combustion engine and developments in chemical industry to a large extent led to the Second Industrial Revolution between 1890 and 1930<sup>2</sup>. The impact of these inventions and discoveries was dramatic as machine power was substituted for manpower. The production process became faster and better and various industries were able to manufacture better quality goods in ever increasing quantities.

Today, in what is known as the Post Industrial Age, a new technology is reshaping the world. It began when scientists designated the diatomic numbers 0 and 1 as binary codes to form the basic element of digital technology. Telecommunication and Computer Technology (CCT) became possible because of this new tool and both have been integrated to give rise to the Information Technology (IT) Revolution which some say is a third industrial revolution. The speed and borderless nature of transferring and processing information are key to this new age.

The advance of Information Technology has impacted on all aspects of life and the economy. Driven by the IT revolution, financial institutions and economic agents around the world have been rapidly embracing IT. In the banking sector, this new technology has been implemented to take advantage of its speed and efficiency and also to create new products and services which are more cost effective. The emergence of virtual banking and portable banking that transcend time and place is becoming increasingly widespread.

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1. Bernard Lietaer, : *The future of money*, (London, 2001), ch 3, p. 57

2. Greenwood, Jeremy and Boyan Jovanovic, *The IT revolution and the stock market*, p. 1

Progressing from the use of plastic cards, we are now heading towards the “cashless society” through the use of electronic money (e-money), which is expected to replace “conventional money” in the future. Many experts predict that e-money could have a significant impact on the way we do business and on the structure of the financial system in general. It has also been predicted that e-money will become a new instrument in the payment system and it will have future implications and challenges to central banks. For example, there will be questions on the impact of e-money (and the IT revolution in general) on monetary policy, in relation to the interest rate, base money, reserve requirements, banks reserves and so on.

E-money is just one of the products of the IT revolution which could have an impact on the financial structure. There are many other IT products that are being used in many areas: for example, ATM (automated teller machine), home banking, Internet banking and so on which already have an impact on our daily lives.

### **1.1 The Purpose of the Project**

This project aims to analyse the impact of IT revolution on the financial structure and the policy responses of central banks in the SEACEN countries.

The rapid growth of information technology has a profound impact on financial structures. Therefore it has become a matter of concern for economic agents, financial institutions, financial intermediaries and also monetary authorities. A previous research conducted by the SEACEN Centre concluded that “Information Technology has a driving role to create new efficiencies and build products and services to compete in markets previously dominated by physical dimensions of scale and scope and it therefore has an impact on banking supervision”.<sup>3</sup> In this paper, we would like to examine its impact on the financial structures of SEACEN member countries.

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3. William A. Barouski & Margaret M.Beutel, “Supervisory Impact of Technology on South East Asian Banking”, page 1.

## **1.2 Scope and Organisation of the Paper**

The project was conducted by a survey method, which covers the eleven SEACEN member countries. A questionnaire was sent to eleven member banks, requesting for data and information regarding the proliferation of information technology and policy responses of each country (refer to Appendix A and B). The responses are summarised in Section 3.

The paper is divided into five Sections. The first section sets the context of the study, outlining its scope, methodology and purpose. Section 2 discusses the origins of the IT revolution, including its impact on globalisation, communication systems and the banking world. Section 3 describes the IT revolution impact on financial market, financial transactions, financial intermediaries and payments and settlements systems in general. It also looks into the development of IT in the various SEACEN countries and the policy responses of the authorities. Section 4 discusses the challenges central banks are facing, especially on the monetary policy, payments and settlements system, and bank supervision. The paper concludes with some policy implications for the SEACEN countries.

## **2. IT Revolution, Globalisation and Impact**

### **2.1 What is the IT Revolution?**

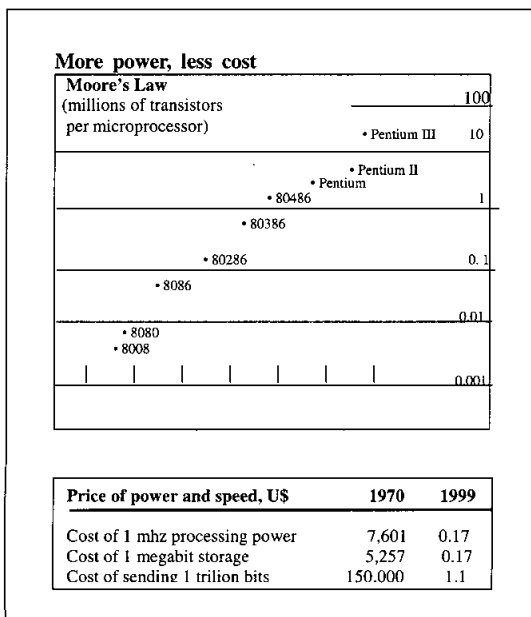
The first programmable electronic computer (ENIAC) was developed in 1946 and had just a memory of 20 words. The IT revolution began with the increased use of mainframe computers and the invention of the micro-processor in 1971. Since then, according to Moore's law (named after Gordon Moore, the President of Intel, in 1965), in every 18 months the processing power or computational speed doubles and the price falls by half (see Chart 2.1).

In general terms, the word "revolution" means a fundamental or foundational transformation which happens over a very short period of time. The distinctive characteristics of the present IT Revolution may be summarised as the integration of information processing and telecommunication technologies; the consequent acceleration of the speed of information processing and transmission, reduction of information processing costs and the increase of geographical distance over which information can be transmitted; and, the astounding speed at which information technologies are

spreading among the public. Chart 2.2 shows the paradigm of the information technology revolution.

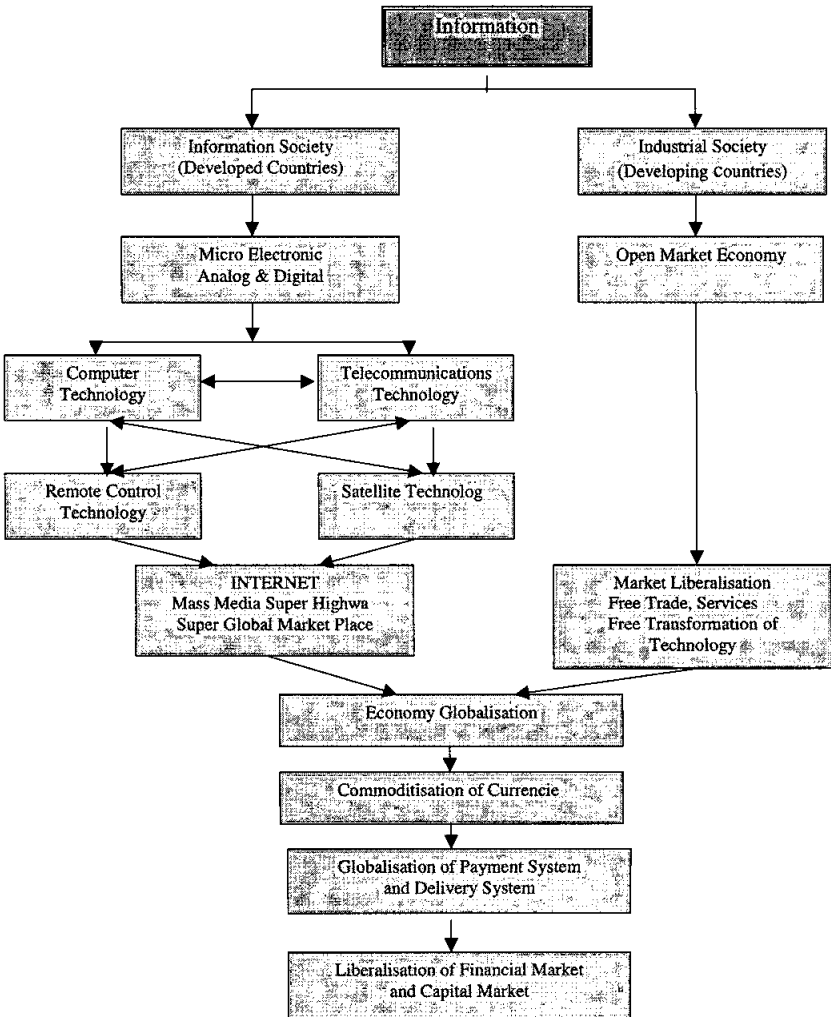
Through the remarkable increases in information processing and data transmission performance and major cost reductions, the IT revolution is increasing the efficiency of the information processing used in goods and services production processes.<sup>4</sup> These technological innovations are resulting in quality improvements and price reductions for existing goods and services and enabling the production of new goods and services that was impossible in the past. Looking at some specific examples, the transfer of conventional financial services to the Internet is facilitating large price reductions. The development of the credit scoring method has systematised credit screening by using computers to execute works formerly conducted by hand, enabling low-cost credit screening.

**Chart 2.1 Moore's Law**



4. Following the end of the technology bubble in early 2000, many of the claims that were made on efficiency gains and costs reductions are now being re-assessed.

**Chart 2.2 Paradigm on Information Technology Revolution**



Source : Manajemen, April 2000

## **2.2 What is the Underlying Concept of Computer and Communication Convergence?**

Computer and communication devices intersect in their handling of information. While the computer is concerned with information processing and storing, communication devices enable information delivery. The scope of the Internet works across national boundaries and has made it possible for corporations, institutions, as well as individuals to exchange information. Private networks are no longer needed to deliver information across dispersed regions of the world. Financial institutions such as banks were already exchanging financial information electronically before the emergence of Internet. However, the previous process lacked worldwide coverage and was relatively expensive since they had to build their own infrastructure. The use of the Internet for financial transactions has grown exponentially but has also caused concerns especially with regards to the confidentiality, privacy, and security of the information being delivered.

## **2.3 IT Revolution and Globalisation**

The Internet lessens geographical and spatial restrictions and makes national borders less important and accelerates the globalisation of trade and financial transactions. Cross-border e-commerce transactions are still not yet very popular for the trade in goods and services (see Table 2.1). However, the reduction in search costs, the dramatic decrease in the transportation costs for digital goods, the changes in transaction patterns and enhanced product differentiation are expected to increase cross-border e-commerce transactions and accelerate the tempo of trade growth. In terms of international financial transactions, the decrease in information transmission costs has made foreign financial trading much easier than in the past, increasing the substitutability of domestic and foreign financial assets. The Internet, will, therefore, probably bring about more international portfolio diversification as well as further convergence.<sup>5</sup>

The Internet represents a financial communication system of almost unimaginable versatility and although most banks are currently using it for communications purposes, rather than for transactions, a recent study by the

---

5. IT can reduce some transaction costs such as information transmission cost and search cost. However, these costs are not all the barriers to trading in foreign assets. There are other barriers such as currency risk and institutional barriers (e.g., tax structure on capital income and regulation on capital mobility).

consultant Booz-Allen & Hamilton, indicated that *over half of all the major European banks* surveyed were aiming to upgrade their Web sites to offer all the services of a real-world bank.

**Table 2.1 E-Finance Penetration, End 1999**

Income group/economy	Online banking (customers as percentage of bank customers)	Online brokerage (transactions as percentage of brokerage transactions)
<b>Industrial country average</b>	<b>8.5</b>	<b>28</b>
Australia	4	22
Belgium	4	20
Denmark	6	38
Finland	20	
France	2	18
Germany	12	32
Italy	1	16
Japan		32
Netherlands	15	40
Norway	8	25
Portugal	2	7
Spain	2	8
Sweden	31	55
United Kingdom	6	26
United States	6	56
<b>Emerging Market average</b>	<b>4.9</b>	<b>27</b>
Argentina	3	
Brazil	5	6
China		3
Czech Republic	1	90
Hong Kong, China	5	1
Hungary	6	
India	11	2
Korea, Rep. Of	13	65
Mexico	3	41
Poland	1	
Singapore	5	10
Thailand	1	
<b>Average for all economies</b>	<b>6.9</b>	<b>28</b>

Source: Data on are from various sources, but mainly from DataMonitor and central banks (Claessens et al., 2001)

With further advances in computing and telecommunications it has also become possible for payments and information about payments to be transmitted without the need for a vast infrastructure of high security magnetic tape generation and processing. Financial institutions can now use electronic credit transfer services for same day value payments (one day settlement), while the international message-switching service, SWIFT, has revolutionised correspondent banking.

The advent of cable television and digital broadcasting with modems/telecommunications offer the prospect of a vast expansion in the ability to engage in financial transactions at home. If provided, modems are a lower-cost option that consumers may select initially. Nor has the impact of IT been limited to retail or commercial banking. In many respects its most dramatic effects have been experienced in wholesale banking, associated money and capital markets. For example, the relatively new but vast markets in derivative instruments – financial futures and options, interest rate and exchange rate swaps and the like – would simply not exist in anything like their present complexity without the support of ultra-sophisticated computer based pricing models.

At the same time, technological advances have altered the competitive landscape within which banks find themselves operating. In short, the same technologies which permit banks to operate more efficiently and provide new services, also allow their competitors – traditional and non traditional alike – to do likewise. They also make it easier for their customers to do away with conventional banking services, or at least to deal with their bankers from an IT platform which gives them greater economic power in the banking relationship. The IT Revolution is essentially, changing financial and economic frameworks, resulting in uncertainties which would prove challenging to central banks which conduct monetary policy. Accordingly, central banks must exert every possible effort to grasp the changes accompanying the IT revolution and to minimise the uncertainty faced in policy decisions.

## **2.4 IT Impact on Productivity**

The IT revolution is increasing the efficiency of the information processing used in goods and services processes through the increases in information processing and data transmission performance and major cost reductions. In B2B (business to business) e-commerce, efficiency can take place in various ways. Firstly, it can reduce procurement costs as it becomes



easier to source for the cheapest supplier. As an example, British Telecom claims that buying goods and services on-line reduces the cost of processing by 90 percent and cuts the direct cost of goods and services by 11 percent. Furthermore, a report by Goldman Sachs, an investment bank, estimates that on-line purchasing could save firms anything from 2 percent in the coal industry to perhaps 40 percent in electronic components<sup>6</sup>.

In the case of digital goods and services, such as software and music, which can be delivered electronically, efficiency originates from the decreasing distribution costs for goods and services and particularly, in digitised financial services where the costs per transaction via internet is the lowest (see Table 2.1).

**Table 2.2 Channel and Cost per Transaction**

<b>Channel</b>	<b>Cost per Transaction (USD)</b>
Full service branch	1.070
Telephone	0.540
ATM full service	0.270
PC banking	0.015
Internet WWW	0.010

Source ABA, Booz-Allen & Hamilton.

The advent of this new era has coincided with dramatic cost reductions in computer components and communications equipment. Declines in computer prices, which were already rapid – roughly 12 percent per year on average between 1987 and 1994, accelerated to 26 percent per year during 1995 and 1999. Between 1994 and 1998 the price of telecommunications equipment declined by 2 percent per year<sup>7</sup>.

IT is revolutionising not only the way we communicate but also the way we work, shop and play. But is it really changing the economy? The optimist argues that IT helps economies to grow faster, and that it has also eliminated both inflation and the business cycle. Cyber sceptics retort that sending e-mail, downloading photos or booking holidays on-line may be fun,

6. The Economist, The New Economy Survey, 23 September 2000.

7. Ibid, p. 3

but the Internet does not begin to compare with innovations such as the printing press, the steam engine or electricity.

The economic benefits of the IT revolution could, however, BE COMPARABLE to those garnered from the invention of electricity. The value of IT and the Internet lies in their capacity to store, to analyse and to communicate information instantaneously at negligible cost. As Brad De Long, an economist at the University of California at Berkeley puts it: “IT and the Internet amplify brain power in the same way that the technologies of the industrial revolution amplified muscle power”.

In addition to falling prices, computers and the Internet have four other important features:

- (i) IT is pervasive - it can boost efficiency in almost everything a firm does, from design to marketing to accounting, and in every sector of the economy.
- (ii) By increasing access to information, IT helps to make markets work more efficiently. Economists at UBS Warburg suggest that the “new economy” should really be called the “transparent economy” because the Internet makes it more exposed and transparent. The Internet allows consumers to seek the lowest price, and firms to get quotes from more suppliers; it also reduces transaction costs and has no barriers to entry. In other words, it moves the economy closer to the textbook model of perfect competition.
- (iii) It is truly global as knowledge can be stored as a string of zeros and ones and sent anywhere in the world at negligible cost. Information technology and globalisation are intricately linked.
- (iv) IT speeds up innovation by making it easier and cheaper to process large amount of data and reducing the time it takes to design new products.

In the real economy, the accumulation of IT capital stock through active IT investment with accompanying labour savings and improved production efficiencies, lead to reductions in the prices of goods and services. In addition, the reduction in information transmission costs has enabled a transformation from the former production system, which was based on projected demand to one based on consumer production orders whereby goods are provided in accordance with actual consumer needs.

As all of us know, IT works as an engine of growth for the industrial sector by transforming information into innovation. William B. Harrison, Jr., Chairman and Chief Executive Officer of Chase Manhattan, an organisation that has pioneered many of the banking industry's most innovative applications of IT, commented: "*IT has been one of the key drivers of the global economy*". The whole Internet phenomenon is furthering a trend that had already begun, and will continue to have a huge impact on our industry. Another comment comes from BSCH's Corcostegui "*there is no doubt that technological development is one of the main motors of change in the financial system*". Technology is permitting new competitors from all over the world to develop quickly the numerous e-business in order to reap the rapid growth of potential customers with low transaction cost.

## **2.5 Impact of IT Revolution on Economic, Social and Cultural Factors**

The importance of technological impact on the global economy and especially on the banking industry worldwide cannot be denied. It has changed the face of human civilisation over the past 50 years and there is no doubt that this sweeping change is going to continue its momentum, at least for the foreseeable future.

Advances in IT have revolutionised virtually every aspect, not only in terms of the economy, but also of human life in the post-war years, as ever smaller and cheaper computers are produced that are able to perform increasingly complex and sophisticated functions. What could originally be undertaken only by a mainframe computer was soon replaced with the mini-computer, then by a microcomputer and now of a laptop. At the same time, advances in programming skills – the intellectual inputs into the physical world of microchips – have vastly expanded the range of tasks which computers can perform which can be anything from chess to forecasting the weather or business prospects.

The most significant are those that have permitted computers to replicate the attributes of human thought than the mere ability to undertake calculations of a pre-set programme. It has become possible to imbue computers with *artificial intelligence* which is essentially a capacity to recognise patterns in the data they receive and to learn from their own experience in processing those data and to develop expert systems which allow computers to capture and apply some of the judgmental experience gained by professionals in their particular field of application.

More recent developments in the areas of neural networks and fuzzy logic have helped computers to address problems which do not lend themselves to solutions which are unambiguously right or wrong, and for which their binary logic is most naturally suited. These developments are of crucial significance to organisations for which 'soft', judgmental, interpretative applications of computing are every bit as important as 'hard' data processing ones.

### **3. IT Impact on the Financial Structures of the SEACEN Countries**

The impact of the IT revolution on the financial industry will be examined in this Chapter. An attempt will be made to answer questions like whether IT will change significantly financial products and services and what changes will occur in financial markets, banks and other financial intermediaries that provide these products and services. This Chapter will therefore examine the influence of IT on financial markets, financial transactions, financial intermediaries, financial risk management and the payment and settlement system.

#### **3.1 Changes in the Financial Market**

IT has reduced asymmetric information in financial markets, mitigated adverse selection and the moral hazard problem. Today, assets that were previously held on the balance sheets of financial institutions can now be traded, in part, because it is easier for third parties to value them. Transaction costs have also fallen as financial institutions have learned how to unbundled and repackage risk, allowing them to be transformed into transparent securities so that the third parties can value and make them tradable<sup>8</sup>.

The IT revolution is changing the content of financial goods and services to more advanced and convenient ones. Combined with revisions to the legal, taxation and disclosure systems for financial markets and other market infrastructure improvements, these changes increase the variety of

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8. Mishkin, Frederic S & Philip E. Strahan, *What Will Technology Do to Financial Structure ?*, page 254.

financial products traded in financial markets. Meanwhile, the rise in the speed of information processing, transmission and the reduction of costs are promoting more active arbitrage trading among financial products<sup>9</sup>.

A quote from *The Economist* says “*The Internet is affecting the way financial intermediaries do business with their retail customers-known as B2C (business to consumer) market. IT has made possible a global digital financial market where, in theory, any security in any currency could be traded anywhere at any time, and where that trade could be settled instantly*”<sup>10</sup>. In other words, the rapid development of IT is causing financial markets to move into retail business, such as B2B and B2 C.

In the USA, the use of automated underwriting and credit scoring for residential mortgages, credit card loans, and small business loans has also reduced the fixed costs of making these loans. This decline in the transaction costs of writing these contracts has both expanded the supply of these kinds of credits and enhanced their liquidity.

### **3.2 IT Impact on Financial Transactions**

The IT revolution may be characterised by the integration of information processing and telecommunications technologies, the consequent acceleration of the speed of information processing and transmission, reduction of information processing costs, and increase of the geographical distance over which information can be transmitted (globalisation) and the astounding speed at which information technologies are spreading. These developments are greatly changing financial transactions.

IT has made it possible for new financial products and services to be innovated. New products such as derivatives (such as options and futures) have grown dramatically and the development of securitisation and the practical use of e-money and other electronic payment and settlement technologies are becoming common.

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9. Institute of Monetary and Economic Studies (IMES), Bank of Japan, *Technological Innovation and Banking Industry/Monetary Policy: Forum on the Development of Electronic Payment Technologies and its Implications for Monetary Policy*, page 26.

10. *The Economist*, 20 May 2000, *Survey Online Finance*, page 36.

The growth in derivative is due to increases in information capacity from IT which has provided banks and other finance market participants with the means to actualise recent finance theory. IT has also made securitisation a less complicated exercise as it is now possible to present risks and returns of financial products which were previously difficult to quantify due to their extreme complexity (that is, to accurately calculate the probability of future cash flows and to present the calculation results to investors). Coupled with this, technologies are also being developed to produce new financial products which have more evenly spread out risk-return by pooling multiple products with different risk-return characteristics<sup>11</sup>. As a result, the securitisation of financial products has been further developed.

Parallel with financial engineering development, the IT revolution is dramatically improving the risk-management capabilities of assets managers. Examples include the quantification of portfolio risk such as price volatility risk through Value at Risk (VaR), the identification of the risk factors that influence portfolios, and the calculation of the correlation among these various risk factors. Thus, investment trust, pension fund, hedge fund and other asset managers can now adjust the composition of their portfolios to optimise the risks and returns. This improvement in risk-management capabilities is also supporting the demand for new, advanced financial products and services.<sup>12</sup>

Along with the development of electronic payment and settlement technologies, attempts are being made to develop and actualise the practical use of e-money and other electronic payment and settlement means and in many countries, debt card payment services are being offered by many financial institutions.

The number of ATMs continues to expand rapidly which has more than doubled between 1988 and 1997, and the number of transactions has almost tripled over the same period. In addition, the use of credit cards and debit cards to make payments at the point of sale has grown very rapidly during the 1990s. Credit card volume doubled between 1993 and 1997, and debit card volume increased by a factor of more than four over the same period<sup>13</sup>.

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11. IMES, op cit, page 24

12. IMES, op. cit, page 25

13. Mishkin, Frederick & Philips., Op Cit, page 262

These technologies, by increasing the speed and efficiency of payments, reduce the need to hold demand deposits as well as other bank deposits. A consumer today, for instance, can make all but the smallest payments with a credit card. By consolidating payments in this way, the average balance in the cheque account can be much lower than in the past. Households can now hold the vast bulk of their wealth in mutual funds and pension funds and make payments electronically.

Financial institutions such as banks are also developing new channels, phone centres, ATMs, home banking and mobile banking (m-banking) to market and deliver their services to household customers outside of branch offices in order to cut costs and provide convenience to the customer. The immediate goal is to take routine transactions and service requests out of branches so that the branch network can be trimmed. Phone centres, ATMs and personal computers create opportunities for some cost savings within the framework of the current branch structure.

### **3.3 IT Impact on Financial Intermediaries**

As we have seen in the previous section, IT is increasing the scope of financial markets and is changing the contents of the services of financial intermediaries. In the past, because financial services were highly dependent on physical service bases such as bank branches, the provision of such services was greatly restricted by geographical limitations. In other words, IT frees market players from geographical constraints, so that they can interact on a permanent platform when carrying out transactions. With the reduction of information transmission costs and dramatic development of information processing technologies, however, the provision of bank services is no longer dependent upon a bank's branch networks, as evidenced by the recent alliances between banks and convenience stores network for example. Furthermore, the increased utilisation of networks, such as Internet banking and Internet finance (for example, public offerings of shares via the Internet), is facilitating the provision of financial services via delivery channels that transcend physical and geographical limitations.

Technological innovations also seem to be increasing the economies of scale in financial services. In USA, research based on data from the 1980s found very limited economies of scale in banking; the location of the minimum efficient scale was usually found to be somewhere between about \$100 million and \$300 million in assets, and some studies found small diseconomies of scale at the high end of the bank size distribution. Recent

efforts to measure scale economies using data on US banks from the 1990s, however, has found economies of scale between \$10 billion and \$ 25 billion in assets. Technologies such as credit scoring models, which rely on statistical analysis of default risks, require large databases on loan default histories, giving large lenders a significant advantage over smaller competitors. For instance, Bank America used about 30000 small business loans to develop a credit-scoring model. In addition, electronic payment technologies require large fixed investments and often require networks that exhibit increasing returns<sup>14</sup>.

In addition, IT and the development of financial engineering have enabled the provision of advanced, complex financial products and services and financial intermediaries are believed to be proving information about these advanced products and services and also transforming them into financial products and services that are easily understood by consumers and businesses (Allen and Santomero, 1998).

All these developments may be reducing the barrier to market entry into the financial intermediation business. The IT Revolution, therefore, may be deteriorating the comparative advantage of banks in information production, facilitating the provision of new financial products and services and the unbundling of existing financial functions so that certain financial institutions may be able to specialise in the provision of particular services. Lastly, it may promote the construction of network infrastructure such as the Internet and thus greatly diminish the significance of bank branches in providing banking services. All of these factors are facilitating the advent of financial institutions specialising in particular services as well as new entry into the financial intermediation market by firms in different industries. However, banks have three basic ways of dealing with the threat of disintermediation. They can:

1. Maximise the appeal of their products and services and the efficiency speed, convenience and usefulness of the means by which these products and services are delivered;

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14. Mishkin, Frederick & Philip E. Strahan, op cit, page 264



2. Team up with retailers offering primary levels of utility and create mutually beneficial joint ventures (or even mergers) with them;
3. Extend their activities into new areas, whether these are areas of the financial sector (for example, a bank decides to go into the business of selling insurance directly) or non-financial areas (say, a bank decides to acquire an estate agency chain but again this last development tends to blur demarcation barriers between financial institutions).

However, even with the advent of IT, the basic functions of financial intermediaries will likely remain unchanged – they will continue to provide a means of payment and settlement; a mechanism for the pooling of funds; a way to transfer resources across space and time; a way to manage uncertainty and control risk; the intermediation of risk (or risk taking); information production (the screening and monitoring of borrowers); and a way to deal with asymmetric-information problems, and the provision of liquidity.

### **3.4 IT Impact on the Payment and Settlement System**

The development of payment and settlement technologies has given birth to new innovations in the area of retail payment systems known as electronic money (e-money). Although it is still in the early stage of development, e-money has the potential to supersede the role of cash in small value payments because it can make retail transactions easier, safer and cheaper both for the individual consumers and merchants. The attempt to develop and use an electronic payment and settlement system has started since 1918, when the Federal Reserve Banks of the United States first transferred currency via telegraph.<sup>15</sup>

Electronic payment systems exist in a variety of forms which can be divided into two group - wholesale payment systems and retail payment systems. In the U.S., wholesale payment system exists for non-consumer transactions, high value wholesale payments that flow through the three major interbank funds transfer systems, namely, CHIPS, SWIFT and Fedwire. Retail electronic payment systems encompass those transactions involving consumers. These transactions involve the use of such payment mechanisms as credit cards, automated teller machine (ATM), debit cards, point-of-sale (POS) terminals, home banking, telephone bill-paying services, and mobile

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15. Article, <http://lawyer.20m/English/articles/e-money.htm>

banking (m-banking). A number of innovations are taking place in the area of retail electronic payments known as electronic money (e-money). These innovations, which are still at the early stage of development, have the potential to challenge the predominant role of cash for making small value payments and could make retail transactions easier and cheaper for consumers and merchants<sup>16</sup>.

### **3.4.1 E-Money**

The European Commission defined electronic money in its draft directive as:

- Stored electronically on an electronic device such as a chip card or a computer memory;
- Accepted as means of payment by undertakings other than the issuing institution;
- Generated in order to be put at the disposal of users to serve as an electronic surrogate for coins and bank notes;
- Generated for the purpose of affecting electronic transfer of limited value payments.<sup>17</sup>

The report of Bank for International Settlements (BIS), Basle, October 1996, defined electronic money as the *"stored value" or "prepaid" products in which a record of the funds or "value" available to a consumer is stored on an electronic device in the consumer's possession*. It can be carried on the person in the form of a smart card or stored-value cards or electronic wallets. The electronic value is purchased by the consumer and is reduced whenever it is transferred directly to other devices, or the consumer uses the device to make purchases via point of sale terminals or over open computer networks such as the Internet.<sup>18</sup>

It is clear that e-money includes both prepaid cards (sometimes called "smart cards" or "electronic purse") and prepaid software products that use computer networks such as the Internet (sometimes referred to as "digital cash"). The most common e-money products are card-based products, the

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16. Ibid, page 1

17. Ibid, page 2

18. Bank for International Settlements (BIS), *Implications for Central Banks of the Development of Electronic Money*, Basle, October 1996, page 1

industry leaders in this sector being *Mondex and VISA Cash*. While the Dutch company *Digicash* first pioneered the software approach, there are dozens of versions such as *Proton, PayPal, eMoneyMail, BillPoint, Payme.com, PayTrust and Propay*. Although each of them comes with different features, they can be included in the two general categories above. These products have so far been only used in limited consumer and business applications.

In general, e-money should be characterised as a substitute for currency. As mentioned above, it is a replacement for currency as well as other payment mechanism such as cheques, credit cards, traveller's cheques and debit cards. Their features include the following:

*Firstly*, e-money value is stored electronically on an electronic device, although different products differ in their technical implementation. To store the prepaid value, card based schemes involve a specialised and portable computer hardware device, typically a micro processor chip embedded in a plastic card, while software-based schemes use specialised software installed on a standard personal computer.

*Secondly*, e-money value is transferred electronically in different ways; some e-money schemes allow transfers of electronic balances directly from one consumer to another without any involvement of a third party such as the issuer of the electronic value. More usually, the only payments allowed are those from consumers to merchants, and the merchants in turn have to redeem the value recorded.

*Thirdly*, related to transferability is the extent to which transactions are recorded. Most schemes register some details of transactions between consumers and merchants in central databases, which could then be monitored. In cases where direct consumer-to-consumer transaction are allowed, these can be recorded on consumer's own storage devices and can be monitored centrally only when the consumer contacts the e-money scheme operator.

*Fourthly*, the number of participants and parties functionally involved in e-money transactions tend to be greater than in conventional transactions. Typically, four types of service provider will be involved in the operation of an e-money scheme: the issuer of the e-money value, the network operators, the vendors of specialised hardware and software and the clearer of e-money transaction. The issuers are the most important providers, while the network operators and vendors only supply technical services, and clear-

ing institutions are typically banks or specialised bank-owned companies that provide a service that is no different from that provided for other cashless payment instruments.

*Finally*, technical hitches and human errors may hinder or prevent the execution of a transaction to a degree not commonly experienced in relation to paper-based transactions.

One version of e-money, the *Mondex*, was developed in 1990 in London and is currently available in more than 75 countries around the world. It contains a microprocessor chip that can hold and transfer electronic value. By utilising bearer certificates, fund deposits are remotely stored on the actual user's card, which is not linked to any central account. In addition, the electronic wallet that accompanies the card allows the value on the card to be transferred from person-to-person indefinitely without any central verification or clearing requirement, making it the closest in operation to real cash. It also has the additional ability to store the recent payment history<sup>19</sup>.

With regard to their potential use and growth, card-based products are being designed to facilitate small-value payments in face-to-face retail transactions and would therefore constitute a close substitute for bank notes and coins while software based schemes would be used to make remote payments over computer networks, primarily the Internet. They are likely to substitute for both cash and, to some extent, other cashless payment instruments such as cheques and funds transfers.<sup>20</sup> However, the growth of e-money may be constrained by the potential of fraud and the high cost of introducing the necessary security measures. Stored value cards may not be used to carry large balances due to potential fraud and as such the aggregate amount of credit supplied by such means may not be enormous.

In some SEACEN countries, there has been some headway made in usage of e-money. For example, e-money (K-cash) has been introduced in Korea in early 1996 and about 4,300 cards have been issued since. Mondex which began in 2000 has issued about 3000 cards. The second development in Korea is m-banking which started with 6 bank providers in March 2000 and has 18 bank providers (from 22 of the total banks) in September

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19. Ibid, page 3

20. Ibid, page 3

2001. However, m-banking services is still not widely used and the total volume of fund transfers amounted to 18,152 a month for all 18 banks. This represents a daily average of only 18 transfers for each bank. In Indonesia, e-money is still in the developing stage. Bank Bali has issued the e-wallet recently while m-banking is only provided by only 3 banks.<sup>21</sup>

### **3.5 Overview of the Development of IT of the SEACEN Countries**

The following Section has been summarised from the SEACEN countries' questionnaire responses. Table 3.2 gives an overview of the development of IT in the SEACEN countries which is also described in the country sections.

**Table 3.1 IT Development in the SEACEN Countries as of 2000**

Country	Number of Internet users (million)	Value of Online Transactions (B2B & B2C) (billion)	Number of e-Banks	Number of e-money products
Indonesia	0.43	Rp. 5,000	6	1
Korea	19.04	W 11,197	20	2
Malaysia	1.4	NA	3	2 <sup>a</sup>
Myanmar	NA	NA	NA	0
Mongol	0.03	NA	0	0
Nepal	0.1	NA	NA	NA
Philippine	NA	NA	31	4
Singapore	1.3	S\$93.878	Almost all	1
Sri Lanka	0.05	NA	6	1
Thailand	NA	Baht 27,125	NA	2
Taiwan	6.26	NT\$1.634 <sup>b</sup>	17	1

<sup>a</sup> initially tested in 1999

<sup>b</sup> 1999 data

Source: SEACEN member central banks.

21. SEACEN Countries Questionnaire Answers.

### **3.5.1 IT Developments and Policy Responses in SEACEN Countries**

#### **Indonesia**

In terms of the payment and settlement system, Indonesia has implemented the RTGS (Real Time Gross Settlement) system or what is known as the BI-RTGS. This is used to speed up the development and implementation of an effective, accurate, safe, and reliable payment system. RTGS will be used as the hub of interbank payment system and was implemented by Bank Indonesia on 17 November 2000. As of September 2001, it has handled credit note transactions totalling about 1 billion rupiah. Consequently, the amount and value of credit note settled through the Jakarta Clearing has declined.

In terms of Internet banking, as of mid-year 2001, there are 6 banks which have provided on-line services, including account information, fund transfer, bill payment, administration, new loan application and historical transactions. Three banks have started mobile banking. Since 1996, securities have been traded electronically while on-line/remote trading of securities began at the end of 2001. The development of the scripless securities settlement system started in 1998 and is expected to be completed by September 2003. In terms of cross border payment system, the S.W.I.F.T. network is the main channel for transmitting information on cross-border payments for international funds transfers. At the end of 2000, S.W.I.F.T. membership in Indonesia stood at 56 banks.

There are currently 6 domestic shared ATM networks and 2 international shared ATM networks. Internet commerce services in Indonesia focuses on "B2C" especially for foreign buyers. A new instrument in retail payment have also been introduced by one of the private bank in Jakarta, namely the "e-wallet".

There is currently no specific policy on IT products and services. However, Bank Indonesia is studying and preparing the concept of Internet banking regulation, especially on the permission and monitoring aspects of banks providing transactional services through their web sites. In regulating Internet banking, Bank Indonesia will emphasise on bank regulatory, and not focus on technology. Bank Indonesia expects that banks in conducting their business are subject to not only prudential banking and risk management principles but also project management such as planning, policy stating, organisation, staffing in operating and using IT system and application, which was

directed in the Circular Letter SE BI No. 27/9/UPPB date 31 March 1995. Second, the regulation will ensure the same level of protection for every bank customer carrying out transactions over the Internet as other delivery channels. For the time being, until the Internet banking regulations are enforced, the banks providing Internet banking services are still subject to the decree of Directive of Bank Indonesia No. 27/164/Kep/Dir date 31 March 1995 on the usage of Information System Technology by banks.

## **Korea**

The development of IT in the financial sector in Korea is at the advanced stage as there is continuous concerted effort by the authorities to promote IT development. Since early 1996, banks, telecommunications companies and credit card companies have been working on the development of K-cash for which the pilot project was launched in July 2000. The pilot project has been successful in terms of security tests, clearing procedure, etc., and banks are preparing for the nationwide operation of the scheme. Mondex cards which is provided by Mondex Korea was established in 1998 as a subsidiary of MasterCard Corporation. Internet banking was introduced in 1999 with 13 operators which increased to 20 in the year of 2000. The user of Internet banking has also multiplied by more than three times. Meanwhile, mobile banking services are provided by 18 domestic banks.

Until now, the development of IT products and e-banking has not led to changes in policies and regulations. E-money is regarded as a multi-purpose prepaid card in Korea and the regulation is also covered in the existing one for prepaid cards. However, efforts have been made to consolidate the regulatory system of e-banking. Firstly, the establishment of union stipulation is in progress among the commercial banks. Secondly, a special law for electronic funds transfer is under consideration by the Government. In addition, it is expected that a regulation for the establishment of Internet-only-banks will be developed by the authorities in the near future.

At present, the informatisation promotion system is largely governed by the Informatisation Strategy Meeting supervised by the President. The enforcement plan for informatisation is a part of the basic plan which details annual plans of the **CYBER KOREA 21** that presents the vision and practice of national informatisation.

## **Malaysia**

Information technology developments in the Malaysian banking industry started in the 1970s when early forms of computer-based applications for information processing were introduced. However, it was in 1981 and 1982 when the first form of automated banking applications made an appearance in the form of Automated Teller Machines (ATM). The widespread adoption of ATM units also created several ATM networks in the late 1980s, which culminated in the formation of the Malaysian Electronic Payment System (MEPS), a private payment channel provider which was jointly owned by the domestic Malaysian banks. MEPS provided a common platform for retail or micro, electronic payment services and is currently engaged in several projects such as MEPS cash, an e-money venture with local banks.

The next phase of electronic banking was telebanking (telephone banking), which took off in the early 1990s. With more than four million fixed lines, the service became popular for inquiries and inter-account transfers. PC-banking started to proliferate in the mid-1990s, with most of the business coming from corporate customers seeking to link their information systems directly to the bank's system for data transfer and on-line inquiries.

In June 2000, Bank Negara Malaysia (BNM) allowed all domestic Malaysian banks to provide full transactional/interactive Internet banking services as an additional delivery channel. Maybank, the first local bank to offer Internet banking services, currently offers a wide range of services through its portal.

In terms of payment and settlement, the RENTAS (Real Time Electronic Transfer of Funds and Securities) is the real time gross settlement platform for interbank payments. It replaced the previous fund transfer system (SPEEDS) in May 1999. In the RENTAS environment, both processing and final settlement of funds transfer instructions can take place continuously in real time.

The Malaysian Government through various agencies such as the central bank, Attorney General's Office, Multimedia Development Corporation, relevant legal firms and in consultation with the banking industry's associations have tackled a wide range of IT infrastructure issues that have an impact on the financial structure of the country. The central bank, BNM, has put in place a regulatory framework that encapsulates prudential require-



ments giving the banks considerable leeway for innovative financial products. BNM has also issued a comprehensive guideline that covers financial services offered through the Internet banking delivery channels. To govern the provision of banking products and services over the Internet, BNM issued the "Minimum Guidelines on the Provision of Internet Banking Services by Licensed Banking Institutions". Banking institutions require a one-time approval from BNM prior to the offering of Internet banking services. The Malaysian Government has also put in place a legal infrastructure in terms of a range of cyber laws.

With respect to the developments in e-money applications, namely MEPS Cash, the activities are regulated by Bank Negara Malaysia under the provisions of the Banking and Financial Institutions Act 1989 in relation to electronic fund transfer systems

### **Myanmar**

IT development in Myanmar is still at a very early stage. However, some progress has been made with regard to the development of the IT environment as follows:

- The setting up of the Myanmar computer development council in 1996.
- Establishment of the Myanmar Computer Federation in 1998 (NGO).
- Establishment of NGO organisations in 1998.
- Fostering relationship with the Center of the International Cooperation for Computerisation (CICC), Japan, for various IT development activities.
- Actively participating at e-ASEAN task force and working group.
- Establishment of the IT sub-committee for Japan-Myanmar Economic Structural Adjustment Task Force.
- Establishment of e-National Task Force and four working groups.

The government policy is to promote the development of IT application to enable Myanmar to catch up with other countries in the sphere of IT science.

## **Mongolia**

The first Smart Building (Center of Scientific and Technological Information) which had on-line and real time connections with Moscow's computing centre was established in the 1980s and functioned until the transition period of the early 1990s. In 1993, during the transitional period, Mongolia formulated the national IT action plan as one of the pillars to advance socio-economic transition. The first Internet connection was established in 1994 and the speed of Information and Communications Technology (ICT) implementation accelerated.

In February 2000, the Parliament of Mongolia adopted the "Concept on Information and Communications Technology Development of Mongolia up to 2010 years". The mission is "to develop a society based on knowledge and intellectual potentials and to develop the quality of people's lives. A principle to ensure accessible and flexible infrastructure promoting dynamic and sustainable development in an open and fair society shall be pursued to achieve the mission".

In December 1994, Mongolia inaugurated the first Internet based services (E-mail service and Internet) and starting from January 1996 full Internet service was available for 24 hours. At present, there are six Internet service providers and it is estimated that there are approximately 8,000 Internet subscribers including corporate customers and more than 30,000 Internet users as of 2000.

E-commerce services, such as e-banking, online shopping and e-services, are becoming available in Mongolia. They have been introduced and initiated by companies such as Datacom, BodiComputer, etc. In the near future, companies are going to establish Internet service centres (ISC) in three aimags and organise corporate networking.

The Banking Supervision Department of The Bank of Mongolia is only carrying out some research work on e-money/e-banking/e-commerce. Consequently, there are no bank supervision policies, even in draft form for e-finance.

## **Nepal**

The number of Internet users in Nepal has increased significantly to more than three times in a period of 2 years, from 100,000 users in 2000 compared to only 30,000 users in 1998.

The first development of IT in Nepal was started by the introduction of the second-generation computer IBM 1401 in 1971. The Central Bureau of Statistics introduced this computer for the purpose of data processing and analysis in the census. Computers in the banking sector were used after the establishment of the Nepal Arab Bank Limited (NABL), the first joint venture bank in the country in 1984. As with the global environment, the application of IT in various sectors started in the later half of the 1990s in Nepal.

One major step for the fostering of comprehensive IT development in Nepal was the introduction of the Information Technology Policy in the year 2000. This policy was implemented with the vision to develop Nepal into an IT centre within 5 years. The policy is also aimed at strengthening the national economy by making IT accessible to the population. The policy is also expected to enhance the social service delivery mechanism to foster an environment of good governance within the country. The IT policy 2000 has formulated strategies under which private sector participation will be given top priority and emphasises the development of efficient IT manpower by creating an environment of competition and utilising information technology for developing rural areas. The IT policy also encourages the use of the Internet for promoting e-commerce, e-education and tele-health.

Credit card and ATM facilities are provided by 4 of the 15 banks in the country. One of the joint-venture bank, NABIL, introduced credit card facilities in 1990 while another commercial bank, Himalayan Bank Limited, introduced ATM facilities in 1999.

Currently, Nepal Rastra Bank is drafting a new manual with the assistance of the World Bank on its inspection and supervision policies on e-money and e-banking/e-commerce.

## **Philippines**

Currently, there are 31 banks out of 45 commercial banks that are providing electronic banking services. The range of e-banking services offered

by these banks include the provision of account information, fund transfer and bills payment, reloading of prepaid Internet and phone cards, and other non-cash services (cheque book or opening savings account, etc.). One bank even provides a free electronic mail account for its online bank clients.

A number of Philippine banks have also started to introduce card-based electronic money products that are aimed at facilitating retail payments although there has yet to be a network-based electronic money system operating in the country. The stored-value card products provide a method of retail payment that allows funds to be electronically transferred to the stored-value card, which could then be used to make purchases up to the total value held on the card. At present, there are 4 such stored-value cards in the market, namely, BPI Express Cash, Unionbank E-ON Electron, SMART Money and Mondex card. Except for the Mondex card, those customers maintaining accounts with the stored-value card participating banks can obtain the other three stored-value card products.

The regulatory framework on e-banking and e-money in Philippine is stated in Section 59 of the General Banking Law enacted in May 2000 which provides the Bangko Sentral Ng Pilipinas (BSP) with the specific legal basis to regulate the use of electronic devices in the operations of financial institutions under its supervision including the delivery of e-banking products and services to customers.

Under the Circular, banks are required to seek prior BSP approval before they can be allowed to provide electronic banking services. Applicant banks must essentially prove to the BSP that they have in place a risk management system that is adequate to assess, control and monitor risks arising from the proposed e-banking activities.

## **Singapore**

The number of Internet users in Singapore is currently about 50 percent of the population. This is the highest percentage among the SEACEN countries. At the same time, the number of Internet banking users stands at 1.14 million (out of 1.3 million total Internet users).

The development of e-money started in November 1996 with the introduction of the CashCard, a multipurpose smart card-based stored value card (SVC), which was issued by a consortium of banks. The CashCard is a bearer SVC containing stored value and is widely accepted by retailers

in Singapore as a convenient mode of cashless payment. In addition, some of the debit cards issued for use at electronic funds transfer at point of sale (EFTPOS) terminals and ATM also have CashCard features. The stored value can be topped up at ATMs, major petrol stations, or through HomeNets, m-phones and the Internet. At the end of 2000, about 4.7 million CashCards were in circulation. On August 2001, the Network for Electronic Transfers (Singapore) Pte. Ltd. (NETS) launched the Virtual Card, a network-based e-money scheme which allows the user to initiate payment via the Internet or m-phone.

Under the Banking Act, only banks in Singapore may issue multipurpose SVCs, with the approval of MAS. The Banking Act also requires banks to maintain reserves and liquid assets against the proceeds arising from the issuance of multipurpose SVCs. Banks that issue SVCs are required to provide monthly reports on the amount of SVC proceeds outstanding as part of their regular reporting to MAS.

In consultation with the financial sector and technology industry, MAS developed and issued the Internet Banking Technology Risk Management Guidelines for the banking industry in March 2001. These guidelines are designed to direct financial institutions to establish a sound and robust technology risk management process, to strengthen system availability for security and recovery capability and to deploy strong cryptography to protect customer data and transactions. Compliance with the guidelines is mandatory and the updating of the guidelines is carried out from time to time.

### **Sri Lanka**

Internet and email connections in Sri Lanka as at July 2001 stands at 50,020 and is supported by 29 Internet service providers (ISPs). The most common Internet access method in Sri Lanka is dial up connections and leased circuits. The Internet is also readily accessible from some urban hospitals, some urban national secondary schools, universities, major metropolitan centres, Internet cafes and mobile telephones (WAP). ISPs in Sri Lanka need to obtain licensing and individual licenses are issued by the Telecommunications Regulatory Commission of Sri Lanka.

The Internet Committee in Sri Lanka was instrumental in setting up the Licensed Internet Service Providers Association (LISPA). LISPA has now established the Internet Exchange (IX) to route local traffic thus saving bandwidth on the international circuit. The IX provides connection to mem-

bers of ISPs to exchange Internet traffic through an agreement and allows them to easily interconnect within Sri Lanka thereby improving connectivity and service to customers. The domestic IX was officially launched by CINTEC (Council for Information Technology) and LISPA on 18 June 2001.

In August 1995, CINTEC established a National EDI/E-Commerce Committee. Cabinet approval was obtained to recognise the national EDI/EC Committee as the National body/focal point for EDI in Sri Lanka, with technical, administrative and financial support from CINTEC. However, the lack of information and knowledge remains the main barrier to e-commerce in Sri Lanka.

As of October 2001, there are 6 Internet banks providing for about 3,214 users which is not very significant but the number has increased more than 6 times as compared to that of 2000. A commercial bank, namely, the People's Bank has introduced a Smart card based e-money product in 1998. This card may be used for multiple purposes, e.g., as electronic purse, saving account, credit card, loyalty card and also as an ATM card.

The Central Bank of Sri Lanka is in the process of implementing the RTGS system by early 2003. This will be a fund transfer system linked with all commercial banks, primary dealers and the Central Bank for their transactions. As the system involves transaction cost to the participating institutions, it has been decided to include "high value critical transfers" at the initial stage. However, primary dealers' transactions through this process will be limited to government securities. In addition, the system will be linked with the Scripless Trading System for government securities.

There is no special supervision policy on e-money/e-banking/e-commerce at the moment since IT development is still in the early stage. Unavailability of Internet services in native languages (Sinhala and Tamil) and the unavailability of telephone services in rural areas in Sri Lanka are the main barriers to the development of IT. Examination and evaluation of the adequacy and effectiveness of the internal control system in the banks form one of the important aspects during on-site inspection by the Central Bank of Sri Lanka.

## **Taiwan**

In order for the government and the private sectors to join forces in promoting the information industry and information application development

and usage, a non-profit organisation known as the Institute for Information Industry (III) was founded in 1979. Over the years, the III has collaborated with software firms for the deployment of important national information systems, which has provided efficient services to the population. These include the Residential Information System, Weather Information and Forecasting System, Agriculture Product Market Information Reporting System (AMIS), National Healthcare Information Network, etc.

In addition, the Government set up the National Information Infrastructure (NII) group in 1994 to promote the construction of information network and the innovative applications of information technology. By 1998, this group has reached its goal of increasing the number of Internet users to 3 millions within 3 years. Since then, the number of Internet users has been expanding dramatically. It reached 6.26 million persons by the end of 2000, which was more than doubled that of 1998.

The Government also approved a programme in 1999 to foster the development of automation and e-business in domestic enterprises. This programme provides tax exemption, technical assistance and training so as to assist domestic enterprises in implementing electronic commerce, with a view to reducing production costs and enhancing competitiveness. The goal is to help more than 50,000 enterprises (at least 80 percent of them will be small and medium-sized enterprises) or more than 200 systems to fully utilise electronic commerce in B2B activities, within 5 and a half years. This programme will also give priority to establishing an electronic commerce demonstration system for the information industry.

With regard to electronic commerce, both B2B and B2C have been growing remarkably over the past three years. According to a survey made by the Market Intelligence Center of the III in 2000, 46 percent of the enterprises in the service sector implemented electronic commerce, although only 18 percent of them actually used or accepted on-line ordering. On the other hand, purchases by customers via Internet have increased significantly. The scale of such purchases reached NT\$ 360 million in 1997, NT\$ 631 million in 1998 and NT\$ 1,634 million in 1999.

Under the current Banking Law revised in November 2000, only banks are allowed to issue multi-purpose stored valued cards. Up to now, many banks have issued multi-purpose stored value cards developed by the Financial Information Service Center but the use of such cards is still not very popular. This may be due to the substitution effect from the services

provided by the ATM network and the small number of shops accepting payments from such cards. Restricting the right to issue multi-purpose cards to banks ensure the control of monetary aggregates and bank credit so that reserve requirement policy can be implemented under the current legal structure. In addition, there are explicit security regulations that banks have to abide by on e-money and e-banking and bank examiners make regular checks on their compliance.

### **Thailand**

IT development in Thailand may be historically traced to the payment system. As of the year 2000, the value of transactions based on electronic based settlement is almost double that of 1996. The history of the Thai payment system has been driven by a determination to transform the system to become electronic based. As a consequence, among all five significant payment systems in the country; there are three systems that are fully electronic based (ATM network, Media clearing, BAHTNET) while the rest are semi-electronic based (ECS, Provincial).

To date, there are two multipurpose e-money schemes. One is MicroCash, which was first introduced in 1996 by the Bangkok Payment Technology Company (BPT). The MicroCash card is a reloadable anonymous electronic purse. The system is similar to that of Finland's Avant scheme. The card can be used to pay for goods and services at designated merchants such as retail stores, petrol stations, bookstores and school shops. Direct C2C transfer features are not available and the value stored on the card is denominated only in Thai baht.

The second one is the SCB smart card which is a closed system e-money scheme provided by the Siam Commercial Bank, Advance Vision System Co. Ltd., Chulalongkorn University and other universities and was launched in May 1999. Issued to various users such as students, lecturers and officers, the SCB smart card is used as an identity card as well as an ATM/debit card for small-value payments in shops such as the campus's bookstore. One year after its launch, an electronic purse feature was added to the card in May 1999. The successful implementation of this card, which currently amounts to more than 40, 000 cards, has been extended to other universities in Thailand.

On recent developments, C.P. Seven Eleven Public Co. Ltd., a convenience store which has numerous branches and a large customer base, in



co-operation with a consortium of three leading banks are considering implementing an electronic purse to help reduce cash handling costs by last quarter of year 2002.

The Bank of Thailand is aware that multipurpose e-money provided by non-bank institutions would not be subject to regulation and supervision under the Bank of Thailand's authority. However, they realise that imposing any regulations at this early stage, for example, allowing only commercial banks to issue multipurpose e-money, could hinder private initiative or innovation, particularly given the potential advantages in technology adoption and marketing incentives of non-bank institutions over commercial banks. However, in order to maintain financial system stability, policies regarding provider issues are currently under revision.

Up to now, e-money in Thailand has not been addressed by specific provision within the legal framework. The Bank of Thailand is collaborating with relevant authorities to lay down a legal framework for regulating the issuance of multipurpose e-money. Currently, the Bank of Thailand has been referring to the conclusion of the G10 Task Force on 'Security of Electronic Money as a reference for an assessment of the technical security of an e-money system.

On e-banking, the Bank of Thailand has imposed the Internet Banking Technology Risk Management Guidelines which was developed from the Bank for International Settlement's "Risk Management Principles of Electronic of Basel Committee on Banking Supervision". The commercial banks have to comply with these guidelines to meet the BIS Standard for the security control and risk management in e-banking. In terms of e-commerce, the Thai government is in the process of drafting five laws in order to facilitate this form of business in the country.

#### **4. The Role of Central Bank in IT Age**

The development of IT is expected to affect monetary policy through a variety of the central bank functions. The substitute of electronic money (e-money) for currency will influence the money multiplier, velocity of money, seigniorage, and demand for money. With globalisation, IT is also expected to promote cross-border transactions. The influence of IT is not limited only to monetary policy. A rise in non-bank enterprises that are not subject to prudential regulation and supervision could threaten the stability of payments and settlements system. Accordingly, it would be necessary for

central banks and government authorities to re-evaluate the financial sector safety net with the aim to safeguard customers and financial institutions.

#### **4.1 Monetary Policy**

Friedman (1999) argues that the effectiveness of monetary policy would be reduced with the proliferation of non-bank enterprises. The influence of monetary policy over interest rates, and then via interest rates over non-financial economic activities, stems from the central bank's role as a monopolist over the supply of bank reserves. Several trends already visible in the financial markets of many countries today threaten to weaken or even undermine the relevance of that monopoly. These developments include the erosion of the demand for bank-issued money, the proliferation of non-bank credit, and emergence of private bank clearing mechanisms. If the central bank cannot influence interest rates (in other words, the prices of financial assets), it cannot affect the prices of goods and services either. This may undermine the efficacy of monetary policy.

There are other issues that may influence efficacy of monetary policy. One is related to any possible erosion in the central bank's ability to conduct monetary policy through reduction in its asset base and reserves. This is especially so, if e-money is issued offshore and by non-bank issuers. Second, the central bank would have to cope with the likelihood of larger and more frequent fluctuations that may create instability in the monetary policy transmission mechanism (Tak, 2002). Third, the central bank's monopoly in issuing base money may be threatened from off-shore e-money issuers. Friedman (1999) makes the point that clearing and settlement might move offshore, reducing the domestic central bank's influence.

##### **4.1.1 E-money and Currency**

Since electronic money was introduced, it has been rapidly spreading and changing the patterns of our everyday lives. There is no consensus in the academic profession as regards the future role of e-money as a substitute for traditional currency.

Friedman (1999) emphasises the erosion of the demand for bank money. As a result of the development of new technologies, there are a variety of alternatives (such as e-cash and smart cards) to conventional bank money. He asserts that some types of smart cards in the future could develop into genuine private monies. If issuers of smart cards settle with mer-

chants by transferring balances at banks, then these cards would be no different from today's Visa or Master cards. But to the extent that third parties are willing to accept balances on the non-bank firm's books in payment for their own transactions, there would be no need for the firm that issues the card to maintain bank balances to back up in full its corresponding liability.<sup>22</sup> At that point, non-financial transactions made by swapping balances on that firm's books would take place independently of any new use of bank money, and hence independently of any need for reserves at the central bank. In that case, what would be left to the central bank would be its control over the remainder of the monetary base, that is, not bank reserves but currency.

Mervin King (1999) has recently offered an even more radical view of the future in a discussion of the prospects for central banking in the twenty-first century. He viewed that the twentieth century was the golden age of central banking—a time in which central banks rose to an unprecedented importance in economic affairs, notably as a result of the rise of managed fiat currencies as a substitute for the commodity money of the past. In his opinion, central banks may never again have such an influence, since the development of e-money eliminates their monopoly position as suppliers of means of payment. This may even lead to the eventual elimination of the demand for settlement balances at the central bank owing to the development of electronic networks allowing payments to be settled without even the involvement of central bank settlement accounts. According to Woodford (2000), this prospect is highly speculative at present, because most current proposals for variants of e-money still depend upon the final settlement of transactions through the central bank, even if payments are made using electronic signals rather than old-fashioned instruments such as paper cheques.

On the other hand, there are different opinions from these forecasts of the diminishing role of the central bank with the advent of e-money. Freedman (2000) concludes that it is extremely unlikely that e-money will displace bank notes or the settlement services that are offered by central banks

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22. Friedman takes an example of the Metropolitan Transit Authority (MTA) in New York, in which the authority has made several attempts, to date largely unsuccessful, to persuade city-area merchants to accept MTA smart cards in payment for purchases. He expects it to be easy to imagine how firms would accept, and swap, balances on the MTA's books, in 25 years, after acceptance of such cards had become sufficiently widespread.

in the foreseeable future. Moreover, even in the extremely unlikely case that the spread of e-money leads to the elimination of bank notes and that alternative settlement services may take the place of central bank services, he believes that central banks would still be able to continue to influence the policy interest rate. He divides e-money or e-banking mainly into two categories. One type is 'e-cash', which includes electronic purses and multi-purpose stored value (smart) cards: for example, the form of stored-value card (SVC) such as Mondex, Visa Cash, and Proton that are known internationally. Another type is 'cyber-money' or 'network money', which is pre-paid software products that can be used for payments or transfers on the Internet, such as the failed Digicash (Freedman, 2000; Hawkins, 2000). E-cash will be used to make small-value payments such as the purchase of newspapers, fast food, telephone calls, in part because of the risk of loss or theft. Thus, e-cash is expected to be a substitute for bank notes and coins, while network money is more likely to substitute for bank deposits. It is generally thought that the spread of e-cash will be quite gradual. Freedman argues that it is unlikely that other mechanisms will be used as a replacement for settlement balances in the foreseeable future, since the central bank is risk-free and is able to act as the lender of last resort.

Goodhart (2000) agrees with Freedman by the following reasoning. Currency is anonymous in the sense that the recipient of a cash payment does not know anything about the counter-party in transaction, while most e-transfers immediately provide a record of what a customer has bought, who is the seller and with which financial institution, enabling an audit trail. Even when e-purses are developed which do not necessitate such information transfers, the payer/payee would not be confident that the other counter-party is not recording the transaction in a manner that may leave an audit trail. In addition, currency cannot legally be refused because it is legal tender. Given these special characteristics, he asserts that the demand for currency would not disappear in the foreseeable future.

#### ***4.1.2 Money Multiplier***

The effect of open market operations on reserves is more uncertain than the effect on the monetary base (Mishkin, 1992). The effect of an open market purchase on reserves differs depending on whether the seller of the bonds keeps the proceeds from the sale in currency or in deposits. If the proceeds are kept in currency, the open market purchase has no effect on reserves; if the proceeds are kept in deposits, reserves increase by the same amount as the open market purchase. Meanwhile, the effect of an open mar-

ket purchase on the monetary base is always the same, whether the proceeds are kept in deposits or currency. Thus, the central bank can control the monetary base (or high-powered money) better than it can control reserves.

The money multiplier plays a role to link the money supply (M) to the monetary base (MB):

$$M = m * MB,$$

where  $m$  is the money multiplier which indicates how much the money supply changes for a change in the monetary base. The central bank can control the money supply by adjusting MB through the money multiplier. In the IT age when e-money is being used more widely, the money multiplier is expected to rise, using the simple money multiplier theory in Appendix C (BOJ, 2000). Although the money multiplier has always been unstable, its movements have been cyclical in nature. As e-money spreads, its movements will have an additional upward shift. Thus, the money multiplier will probably be more unstable, with the proliferation of e-money, than now, so that it will be difficult to predict the movements of the money multiplier and that it will not be easy for the central bank to control the money supply through the monetary base.

#### ***4.1.3 Money Demand and Velocity of Money***

Money has three primary functions – as a medium of exchange, a unit of account, and a store of value. Electronic means of payment will mainly provide the first function, although it will give the other two functions. The effect of e-money on money demand can be analysed by applying to the money demand model of Baumol and Tobin, based on this transaction motives (BOJ, 2000). In their model, money that earns zero interest is held only because it can be used to carry out transactions. There is a positive correlation between the costs of converting deposits into cash and the cash demand. As electronic payment system develops, it would be easy to access one's deposit account through Internet so that the costs of converting deposits into cash will be reduced. The costs reduction of travelling to and from the bank will make it possible to convert from deposits to cash more frequently, and thus to reduce the balance of non-interest bearing cash.

E-money could also affect velocity of money. Velocity (V) of money is defined as the ratio of total spending (PY) to the money (M):

$$V = \frac{PY}{M} .$$

According to Irving Fisher, velocity of money is determined by the institutions in an economy that affect the way individuals conduct transactions (Mishkin, 1992). For example, if people use credit cards increasingly, instead of money, to conduct transactions, less money is required and consequently velocity will rise. Fisher took the view that the institutional features would affect velocity only slowly over time, so velocity would normally be reasonably constant in the short run. This view argues that nominal income is determined by movements in the quantity of money. The effectiveness of monetary policy is closely related to whether there is a stable relationship between money and nominal income. The stability and forecast of velocity of money in the IT age would be an important issue for conducting an effective monetary policy.

According to Havrilesky (1987), the concept of velocity of money based on national income and money would weaken in the IT age. Velocity of money tells us the ratio of nominal income to money *stocks* (at the end of a period). This ratio is not expected to reflect money *flows* (during a period) well, since transactions through electronic payments would increase, as a consequence of positive factors such as convenience of transaction, reduced transaction costs, etc. Another issue is the stability of velocity in the short-run, which cannot be forecasted easily in the IT age, since each country has a different and specific financial environment and payments system (Kim, 1999). However, as electronic payments system develops and e-money usage prevails, velocity of money would be unstable in the short run more than before (Tak, 2001).

#### **4.1.4 Transmission Mechanism**

The development of the IT industry will have an impact on the transmission mechanism in various ways. Hawkins (2001) explains the impact through influences on financial institutions and trading in financial markets. First, some e-finance developments will attenuate, or slow, the impact of monetary policy. For example, previously constrained firms may be able to access a wider range of potential lenders. If hedging against exchange rate

and interest rate fluctuations become easier and cheaper, this could reduce the responsiveness to changes in interest rates.

Second, the spread of e-broking in retail markets may increase the wealth effects in the transmission mechanism of monetary policy. It could reduce transactions costs, encouraging more small investors to invest directly in equity markets. Reductions in equity prices resulting from a tightening in monetary policy would have much larger effects than before.

Third, another impact of e-finance is associated with competition between financial institutions. For example, virtual banks operating without physical branches are expected to make such large savings on operating costs that they would be able to offer more attractive interest rates than established banks. Savings on branch operating costs, however, may be offset by much higher marketing expenses. In the longer-term, economies of scale may lead to increased consolidation in the financial market, making the market less competitive and responsive.

Fourth, the emergence of new entities is expected - e.g., vertical portals (which compare offers from rival banks), smart agents (which go one step further and automatically transfer funds to the bank offering the best deal) and aggregators (which consolidate information about a consumer's various bank accounts). These entities might be expected to reduce information and transactions costs and so reduce lags in the monetary transmission mechanism.

#### ***4.1.5 Impact on Seigniorage***

Seigniorage is defined as a certain amount of revenue obtained from the creation of money. Seigniorage is also known as "inflation tax," which is the quantity of real purchases that the government finances from money issue. Seigniorage by this concept is earned by the government and central bank.

In the balance sheet of the central bank, the liabilities generally consist of currency with zero interest rates, while the assets consist of interest-bearing securities such as government bonds. The central bank can obtain profit from the interest differentials between the assets and liabilities and this profit is another source of seigniorage (BOJ, 2000). Seigniorage by this second definition can be obtained by the issuers of e-money, while that of the first definition is earned only by the government and central bank.

As e-money is largely substituted for cash, the balance sheet of the central bank will contract and therefore the central bank's profit arising from the interest differentials will decrease. However, forecast for these profits can differ. According to BIS (1996), the profits are usually far larger than the central bank's expenses, so even a substantial decrease in profit is unlikely to put the central bank in a situation in which it is unable to cover its costs. Hawkins (2001) argues that in the very long-run, seigniorage may be less than operating expenses of the central bank. This may force the central bank to rely on government grants to fund its operations, influencing central bank independence. Subsequently, the central bank could make three possible responses to this challenge:

- (i) persuade the government to impose taxes or reserve requirements on private issuers of e-cash to generate revenue for the central bank;
- (ii) become the issuer of e-cash;<sup>23</sup>
- (iii) increase other revenue such as charges for services rendered or build up its capital to the point where the yield on it was sufficient to fund their expenses.

There are some econometric analyses on the effects of e-money proliferation on seigniorage reduction.<sup>24</sup> Boeschoten (1996) argues that most countries would experience reduction in seigniorage by about 0.28 to 0.67 percentage of GDP.

#### **4.1.6 Cross-Border Transactions**

The development of information technologies that enable credit card numbers to be transmitted securely from Internet websites has reduced the transaction costs for electronic commerce (e-commerce). In addition, e-commerce is not subject to spatial constraints and thus cross-border e-commerce is expected to grow (BOJ, 2000). As cross-border transactions account for a larger proportion of business, each company will be more exposed to foreign exchange risks, when converting between foreign currencies and domestic currency, and therefore have an incentive to reduce those risks by retaining the foreign currency a company receives and using it for payments

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23. The authorities in Singapore plan to issue e-cash with legal tender by 2008.

24. There are two analyses in the case of Korea (Tak, 2001) and Kang (1999) where it is estimated that seigniorage reduction would be less than 10 percentage. Tak (2000) estimated that in the third stage when 70% of currency is replaced with e-money, the ratio of seigniorage to GDP would be 0.07% from currently 0.24%.



without converting back to domestic currency. If the spread of cross-border e-commerce integrates markets among countries with strong trading relationship, it may not always be desirable to employ floating exchange rates. There may be greater advantages to using a common currency for payments.

#### **4.1.7 Data and Statistics**

E-money and e-finance are expected to affect economic data that are used for analysis. If e-money displaces a significant amount of currency but is not included in monetary aggregates, the monetary base and narrow monetary aggregates may be under reported and be misleading to policy-makers. Furthermore, offshore e-banks may attract a significant share of deposits which may distort broader monetary and credit aggregates (Hawkins, 2001). Central banks may need to start collecting data on e-money and incorporate it into monetary aggregates. Since 1998, the European Central Bank has included e-money issued by banks as overnight deposits and therefore as a component of monetary aggregates. However, it is not clear that a monetary aggregate including e-money would bear the same relationship to economic activity as the current forms of monetary aggregates.

#### **4.2 Payment and Settlement System**

The introduction of Interbank net settlements system like the CHIPS (Clearing House Interbank Payments System) is threatening the monopolistic power of the central bank over reserve supply. This is because the interbank net settlement system could rid commercial banks of the transaction costs such as fees and collaterals required in the central bank settlement system (Hahm, 2000). Banks, however, are concerned about default, which might lead to the collapse of the payments and settlements system. Thus, most transactions have been so far made through the central bank settlement system.

As IT develops, non-bank enterprises may provide settlements service. On this issue, Friedman (1999) argues that if private settlements system work satisfactorily, the effectiveness of monetary policy will weaken because banks need not deposit reserves for settlements. However, there are opposite opinions to this. King (1999) stressed the finality of settlements through the central bank and Freedman (2000) pointed out the banks' concern about the settlements risk. They argue that the settlements system through the central bank would still be important even though private settlements system exist.

The merit of central bank settlements is free of risks, and the central bank can provide money easily, even in a serious liquidity-shortage condition as the lender of last resort.

Excessive issue of e-money by non-bank institutions might result in failure of a prominent e-money system, although it is not conceivable in the short-run. Since non-bank enterprises are not subject to prudential regulation and supervision, they have higher risks of failure and insolvency. This failure could shatter consumer confidence, so the stability of payment and settlement system would become an important issue. The central bank is responsible for the stability of the payments and settlements system and so must have the authority to monitor the liquidity condition of each e-money issuer. In the country where the central bank does not have the authority on bank supervision, the central bank must cooperate with the supervisory agency to enhance financial stability. Meanwhile, there is no consensus on whether the right to issue e-money must be restricted to banks only or otherwise (Lee, 2000). The opposers to this restriction assert that the restriction of issuers discourages private competition and creative efforts.

### **4.3 Bank Supervision**

Technological advances, along with financial deregulation, are greatly changing the financial structure and services provided by financial institutions, especially banks, in a majority of the SEACEN countries. While these changes have been motivated mainly by domestic competition and directed to retail customers, there is indication that banks will further expand IT deployment to other areas as domestic markets are increasingly open to foreign competition. This development puts additional pressure on the banking supervision authorities in their efforts to ensure financial stability as they have to contend with IT risks in addition to the conventional ones that are already inherent in the banking business.

The problem is compounded by the fact that the region's financial services industry has not historically placed a heavy reliance on formal risk management systems<sup>25</sup>. Based on an estimate by the Asian Wall Street Journal in 1998, the Asian banks trail the US and European banks by 3-5 years

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25. More detail discussions on this issue can be found in Barouski (1999), p. 23.

in using technology to implement risk-management systems. As a result, information sources are often fragmented and incompatible, making it difficult, if not impossible, to aggregate and assess risks on a consolidated basis for the organisation. In the current environment when internal risk management is a key element of banking supervision, such deficiency in the individual organisation makes the tasks of bank supervisors much more difficult.

On the bank supervisor side, a survey of selected SEACEN member countries conducted in the Barouski and Beutel study<sup>26</sup> indicated that bank supervisors might not comprehensively consider the risks associated with IT as they evaluate and assess the overall effectiveness of the organisation's risk management process. To address this problem, it was pointed out that bank supervisors should incorporate recent guidance on IT risk management, such as those recommended by the Basel Committee on Banking Supervision, or the Federal Reserve System, which defines such risks in five areas, namely management processes, architecture, integrity, security, and availability. More importantly, there is a need to review banking supervision policy towards an integrated risk management system that includes IT considerations.

#### ***4.3.1 Safety Net***

One of the important changes taking place in the IT age is the erosion of the nature of what has made banks special, owing to technological developments and deregulation (Claessens, 2000). For example, on the lending side, e-finance allows non-deposit-taking financial institutions and capital markets to reach far more borrowers; on the deposit and payments system side, many deposit substitutes (such as stored value cards) are emerging and many non-banks are offering these payment accounts. These changes make banks less special and challenge authorities to re-evaluate the financial sector safety net which aims to safeguard customers (deposit insurance) and financial institutions (lender of last resort).

The existence of the safety net may cause distortions as a result of the elimination of market discipline and increase incentives to take more risk, posing a moral hazard problem. This justifies government intervention

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26. Barouski (1999), pp. 33-38.

in the form of prudential regulation (e.g., minimum capital requirements, limits on the concentration of credits) and supervision of financial institutions (e.g., on-site and off-site) in order to secure the stability of the financial intermediaries (Nieto, 2001). Regulators, however, should not deter innovation, ensuring that consumers are not deprived of its benefits while securing the soundness of the financial system. Moreover, national regulations may not fit a global marketplace, needing a more internationally coordinated approach to prudential regulation and supervision. At the same time, market surveillance is becoming increasingly important.

In light of the evolution of the role of financial institutions, various authors argue that the monitoring of compliance with prudential regulation needs to be revised (Di Giorgio et al, 2000; Claessens et al, 2000). According to them, the three objectives of supervision (stability, transparency and competition) would be entrusted to three distinct authorities designed to oversee the entire market regardless of the legal form of the institutions and the functions they perform. For example, market stability and solvency of each intermediary, whether a bank, security firm or insurance company, would be the responsibility of one authority.

The most attractive aspect of this approach is that it provides uniform regulation for the same activities. The negative aspect is that it may produce a certain multiplication of controls or, vice versa, a deficit of controls may occur whenever the exact areas of responsibility are not clearly identifiable in specific cases.

Technological developments provide less face-to-face interaction with customers, so the regulators face new challenges. They have to balance the need for easy customer access with the need to ensure that transactions and data access are properly authenticated. A lack of strong authentication methods increases the risk of computer crime and breaches in privacy.

Currently, most e-finance operators rely on the use of passwords and user IDs to authenticate customers, which often prove vulnerable. New authentication methods (such as digital certificates, smart cards and biometrics) are being explored by larger financial institutions and vendors (OECD, 2001). Besides the authentication methods, systemic risk can take place from any financial institution sufficiently large in size and scope by affecting the system as a whole.

### ***4.3.2 Consumer and Investor Protection***

Issues related to consumer and investor protection include security, privacy, and transparency (Claessens et al, 2000). On security issues, technological developments (cryptographic techniques, cards with built-in chips and other verification techniques) make complete security nearly possible. Regulators may need to encourage or require operators to adopt best practice standards. Banking regulators of the G10 countries have agreed on principles aimed at addressing the risks related to the establishment of a comprehensive security control process, the privacy of customer information, non-repudiation and accountability for e-banking transactions (Nieto, 2001).

Privacy issues are becoming more important. The Internet has simplified the collection of credit and other data on individuals and businesses, and technology has lowered the costs of processing and using such information. Global standards and protocols will be needed to assure desired privacy levels. With respect to transparency issues, the proliferation of financial products, delivery channels, and institutions have allowed easier comparison of prices and products. However, the emergence of many new products and providers can reduce transparency on the exact service being offered. Transparency rules aim to impose the correct dissemination of information and equal treatment among market players.

### ***4.3.3 Competition Policy***

Promoting competition is linked with efficiency. This requires rules for controlling the structure of competition in the markets aimed at avoiding abuse of dominant positions and excess concentration (Nieto, 2001). An example is the current revision of banks' minimum capital requirements that allows for greater competition via enhanced risk management techniques. Technological developments have reduced barriers to entry, resulting in an increase in competition. Freer trade in financial services will be critical for consumers to obtain the benefits of technological gains. However, there is a need to balance those benefits with measures to ensure that systemic financial stability is not threatened.

Information technology will enable financial institutions to reach the economy of scale and economy of scope. As a result, the concentration ratio in financial markets may become higher than before, and some finan-

cial institutions may fail. Therefore, the authorities may have to take preemptive strategy to mitigate the possible negative impact.

#### **4.3.4 Money Laundering**

Money laundering is a process that conceals the illegal origin of funds stemming from criminal activities in order to give the impression that the sums have legal origins. According to IMF estimates in 1997, money laundering transactions accounted for 1.2 to 4% of world GDP, roughly the equivalent of Spain's GDP (USD 600 billion).<sup>27</sup> As a result of globalisation and technological developments, money laundering is becoming one of the most important issues.

International response is required to address the concern of internationalisation of criminal and money laundering. The three international responses to money laundering are summarised from Michau (2001). One is the Basel Declaration. At the end of 1988, the Basel Committee published a "Statement of Principles" which established the first rules applying to their member countries' international banks to prevent them from getting involved, even involuntarily, in criminal activities. The objective is to prevent the public from losing confidence in the banking system. The main principles to which the financial institutions have to adhere are "consumer identification, detection of suspicious transactions, co-operation with law enforcement authorities, drawing-up of internal awareness-raising and training programmes for staff members."

Another is the Vienna Convention. On 20 December 1988, an international Convention was signed in Vienna under the aegis of the United Nations. It laid down the fundamental principles for fighting money laundering. This anti-money laundering text defined a general framework and required the countries signatories to: (i) improve international co-operation in investigations; (ii) apply the extradition rules between signatories; and, (iii) make sure that bank secrecy does not impede international criminal investigations.

The third one is Financial Action Task Force (FATF). In 1989, the heads of the State and Government of G-7 countries decided to create the

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27. The estimate is quoted in Michau (2001).

FATF. The objective of this body was to assess the results of cooperation being fostered to combat money laundering, then to draw up and promote new strategies. The FATF currently includes 26 countries and 2 international organisations. It supports the fight against money laundering in non-member countries by recruiting new members and promoting anti-money laundering initiatives at the regional level.

#### **4.4 Implications for the SEACEN Member Banks**

The use of computers and mobile phones, and access to the Internet, are commensurate with the income level especially in developing countries, where access to the quality of financial services is limited. E-finance and globalisation offers many opportunities (Claessens et al, 2000) - (i) the low efficiency and quality of financial services favour migration toward e-finance in emerging markets. In some emerging markets, online brokerage is already on par with that of developed countries; (ii) e-finance will offer fewer choices to economies with poorly capitalised banking systems, weak regulations, and extensive guarantees on liabilities. To reduce the risk of financial crises, regulatory approaches in developing countries should recognise weak governance and institutions, concentrated ownership structures, which make textbook solutions difficult; (iii) e-finance allows much easier access to global capital and financial service providers. As financial services are imported, the need for a domestic safety net and corresponding regulation and supervision declines; (iv) e-finance offers opportunities to quickly widen access to and improve financial services. Achieving such gains will require that emerging markets give far greater priority to improving the framework for financial information, modernising and strengthening their legal systems, and improving technology-related infrastructure (such as telecommunications). These issues are also applied to the SEACEN countries.

##### ***4.4.1 The Proliferation of E-money and Monetary Policy***

Although electronic money was introduced quite a few years ago, the displacement of currency by e-money is only happening very slowly. The ratio of notes and coin to GDP has actually risen in some countries. Data from the European Central Bank (ECB) for the Euro area show that e-cash outstanding in 2000 was only 140 million Euros, less than 0.1 percent of notes and coin issued, and its spread has been slowing (Hawkins, 2001). Chart 4.1 and Table 4.1 show the ratio of currency issued to current GDP

in 10 member countries of SEACEN<sup>28</sup>. The ratio is decreasing in five countries (Malaysia, Myanmar, Singapore, Sri Lanka, and Taiwan), nearly not changing in Korea, and even rising in four countries (Indonesia, Nepal, Philippines, and Thailand).<sup>29</sup>

Although the displacement speed of e-cash may be slow in the short-run, there are possible concerns about the widespread issuance of e-money by private non-banks in the long-run. Accordingly, money multiplier and income velocity could become unstable and wider usage of e-money could eventually reduce seigniorage, restricting interest rate policy of central banks. As a result, the effectiveness of monetary policy might be substantially eroded.

There are several challenges that central banks face. First, it would be necessary to develop new monetary aggregates suitable for the IT environment, so that monetary aggregates could continue to be a reliable indicator for monetary policy. With the development of new monetary aggregates, central banks should increase effort in analysing the impact of e-money and electronic payments system on the monetary transmission mechanisms. In this regard, other meaningful data to be collected include the proportion of e-money transactions that leaks into the traditional payment and clearing system, the proportion of cross-border transactions as well as the influence of offshore e-money issuers.

The second issue is related to reserve requirements. In this regard, the Bank of Japan Forum suggests three proposals (BOJ, 2000). The first one is to impose reserve requirements at a uniform reserve ratio, on all electronic payments instruments including e-money. This policy can be expected to minimise the distortions to resource allocation because the same reserve ratio is applied across the board. The second proposal is to impose zero reserve ratios for all financial instruments. After the spread of electronic payments technologies, if there still exists a stable demand for payments through the central bank account, market operations would be effective even with zero reserve ratio, which would also minimise the disadvantages from imposing the reserve requirements. The third proposal is to make the central bank itself issue e-money. There is, however, opposition to this on account that it would constrain competition among financial institutions and

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28. The case of Mongolia is not included because of insufficient data series.

29. For five crisis-hit countries, the ratio is fluctuating after 1998, which seems to be a temporary phenomenon which digresses from the general trends.



therefore reduce the incentives to private sector innovation. This proposal needs to be dealt with the modern 'free banking' issue.<sup>30</sup> Thus, careful consideration is required for this proposal to be undertaken.

**Table 4.1 Ratio of Currency to GDP (%)**

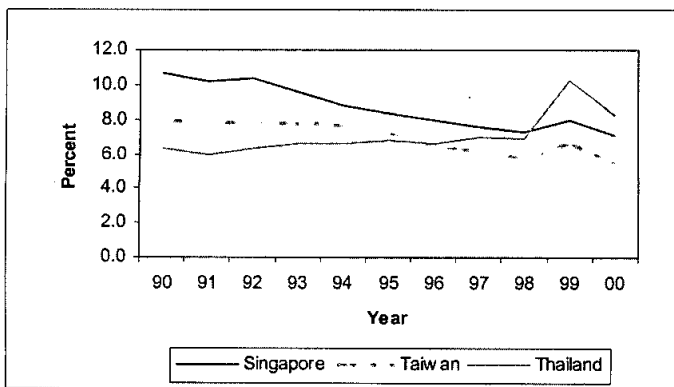
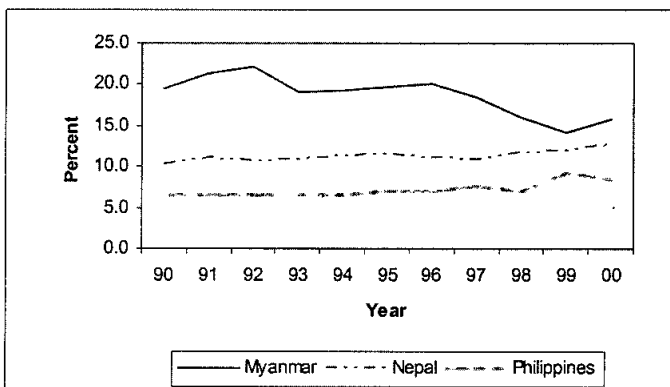
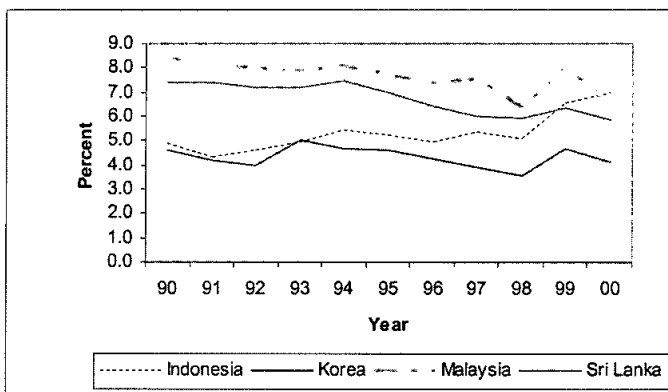
	Indonesia	Korea	Malaysia	Myanmar	Nepal
90	4.9	4.6	8.4	19.4	10.2
91	4.3	4.2	8.2	21.3	11.0
92	4.6	4.0	8.1	22.1	10.6
93	5.0	5.0	7.9	19.1	10.9
94	5.5	4.7	8.1	19.2	11.3
95	5.2	4.6	7.8	19.7	11.5
96	4.9	4.3	7.4	20.2	11.0
97	5.4	3.9	7.5	18.4	10.8
98	5.1	3.6	6.3	15.9	11.7
99	6.5	4.7	8.0	14.2	11.8
00	7.0	4.1	6.5	15.7	12.7

	Philippine	Singapore	Sri Lanka	Taiwan	Thailand
90	6.6	10.7	7.4	8.0	6.3
91	6.5	10.1	7.4	7.8	6.0
92	6.5	10.4	7.2	7.9	6.4
93	6.6	9.6	7.2	7.7	6.6
94	6.6	8.8	7.4	7.7	6.7
95	6.9	8.4	7.0	7.2	6.8
96	6.9	8.0	6.4	6.5	6.6
97	7.5	7.6	6.0	6.1	7.0
98	7.0	7.3	5.9	5.7	6.9
99	9.3	8.0	6.3	6.6	10.2
00	8.4	7.1	5.8	5.5	8.3

30. During the last four decades, governments around the world have removed a number of restrictions from financial markets and payments systems. Some economists had the idea of a completely unregulated financial and payments system, i.e. laissez faire in money and banking. The economic environments also encouraged this idea: the high inflation rates of 1970s and the difficult disinflation of the early 1980s prompted some economists to wonder whether alternative regimes might produce better outcomes (Selgin and White, 1994).

Chart 4.1 Ratio of Currency to GDP (%)



The third issue is on the increase in cross-border transactions that corresponds to the development of electronic technologies. As each company is exposed to more foreign exchange risks, central banks are expected to find measures to reduce foreign exchange risks, for example, by adopting a common currency.<sup>31</sup> The increase in cross-border transactions would also blur the concept of the national economy. In this regard, more cooperation would be necessary between central banks in the SEACEN countries.

#### ***4.4.2 Financial Stability and Bank Supervision***

As market participants easily obtain and respond to a variety of information, risks are likely to spread rapidly in financial markets, threatening financial stability. Accordingly, central banks and governments authorities need to build up a safety net with the aim to safeguard customers (deposit insurance) and financial institutions (lender of last resort). Although the existence of a safety net may cause distortions by eliminating market discipline and lead to moral hazard problem, this problem could be solved by such measures as prudential regulation and supervision of financial institutions.

The global character of e-finance through the Internet demands a different approach to the supervision framework for cross-border financial activities. For example, the approaches developed for the traditional banks do not appear to work well for Internet-only banks. The emergence of unregulated non-traditional financial providers may pose new challenges for regulators on consumer protection. Considering the importance of financial stability, it is not enough to leave banking supervision to only the central bank or the other concerned government agency of each country. Regional cooperation among the SEACEN countries as well as international cooperation would be greatly needed on cross-border supervisory issues. In this regard, the Basel Committee of BIS has issued the Electronic Banking Group (EBG) Initiatives and White Paper in October 2000 and Risk Management Principles for Electronic Banking in May 2001 (BIS, 2000; FSS, 2001). Through the SEACEN channel, bank supervisors in the SEACEN countries could identify common IT staff development objectives and collaborate in their pursuit of technical staff training (Barouski, 1999).

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31. However, there are other important considerations in order to adopt a common currency.

## **5. Conclusions and Recommendations**

IT revolution in the SEACEN countries is still under way, although the degree of development is different by country. Thus, it is not easy to predict the outcome of its impact at the present time, but IT is expected to substantially influence the financial markets and economy in the future. It would be necessary to recognise the risk of overestimating the impact of the IT revolution as well as the problem of underestimating its potential ramifications. There are several issues that the central banks in the SEACEN region needs to tackle with.

*First*, e-money is expected to have impact, in the long-run, on monetary aggregates, money multiplier and money demand, restricting the effectiveness of monetary policy. Thus, it would be necessary to develop new monetary aggregates and to analyse the monetary transmission mechanisms suitable for this new financial environment.

*Second*, as each company is exposed to more foreign exchange risks due to increase in cross-border transactions, central banks should find measures to reduce foreign exchange risks.

*Third*, since non-bank enterprises are not subject to prudential regulation and supervision, they have higher risks of failure and insolvency and market participants are expected to be more responsive to a variety of information. Thus, central banks need to build up a safety net to safeguard customers and financial institutions.

*Lastly*, the SEACEN countries need to undertake the following general measures:

- (a) to foster closer regional cooperation on cross-border supervisory issues as well as on monetary policy;
- (b) to narrow the IT development gap among the SEACEN countries and improve related research;
- (c) to deepen the understanding of regional IT risks in handling payment and settlement.

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## **Appendices**

### **A. The Questionnaire Form**

### **B. The Responses to the Questionnaire**

### **C. Money Multiplier with E-Money Effect**

## Appendix A: The Questionnaire Form

### A. General Questions

1. Please explain chronological developments of IT environments (IT usage maturity; government policies and plan on IT applications; IT national infrastructure including network and databases, future direction of IT applications).
2. If e-money is used already, please inform us of issuers of e-money (electronic money), and the chronological development of e-money. If the issuers of e-money are non-financial institutions in your country, is there any regulation over these non-financial institutions? Even if not now, is your country going to regulate in the future? Please describe it in detail.
3. Please describe bank supervision policies in your country on e-money/e-banking/e-commerce in detail.

### B. Specific Questions

	(Year)				
	1996	1997	1998	1999	2000
<b>1. Number of internet users in your country</b>					
<b>2. E – Commerce</b>					
- <b>Business to Business (B to B)</b>					
* number of users					
* volume of business					
* value of transactions					
- <b>Business to Consumer (B to C)</b>					
* number of users					
* volume of business					
* value of transactions					
<b>3. Electronic Fund Transfer Data</b>					
- number of transactions					
- value of transactions					
<b>4. Payments and Settlements</b>					
- paper based settlements (e.g. cheque, draft)					
- electronic based settlements (e.g. ATM, credit card)					
	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
<b>5. Internet Banking</b>					
- number of internet banks in your country					
- Total number of banks in your country					
- number of internet banking users					

**6. [Optional] Please provide the statistics on productivity (total factor productivity) and PC prices from 1996 to 2000.**

## **Appendix B: The Responses to the Questionnaire**

### **B.1 Indonesia**

#### **B.1.1 General Questions**

##### **1. IT Environments**

###### **■ Settlement System: Bank Indonesia Real Time Gross Settlement (BI-RTGS)**

To speed up the development and implementation of an effective, accurate, safe and reliable payment system, Bank Indonesia is now implementing RTGS. RTGS will be used as the hub of inter-bank payment system.

###### **■ Internet Banking**

Until mid-year 2001, there are 6 banks that run the Internet banking services. The services provided vary from the Account Information, Fund Transfer, Bill Payment, Administration, new loan application and history transaction

###### **■ Mobile Banking**

There have been 3 banks which have adopted and implemented this mobile banking

###### **■ Electronic Securities trading**

The development of electronic securities trading started in 1996, and is currently in the process of preparing an on-line/remote trading which is targeting to be implemented at the end of year 2001. Meanwhile the scripless securities settlement has been developed since 1998 and is expected to be completed in the middle of 2002. In anticipating global competition, recently the Indonesian Capital Market is preparing the main rules for the cross listing and cross trading.

###### **■ ATM**

To date, there are six domestic shared ATM networks and two international shared ATM networks

###### **■ Cross Border Payment System**

The S.W.I.F.T network is the main channel for transmitting information on cross-border payments for international funds transfers bank relies on their foreign correspondent network. At the end of 2000,

SWIFT membership in Indonesia accounted for 56 banks.

### ■ E-commerce Services

Currently, the Internet Commerce services in Indonesia is focusing on 'Business to Consumer' especially for the foreign buyers, 'Business to Business', and 'Government to Consumers' which are especially developed to assist government to speed up tax collection time.

## 2. Developments of E-money

Currently, there is no Indonesian financial institution including banks that has issued e-money and we do not yet see any development in this field. However, before the 1997 crisis, there were several banks which were interested in launching e-money products into the market, e.g. Mondex type and Visa Proton. This may come back when the economy picks up again since the level of cash usage is very high and therefore put pressure on cash handling for banks. As for the regulations, since BI is the authority for payment system oversight in Indonesia, it is our plan to at some point of time to draw up the regulations. The regulation will cover at least the issue of security and that related to the transferability of the money. This, we deem very important since it is BI's responsibility to maintain people's confidence in payment systems.

## 3. Bank Supervision policies on e-money/e-banking/e-commerce

Until now, we do not have any specific regulations concerning e-banking. In anticipation of the development of Internet banking services, Bank Indonesia is currently studying and preparing the concept of Internet banking regulation, especially on permission and monitoring aspect for banks providing transactional services through their websites. In regulating Internet banking, Bank Indonesia's policy will be based on two main principles. First, Bank Indonesia will emphasise on bank regulatory focus, and not technology focus. Bank Indonesia expects that banks are subject to prudential banking and risk management principles in conducting their business. Second, the regulation will ensure the same level of protection for every bank customer doing transactions over Internet as other delivery channels. For the time being until the Internet banking regulation is released, the banks providing Internet banking services still subject to the Decree of Director of Bank Indonesia No. 27/164/KEP/DIR date 31 March 1995 on the usage of Information System Technology by banks.

## B.1.2 Specific Questions

### 3. Electronic Fund Transfer Data

**High Value Transaction (RTGS) with transactions more than 1 Billion Rupiah.**

Period	RTGS Transactions	
	Transactions	Amount (Rp. Billion)
November 2000 (17 Nov to 30 Nov)	26.891	429.142
December 2000	54.250	971.333
January 2001	62.553	1.007.858
February 2001	59.333	778.066
March 2001	66.296	936.542
April 2001	66.882	885.839
May 2001	71.993	857.281
June 2001	72.666	750.328
July 2001	93.180	944.994
August 2001	105.715	992.247
September 2001	96.606	928.544.080

### 4. Payment and Settlement

#### Indonesian Clearing Data (Paper Based)

No	1996		1997		1998		1999		2000	
	Transaction (Thous)	Amount (Rp. Million)	Transaction (Thous)	Amount (Rp. Million)	Transaction (Thous)	Amount (Rp. Million)	Transaction (Thous)	Amount (Rp. Million)	Transaction (Thous)	Amount (Rp. Million)
	107.945	5.688.366	110.314	6.471.444	86.278	5.55.269	78.0888	5.156.060	73.857	7.305.420

**Jakarta Clearing Data (Paper Based)**

Month	2000				2001			
	Debit		Credit		Debit		Credit	
	Transaction (Thous)	Amount (Rp. Billion)	Transaction (Thous)	Amount (Rp. Billion)	Transaction (Thous)	Amount (Rp. Billion)	Transaction (Thous)	Amount (Rp. Billion)
January	1.272	26.363	1.145	312.070	1414	52.800	1.339	134.311
February	1.554	32.704	1.287	481.889	1390	30.764	1.219	28.448
March	1781	33.886	1.407	571.945	1462	32.447	1.212	24.986
April	1549	28.199	1.173	449.108	1537	32.609	1.289	26.379
May	1830	35.674	1.435	572.695	1571	34.276	1.371	27.655
June	1579	32.491	1.329	555.613	1483	32.742	1.308	26.568
July	1600	31.876	1.342	548.920	1602	35.466	1.313	27.587
August	1619	34.456	1.395	539.521	1591	34.277	1.406	28.101
September	1548	33.203	1.303	532.105	1438	30.510	1.285	25.349
October	1697	34.900	1.357	564.989	NA	NA	NA	NA
November	1669	35.992	1.376	455.575	NA	NA	NA	NA
December	1232	27.955	1.258	193.226	NA	NA	NA	NA

**Note:** Since November 17th 2000, Bank Indonesia has implemented Bank Indonesia Real Time Gross Settlement handling credit note transactions more than 1 billion Indonesia Rupiah. Consequently, amount and value of credit note settled through Jakarta clearing declined.

## Card Based Payment Instrument

Type of Transactions	1998	1999	2000
<b>Credit Card</b>			
Transactions (Rp. thousand)	15.395	29.578	33.741
Amount (Rp. trillion)	4.9	10.4	12
<b>Debit Card</b>			
Transactions (Rp. thousand)	11.935	16.002	17.144
Amount (Rp. trillion)	2.6	3.2	4
<b>Smart Card</b>			
Transactions (Rp. thousand)	4.171	62	958
Amount (Rp. trillion)	2.6	0.2	1
<b>ATM</b>			
Transactions (Rp. thousand)	171.802	408.766	426.167
Amount (Rp. trillion)	20.5	85.4	136

## 5. Internet Banking

	1996	1997	1998	1999	2000	2001 a)
No. of Internet Banks	NA	NA	NA	NA	5	6
Total No. of Banks	NA	NA	NA	NA	151	149
No. of Internet Banking Users b)	NA	NA	NA	NA	76,996	154,375

Note: a) Data as of April 2001.

b) Data from 4 banks.

## **B.2 Korea**

### **B.2.1 General Questions**

#### **1. Developments of E-money**

##### **(a) Card-based products**

**K-CASH** Since early 1996, banks, telecommunication companies and credit card companies have been working to develop K-Cash. A pilot project for K-Cash, a pan-bank scheme, was launched in Yoksam-dong, in the southern part of Seoul in July 2000 and in Choonchun, a medium-sized provincial city in September 2000. Suwon City plans to construct a retail payment system based on K-Cash in the course of 2001. Ten banks had issued about 4,300 cards and 350 merchant terminals had been installed. The volume of transaction were 56,000 and their value was U\$ 135,000 at the end of April of 2001. As the pilot project has been successful in terms of safety tests, clearing procedures etc., banks are planning nationwide operation of the scheme. The details of the feature of K-Cash are as follows:

- security devices are installed for consumer protection and prevention of unauthorised use
- maximum amount per card is 500,000 Won.
- closed-loop type
- outstanding balance is refundable
- compliant with transportation card system
- contact and contactless feature

**MONDEX/MYBI** Mondex cards are provided by Mondex Korea established in January 1998 as a subsidiary of MasterCard Corp. The pilot project was launched in June 2000 at COEX (Convention and Exhibition Center), Samsung-dong, Seoul. Transferability is possible within families. About 3,000 cards had been issued at the end of April 2001.

Mybi card, developed by Pusan Bank, is a closed-loop type. It has contact and contactless feature. The pilot project was launched in Pusan, in September 2000 and its use is being expanded to include transportation.

##### **(b) Network/software-based products**

**K-CASH** It is planned to allow the utilisation of K-Cash over the network(an internet) in 2001 using a special device, such as, a card reader.



**MONDEX/MYBI** Mondex and Mybi cards are to be provided network-based functions in 2001.

**(c) Policy responses**

**Monetary policy and seigniorage.** At present e-money balances are not included in monetary statistics because the amount is negligible. However, when e-money comes into use nationwide or the amount issued increases significantly, the Bank of Korea (BOK) thinks it will be necessary to include it in monetary statistics. It is not thought that e-money will have any considerable impact on seigniorage, because its use is not expected to increase significantly in the near future.

**General legal issues.** The regulatory provisions governing prepaid cards including e-money are set out in the Act on Financial Companies Specialising in Loan Business (which represents a revision of the former Credit Card Business Act, and was passed into law in January 1998). The provisions include the obligation to set aside 10% of the amount of e-money issuance for collateral and repayment procedures, etc. Because its provisions were originally established to regulate the disposable M/S type prepaid cards in January 1994, they are not adequate to regulate e-money. The BOK, therefore, is considering the preparation of new draft legislation.

**Relevant security issues.** The e-money scheme incorporates some features for security enhancement such as ruling out card-to-card transactions, authenticating transactions at each stage, setting a ceiling on the value loaded, managing keys, etc. The Government intends to develop and provide encryption systems for the e-money scheme.

**Provider issues.** Only banks and credit card companies are at present issuing e-money (and credit card companies will be able to clear their e-money only through bank accounts).

**Payment system issues.** The BOK is actively participating in the process of determining features of the e-money scheme in line with its policy considerations as a member of the committee which coordinates banks' projects related to payment and information systems. The Korea Financial Telecommunications and Clearings Institute (KFTC) is in charge of technical development, operation and clearing of pan-bank e-money funds, and final interbank settlement of e-money is carried out across their accounts with the central bank.

**Supervisory issues.** There are so far no officially announced initiatives related to the development of e-money. However, The BOK hopes to develop ways to examine the financial situation of the credit card companies that issue and operate e-money.

**Law enforcement issues.** Korean e-money products seem to have little attraction for money laundering because of various features such as the prohibition of card-to-card transactions and the ceiling on the value loaded. No official action has so far been taken by the Government on this matter. The BOK, however, is trying to minimise possible risks through the formulation of detailed procedures for system operation and issuance.

**Cross-border issues.** It is not expected that customers will be inclined to use domestic based e-money overseas or to use foreign currency based e-money in Korea because infrastructures are different and incompatible at the moment.

**Standardisation issues.** Because e-money standards have been set out and these apply to all the banks and credit card companies, a system using these standards will operate nationwide.

**Other issues.** There have been no specific measures taken by the Government on issues and questions related to taxation, consumer protection, the implementation of operational and technical standards, access and competition, etc.

## **2. Bank supervision policies on E-banking**

Until now, the development of e-banking has not led to any change of policies and regulations. E-money is regarded as prepaid card with multi-purpose in Korea so that it is stipulated by the existing act which regulates prepaid card. However there are various efforts to consolidate the regulatory system of e-banking. First of all, the establishment of union stipulation is in progress among commercial banks. Secondly, a special law for electronic funds transfer is under consideration by the government. In addition, it is expected that a regulation for the establishment of Internet-only-bank will be made by the authority sooner or later. Recently there are some financial institutions announcing the plan to establish Internet-only-banks. On the other hand, the Basic Electronic Transaction Act and Digital Signature Act were made for promoting the development of e-commerce in July 1999.

A few years ago the supervisory authority adopted a new checklist for the development of e-banking. It represents a modified version of the Information Systems Examination Handbook of the Federal Institutions Examination Council. Examinations usually cover IT audit, IT management, systems and programming, and computer operations. On the basis of its examination findings the Authority conducts an integrated evaluation. In 2000, the Authority organised a new department to take full charge of supervision of information systems of financial institutions. And it released a supervisory regulation on e-banking in response to new risk factors and to protect consumers' right.

## B. 2.2 Specific Questions

(thousand in number except number of banks, billion Korean Won in value)

	1996	1997	1998	1999	2000
<b>1. Number of internet users<sup>1/</sup></b>	731	1,634	3,103	10,860	19,040
<b>2. E-commerce<sup>2/</sup></b>					
- Business to Business (B to B)					
• value of transactions	-	-	-	4,710	8,178
- Business to Consumer (B to C)					
• value of transactions	-	-	-	2,173	3,019
<b>3. Electronic Fund Transfer Data<sup>3/</sup></b>					
- number of transactions	447,856	595,815	702,142	803,940	1,023,251
- value of transactions	7,900,943	10,505,709	15,481,562	21,608,963	20,806,859
<b>4. Payments and Settlements<sup>4/</sup></b>					
- cheques and bills					
• volume of transaction	1,146,624	1,222,192	1,012,466	1,027,172	1,091,810
• value of transaction	7,435,701	7,391,659	7,055,826	9,677,298	6,790,060
- CD/ATM					
• volume of cash withdrawal	177,974	239,517	260,885	324,312	395,625
• value of cash withdrawal	55,671	79,854	80,036	109,971	164,493
<b>5. Internet Banking<sup>5/</sup></b>					
- number of internet banks	0	0	0	13	20
- total number of banks	33	33	23	22	22
- number of internet banking users	0	0	0	120,000	2,600,000

<sup>1/</sup> Source : KRNIC(Korea Network Information Center)

<sup>2/</sup> Source : MOCIE(Ministry of Commerce, Industry and Energy)

<sup>3/</sup> Source : Bank of Korea. Including BOK-Wire, bank giro, Interbank Transfer System, Electronic Banking Network, Debit Card Network, Cash Management System, and Inter- local bank Network

<sup>4/</sup> Source : Bank of Korea

<sup>5/</sup> Source : Bank of Korea

## B.3 Malaysia

### B.3.1 General Questions

#### 1. IT Environment

*[Note: The response to the above question is framed based on information derived from two surveys: (1) SEACEN Research Workshop 1999 – Supervisory Impact of Technology on South East Asian Banking; and (2) Bank Negara Malaysia’s IT Survey for the Banking Industry, 2001.]*

Information technology developments in the Malaysian banking industry started in the 1970s when early forms of computer-based applications for information processing were introduced. But it was in 1981 – 1982 that the first form of automated banking applications made an appearance in the form of Automated Teller Machines (ATM). It took several years before public confidence grew to a point where the ATM gained widespread acceptance. The range of services also grew rapidly from balance inquiry and cash withdrawal to transfer of funds between checking, savings and credit card accounts, bill payments, IPO subscriptions, own cash and cheque deposits. The widespread adoption of ATM units also created several ATM networks in the late 1980s, which culminated in the formation of the Malaysian Electronic Payment System (MEPS), a private payment channel provider which was jointly owned by the domestic Malaysian banks. MEPS provided a common platform for retail or micro, electronic payment services, and are currently engaged in several projects, such as MEPS Cash, an e-money venture with local banks.

<u>Multi-Purpose Financial Services Channels</u>		No. of BI (26)
1.	Phone banking / Call centre	→ 13
2.	PC Banking	→ 12
3.	ATM Facilities	→ 20
4.	Cheque Deposit Machine	→ 6
5.	Cash Deposit Machine	→ 5
6.	Wireless Mobile Banking	→ 2
7.	Internet Banking (Transactional)	→ 6
<u>Payment and EFTPOS Channels</u>		No. of BI (26)
1.	Credit Card	→ 16
2.	Debit Card	→ 9
3.	Smart Card / e-money	→ 3
4.	MEPS SET Gateway	→ 4

*Information current as of July, 2001*

The next phase of electronic banking was telebanking (or telephone banking), which took off in the early 1990s. With more than four million fixed lines, the service became popular for inquiries and inter-account transfers. PC-banking started to proliferate in the mid-1990s, with most of the business coming from corporate customers seeking to link their information systems directly to the bank's system for data transfer and on-line inquiries. PC-banking graduated from proprietary systems to full fledged Internet banking in the year 2001. But before Internet banking emerged, another form of electronic banking, namely Automated Self Banking Centres, or also known as banking kiosks, made an appearance towards the end of the 1990s. Automated Self Banking Centres also provided pseudo e-commerce facilities by providing electronic shopping, on-line bill payment and hotel reservation services through interactive multimedia touch screen terminals. Finally, yet another remote banking service that has emerged recently is wireless mobile phone banking, but the services offered are still limited. In June 2000, Bank Negara Malaysia (BNM) allowed all domestic Malaysian banks to provide full transactional / interactive Internet banking services as an additional delivery channel. Maybank, the first local bank to offer Internet banking services, currently offers a wide range of services through its portal. Foreign owned banks would be allowed to offer the service from the 1<sup>st</sup> of January 2002. Table 1 summarises the main delivery channels for banking institutions (BI) that can be classified as electronic banking.

## **Government Policies and Infrastructure**

The Malaysian government, through various agencies, such as the central bank, attorney general's office, Multimedia Development Corporation (MDC), relevant legal firms and in consultation with the banking industry's associations has tackled a wide range of infrastructure issues that have an impact on the financial structure of the country. These infrastructure issues are summarised below:

**(1) Regulatory Factors** – BNM has put in place a regulatory framework that encapsulates prudential requirements, while giving the banking institutions considerable leeway for innovative financial products. Apart from the guideline regulating electronic fund transfer systems, BNM also issued a comprehensive guideline that covers financial services offered through Internet banking delivery channels.

**(2) Institutional Factors** – Generally the foreign banks have been instrumental in introducing technologically sophisticated products. The advantage of having powerful global parent banking entities provides these insti-

tutions with significant cost and risk benefits. Nonetheless, several major local banks have kept pace with the foreign banks with a suite of on-line financial services. The factor that inhibits the development of electronic banking products is the difficulty to reduce costs associated with branches. This is because, migrating the bulk of customers to the on-line platform has proven to be slow and cumbersome. Other institutional factors include the shortage of qualified information technology staff, particularly in the areas of software development, strategic management of technology and risk management for vulnerabilities typically associated with electronic banking services provided through an open network.

**(3) Infrastructural Factors** – The telecommunications infrastructure in Malaysia is growing rapidly, but penetration of fixed telephone lines is far from adequate, compared to regional financial hubs like Singapore and Hong Kong. In particular, the network penetration into rural areas is extremely poor, and is a major obstacle to providing more electronic banking services to a wider segment of the population. On a more positive note, PC penetration into homes is increasing rapidly, and together with the wide availability of Internet cafes, Malaysia has a rapidly growing population of Internet savvy consumers. Another positive development has been dramatic growth in mobile phones, which has grown much faster than fixed line telephony. Wireless banking services are beginning to develop, but the lack of security for wireless transmission will limit the range of services that can be provided through this channel.

**(4) Legal Infrastructure** - In terms of a legal infrastructure, the Malaysian government has introduced a range of cyber laws, as shown below:

- Computer Crimes Act 1997
- Digital Signature Act 1997
- Amendments to the Evidence Act
- Communications and Multimedia Act
- The Copyright (Amendment) Act 1997
- Personal Data Protection Bill (under development)

However, there remain many contentious issues that need to be addressed not only with local problems in mind, but also within the context of multiple legal jurisdictions. Some of the issues include:

- Protection for various forms of intellectual property rights.
- Inequality of bargaining positions, in particular between small customers and large vendors.

- Abuse of the terms ‘confidential’, ‘privacy’ and ‘non-disclosure’ in the context of different local business practices.
- Liability for cross border transactions for reasons such as non completion of the contract, lack of proper governance, negligence or misrepresentation of information through electronic channels.
- Proper and consistent recognition of parties involved in cross border electronic signature based contracts.
- Commonality in the regulatory regime for e-banking and e-payment services to ensure business continuity and acceptable settlement practices.

**(5) Technological Factors** – The main technological issue revolves around security systems for the secure provision of financial services over an open network environment, like the Internet. The occasionally alarming signs of virus threats, as well as presence of hackers, can only be resolved through cost effective technology solutions in the form of firewalls and other intrusion detection and prevention devices.

**(6) Social and Political Factors** – The Malaysian government and the central bank have both been extremely keen to promote innovation in financial services. The development of the Malaysian Multimedia Super Corridor (MSC) initiative, the e-government agenda and the proposed introduction of Government and Payment Multi Purpose Cards, using smart card technology, all contribute to a positive political environment for electronic banking services. Further, the more intense use of information technology and teaching of the same in all levels of the education system will accelerate the adoption rate of new electronic banking products.

**(7) Supervisory Factors** – Bank Negara Malaysia has a dedicated unit to conduct periodic information systems audits on all banking institutions. The information systems supervisory function plays an important role in mitigating the risks, in particular the possibility of systemic risks, associated with the widespread adoption of electronic banking delivery channels.

## **National Payments Infrastructure**

### **(1) Interbank ‘Bulk’ Payment RTGS**

The RENTAS (Real Time Electronic Transfer of Funds and Securities) is the new real time gross settlement (RTGS) platform for inter-bank payments. It replaced the previous fund transfer system (SPEEDS) in May 1999. In the RENTAS environment, both processing and final settlement of funds

transfer instructions can take place continuously in real time. Unlike a net settlement system, fund transfers under RENTAS are settled individually, that is without setting-off debits against credits.

### ***(2) Cheque clearing system (KLACH, REACH and SPICK)***

The cheque imaging system known as SPICK replaced the KLACH and REACH system in late 1999. The imaging system has been implemented nationwide in all but four states, where the processing volume is extremely low. The remaining four states are processing the cheques manually, and sending them by courier to the main clearing centre in Kuala Lumpur for processing. The Association of Banks is still working on the details to have SPICK implemented in these four states. The SPICK system was implemented with the following objectives:

- Provide the same day clearing of all local cheques
- Extend the coverage to all local zones
- Improve dayhold for the clearing of all outstation cheques to a maximum of five days
- Reduce the handling and movement of physical cheques

### ***(3) ATM Network***

Malaysian Electronic Payment System (1997) Sdn. Bhd. (MEPS) is the service provider of the shared ATM network in Malaysia. The focus of MEPS is to provide a comprehensive ATM network system, as well as additional application systems such as E-Purse, SET Payment Gateway and Inter-Bank Giro. It must be noted that only 30 per cent of total ATM transaction volume goes through MEPS (i.e. not-on-us transactions), with the remaining 70 per cent of transaction are being channelled directly through the financial institution's own systems (i.e. on-us transactions). Hence non-availability of MEPS will mean that cardholders will have to seek their own bank's ATM terminal to make a withdrawal. Apart from ATM services, MEPS Sdn. Bhd. is also involved in various payment systems projects, namely:

- A government and private sector sponsored initiative to develop a Payment Multi Purpose Card (PMPC), which could be used at any ATM machine, as well as wide range of shopping outlets as a stored value card for on-line payment.
- An e-money initiative led by the Malaysian Electronic Payment System (MEPS) network service provider. This initiative is known as MEPS Cash will provide on-line digital cash.



- The SET (Secure Electronic Transaction) Gateway initiative, where a common gateway will be provided by MEPS for banking institutions to switch all domestic e-commerce (Internet) payment transactions.
- The Interbank GIRO scheme by MEPS to facilitate third party payments between participating banking institutions for transactions of less than RM 50,000 in value (high volume low value).
- The Debit switch network to provide a common network for domestic debit cards.

At the moment, there are 5 financial institutions that are involved in issuing MEPS Cash (an application in the Payment Multipurpose Card (PMPC)<sup>26</sup>), namely, Malayan Banking Berhad, Public Bank Berhad, RHB Bank Berhad, Bumiputra Commerce Bank Berhad and Affin Bank.

#### ***(4) Electronic Data Interchange Service Provider***

Currently, the Dagang\*Net services provided by Dagang\*Net Technologies S/B (DNT), formerly known as EDI (M) S/B, is facilitating custom duty payments by forwarders at Port Klang and KLIA (Kuala Lumpur International Airport) to Custom. Upon request from the Custom, DNT and MEPS and also participating banking institutions are looking into possibilities to enhance the current system e.g. for making it an online real-time system. The payment EDI services provided by DNT only involved duty payments to Custom at the PKCS (Port Klang Community Service) and KLIA Customs Services.

The number of participants for the payment EDI:

- (i) Banking institutions - 10 banks
- (ii) Forwarders - 650 (approx.) - based on the number of bank accounts

## **2. Developments of E-money**

With respect to the developments in e-money applications, namely MEPS Cash, the activities are regulated by Bank Negara Malaysia under the provisions of the Banking and Financial Institutions Act 1989 in relation to electronic fund transfer systems. The e-money architecture, which is running on the Proton technology for smart cards, can be described as follows:

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26. The Payment Multi Purpose Card is part of a major government initiative to foster the development of technology within the country.

- E-money Application – This is the software that enables the e-money system to function. The software resides in two types of cards, namely the Government Multi Purpose Card (GMPC), which is issued by the government; and the Payment Multi Purpose Card (PMPC), which is issued by the participating banks. In order to activate the e-money application in the GMPC, the cardholder will have to go to one of the participating banks.
- Network Service Provider - MEPS Sdn. Bhd. is the network service provider, and routes all transactions between the cardholder, the merchants and the respective banking institutions.
- Merchant – The merchants are any retail-shopping outlets that are enabled to accept the MEPS Cash system as a method of payment.
- Regulator – Bank Negara Malaysia as the central bank will be the principal regulator.

The e-money application initially tested in 1999, but has not been officially launched as of October 2001.

### **Regulatory or Supervisory Policies for E-banking and E-commerce**

The Internet Banking Guideline issued on 1<sup>st</sup> June 2000 is the principal source of regulation in relation to prudential management for e-banking activities. The Guideline on Consumer Protection on Electronic Funds Transfers, dated 10 December 1998 defines the responsibilities of parties engaged in EFT transactions. The final aspect of supervision is the role played by the bank examiners who include e-banking / e-commerce activities of the banking institutions as part of the on-site examination portfolio.

### **3. Bank Supervision Policies on E-banking**

To govern the provision of banking products and services over the Internet, BNM issued the “Minimum Guidelines on the Provision of Internet Banking Services by Licensed Banking Institutions”. Under the Guidelines, the Board of directors and senior management of the banking institutions are entrusted with the responsibility of ensuring the feasibility, safety and integrity of the internet banking activities that would pose risk of serious loss to depositors.

Banking institutions require a one-time approval from BNM prior to the offering of Internet banking services. This is to enable BNM to ensure that the banking institutions have evaluated the costs and benefits of providing Internet banking services, and is ready to manage the risks Internet

banking brings. While BNM would conduct on-site examinations to ensure that the banking institution complies with the minimum security requirements stipulated in the guideline as part of its on-going supervision, the banking institution is responsible to ensure that its risk management framework is comprehensive enough to deal with known risks and flexible enough to accommodate changes.

The Guidelines issued by BNM include requiring banking institutions to put in place the following:

- (i) An effective and comprehensive risk management framework to enable identification, quantification, monitoring and management of all associated risks. The risk management framework must also be flexible and sophisticated enough to accommodate changes in the electronic environment and advancements in technology;
- (ii) Internet banking security policies including security requirements to be implemented for the Internet banking systems, contingency and business resumption plans, objective review and audit requirements;
- (iii) Safeguards and administrative requirements for outsourcing, advertisements, web link arrangements, strategic alliances/partnerships;
- (iv) Human resource requirements including training programmes to ensure availability and adequacy of experts and skilled personnel to run and support the Internet banking system;
- (v) Proactive consumer protection programmes including educating consumers on the risks involved in Internet banking and their rights and responsibilities and providing clear terms and conditions for Internet banking services; and
- (vi) Formulation of Client Charter on Internet banking which stipulate amongst others, commitments to privacy of customer information, product transparency and reliability of the service.

Banking institutions are free to adopt more stringent measures and are expected to keep abreast not only with technological developments but also the needs of their customers.

## B.3.2 Specific Questions

	1996	1997	1998	1999	2000
1. Number of internet users	N/A <sup>1/</sup>	N/A	N/A	778,000 <sup>2/</sup>	1,400,000 <sup>23/</sup>
<b>3. Electronic Fund Transfer Data</b>					
- number of transactions	2,029,306	2,390,372	1,947,319	1,408,340	1,493,021
- value of transactions(RM billion)	15,738.89	23,069.25	17,663.81	12,166.00	11,383.00
<b>4. Payments and Settlements</b>					
- paper based settlements (RM million)	1,109.9	1,304.7	954.1	1,041.9	1,076.0
- electronic based settlements (RM million)	9,524.4	12,557.8	11,108.6	11,858.8	16,439.1
<b>5. Internet Banking</b>					
Number of internet banks					3 <sup>6/</sup>
Total number of banks	77 <sup>4/</sup>	74 <sup>4/</sup>	68 <sup>4/</sup>	56 <sup>4/</sup>	27 <sup>5/</sup>

1/ N/A: Data is not available in any statistically reliable format.

2/ Estimated figure

3/ In 2001, the number of users/subscribers is expected to be about 6 million.

4/ The number of banking institutions prior to the year 2000 is significantly higher because the number includes commercial banks, finance companies and merchant banks. The merger program that was completed in 2000 reduced the domestic institutions to 10 banking groups, with one institution that remains to be merged.

5/ The 27 banking institutions comprise 11 domestic bank groups, 2 Islamic banking institutions and 14 foreign banks.

6/ The number of banking institutions offering transactional internet based services has risen to 6 as of September 2001.

## B.4 Mongolia

### B.4.1 General Questions

#### 1. IT Environment

##### *Government Policies and Plan on IT Application*

The first Smart building (current Center of Scientific and Technological Information) which has on-line and real time connections to and from Moscow's computing center was created in the 80's and has been functional until the transition (1990-). The Internet as a tool for development continued even in time of very difficult transition time. In 1993, which is at the height of the economic difficulty, Mongolia formulated a national IT action plan as one of the pillars to advance socio-economic transition. Unfortunately, resource constraints and other difficulties have hindered this early development. Despite the difficulty, first Internet connection was established in 1994 and the speed of ICT implementation accelerated.

In May 1996, the Parliament of Mongolia adopted the “Concept of Development of Mongolia” in which the key strategy of national development is laid out in the next 15 to 25 years. For achieving this conceptual goal under the Government Action Programme 2000, projects were implemented over the last few years. In May 1998, the Government of Mongolia adopted the “Mongolian Action Programme for the 21<sup>st</sup> century”. In December 1998, as approved by the Minister’s Council of the Ministry of Infrastructure Development, the Government adopted the Mongolian Telecommunications Sector Policy Statement for 2010. The main purpose of this policy statement is to implement the policies for improving the quality and for increasing the types and coverage of info-telecommunication services for the purpose of meeting the increasing socio-economic demand and accelerating further development of other sectors of the economy.

In February 2000, the Parliament of Mongolia adopted the “Concept on Information and Communications Technology Development of Mongolia up to 2010”. The mission of the ICT development concept in Mongolia is “to develop a society based on knowledge and intellectual potential and to develop the quality of people’s lives”. A principle to ensure accessible and flexible infrastructure promoting dynamic and sustainable development in an open and fair society shall be pursued to achieve the mission. The Government, the private sector and the public, indeed all sectors of society and of the economy, need to harness the potential of the information and knowledge revolution to improve the health, wealth and well being of everyone

The Information and Communications Division of the Strategic Planning and Integrated Policy Department of the Ministry of Infrastructure Development (MOID) is responsible for policy and decision-making, administering, legislation and management of the posts, broadcasting and frequency, information and telecommunication sectors of the Mongolia. As a result of the National Seminar on “Development of Mongolia-Information and Communication Technology”, held on 7 February 2001, the National Committee for ICT, headed by the Prime Minister, was established and approved by Government.

### ***IT National Infrastructure***

***Telecom networks*** The overall telecommunications network of the country consists of 3,200 km analogue and about 800 km digital microwave lines, connecting Ulaanbaatar and aimag centers. VSAT systems are used to connect 13 aimag centers and soum (districts of aimag) centers. More than 55 percent of the total switching capacity and 30 percent of the transmission network are digital.

The Mongolian Railway (MR) Company completed an optical fibre cable network along the railway from the north border to south border (1600 km) on April 2000. It is strategically important to have international information and telecommunication network of Mongolia connected to the optical fibre and railway networks of Russia and of the People's Republic of China. Such connections with neighbouring networks will increase international traffic, introduction of new data and telecommunications services and subsequently, enable maximum utilisation of the installed capacity of the new optical fibre transmission system.

### ***Database Environment***

Most state organisations use the *Clipper* development tool running on a DOS environment. Their applications suites have either been developed by local software companies or by "in house" *Clipper* trained staff. The *Clipper* development tool was developed in the 1980's while DOS was a single use environment. Consequently, the *Clipper*/DOS combination had severe limitations in terms of multi-tasking, maintenance of database integrity, network management, database query and reporting, security/encryption, and flexibility and functionality. Currently, some of the state enterprises have begun to migrate to newer types of relational database management systems, such as Oracle, SQL, etc. These new software will support the easy storage and retrieval of information and enable the use of Structured Query Language (SQL) to extract data for reporting purpose. A widely supported network protocol will be utilised for both the LAN and WAN. This will be able to support current and projected transaction volumes and will facilitate standard functionality such as multiple database reads, file sharing and printer sharing and access to wide area networks.

### ***Internet Networks***

In December 1994, Mongolia inaugurated the first Internet based services and starting from January 1996, full Internet service was available for 24 hours. At present, there are six Internet Service Providers in Mongolia. It is estimated that there are approximately 8,000 Internet subscribers including corporate customers and more than 30,000 users accessing the Internet as of 2000. The total international bandwidth of Internet is about 3 Mbps. Currently, there are more than 40 Internet cafes, which are mushrooming in Ulaanbaatar, which use the services of the Internet service providers and offer Internet access to the public.

## 2. E-commerce

E-commerce services such as e-banking, online shopping and e-services, are becoming available in Mongolia. They have been introduced, initiated and experimented with by Datacom, BodiComputer etc. In the near future, companies are going to establish Internet Service Centers (ISC) in three aimags and organise corporated networking. It requires US\$60,000 for the establishment of one ISC so the total cost (for Ulaanbaatar and 20 aimags) will be about US\$ 2.2 million. Currently, there is no regulation one-commerce.

## 3. Banking Supervision

The Banking Supervision Department of The Bank of Mongolia is undertaking some research work on e-money/e-banking/e-commerce. Currently, there are no bank supervision policies, even in draft form.

### B.4.2 Specific Questions

	1996	1997	1998	1999	2000
1. Number of Internet users	3.0	-	-	-	30.0
3. Electronic fund transfer Data					
- number of transactions (thous)	261.65	517.0	312.676	310.001	339.605
- value of transactions (MNT)	855	-	1.2T	855B	1.2T
5. Internet Banking					
- number of internet banks	-	-	-	-	-
- total number of banks	14	14	16	12	12

## B.5 Myanmar

### B.5.1 General Questions

#### 1. IT Environment

The chronological development of the IT environment is as follows:

- Set up of the Myanmar Computer Development Council in 1996.
- Establishment of the Myanmar Computer Federation in 1998 (NGO).

- Establishment of the following NGO organisations in 1998.
  - (i) Myanmar Computer Scientist Association
  - (ii) Myanmar Computer Industry Association
  - (iii) Myanmar Computer Enthusiast Association
- Foster close relationship with Center of the International Cooperation for Computerization (CICC), Japan for various development activities.
- Active participations at e-ASEAN task force and working group
- Establishment of IT sub-committee for Japan-Myanmar Economic Structural Adjustment Task Force.
- Establishment of e-National Task Force and four working groups.

The government policy is to promote the development of IT application to enable Myanmar to catch up with other countries in the sphere of IT science. Currently, IT application is limited to:

- publishing and printing (both public and private sectors)
- supermarkets and POS (private)
- statistical organisation (government)
- hotels and restaurants.

Possible areas of application are: (1) agricultural database, (2) immigration and customs, (3) transportation, (4) on-line transaction, (5) e-commerce.

## **2. Developments of E-money and Banking Supervision**

At present, e-money is not in use in Myanmar. As such there is no bank supervision regulation on it yet. In the future, when and if it is introduced, regulations to related activities will need to be applied.

### **B.6 Nepal**

#### **B.6.1 General Questions**

##### **1. IT Environment**

The development of IT environment in Nepal can be traced to the introduction of the second generation computer IBM 1401 in 1971. This computer was introduced for the purpose of data processing and analysis in the census by the Central Bureau of Statistics. After this, another Main Frame computer ICL 2950/10 was introduced in 1978 for the same purpose mentioned above. To foster institutional development in the IT sector, the Electronic Data Processing Center was established by His Majesty's



Government of Nepal in 1974 and this Center was later renamed the National Computer Center in 1980. This Center contributed much in the development of computer manpower and computer network within the country in the decade of 1980s.

Computers in the banking sector was used in the same decade especially after the establishment of the Nepal Arab Bank Limited (NABIL), the first Joint Venture Bank in the country, in 1984. The application of IT in various sectors occurred in the late 1990s in Nepal. The use of the latest techniques of information technology has become popular especially in the capital city of the country due to the increasing service provided by institutions established in the private sector. These institutions have significantly contributed to the development of IT environment by providing Interact and e-mail access to both organisational and individual users.

His Majesty's Government of Nepal introduced the Information Technology Policy in the year 2000 for the comprehensive development of IT in the country. This policy envisages an information technology vision to develop Nepal as an IT center within 5 years. The policy is aimed at strengthening the national economy by making IT accessible to the common people whereby the task of poverty alleviation and women's empowerment can also be supported. Besides this, the policy is also expected to develop an effective social service delivery mechanism to intensify the environment of good governance within the country. The IT policy 2000 has formulated its strategies under which the private sector participation will be given top priority by encouraging foreign direct investment in this sector, and the role of the government will be of a facilitator, promoter and regulator. The strategy also emphasises on developing efficient IT manpower, creating an environment of competition and utilising information technology for the development of rural areas.

His Majesty's Government of Nepal has also devised the IT policy which consists of developing both a physical and virtual information technology park for the development of Hardware and Software. The IT policy also encourages the use of the Internet for promoting e-commerce, e-education and tele-health on the one hand and transferring technologies in rural areas on the other. The policy also aims to establish the National Information Technology Center to work as a data bank and to expand computer networking in government offices. Furthermore, the policy also aims to establish a Venture Capital Fund in the joint participation of both the public sector and private sector. Besides these objectives, strategies and policies; the IT Policy 2000 of His Majesty's Government of Nepal also consists of

a working policy framed out of the specific guidelines for private sector participation in infrastructure development, necessary initiatives by government for such infrastructure development and other guidelines for institutional development.

**2. E-money developments**

Credit card facilities and ATM facilities are provided by a small number of commercial banks in the country. One of the joint venture banks, NABIL introduced the credit card facility in 1990 and ATM facility was introduced by another commercial bank, Himalayan Bank Limited in 1999. Currently four of the 15 commercial banks in the country are providing these facilities.

**3. Banking Supervision**

Nepal Rastra Bank is drafting a new manual with the assistance of the World Bank on its inspection and supervision policies. This new manual is expected to cover bank supervision policies on e-money/e-banking/e-commerce, since it does not have specific policies, at present, in this regard.

**B.6.2 Specific Questions**

	1996	1997	1998	1999	2000
1. Number of Internet users	5,000	10,000	30,000	50,000	100,000
4. Payments and settlements (\$ bill)					
- Paper based settlements	1.67	1.83	2.09	2.30	2.78
5. Internet Banking					
- number of internet banks					
- total number of banks*	11	11	13	13	14
* Commercial banks only					

## **B.7 Philippines**

### **B.7.1 General Questions**

#### **1. E-Banking Services**

Of the 44 commercial banks currently operating in the Philippines, 35 have developed their own Web sites to convey product and service information. Of these, 20 banks already provide electronic banking services, either over the Internet or through landline and mobile phones. The range of electronic banking services offered by these banks include the provision of account information, funds transfer and bills payment, reloading of prepaid Internet and phone cards, and other non-cash services (e.g., statement request, chequebook request, request to open savings, chequeing and time deposit accounts, request for stop payment of cheques issued, change of Personal Identification Number [PIN], activation/suspension of mobile banking, inquiry on status of loan application, application for housing loan, auto loan and credit card, deposit maturity reminders, and inquiry on other products and services).

In view of the recent introduction of electronic banking services in the country, there are as yet no data available on the number of electronic banking users/customers.

#### **2. E-money Developments**

Some Philippine banks have also started to introduce card-based electronic money products that are aimed at facilitating retail payments. There are as yet no network-based electronic money systems operating in the country. The stored-value card products provide a method of retail payment that allows funds to be electronically transferred to the stored-value card, which could then be used to make purchases up to the total value held on the card. Funds can be loaded as many times as the customer wants by either maintaining an account with the participating bank and depositing money for the purpose or reloading the stored-value card from dedicated loading stations and payment counters.

At present, there are three such stored-value cards in the market, namely: the Bank of the Philippine Islands (BPI) Express Cash, SMART Money, and Mondex Card. Considering that the stored-value cards only started to be issued in late 2000, the volume and value of payments carried out using electronic money remain small.

### **3. Banking Supervision**

#### **Electronic Commerce**

Republic Act No. 8792 (Electronic Commerce Act of 2000), which was passed on 14 June 2000, provides the legal and regulatory framework governing commercial as well as non-commercial transactions through the Internet. The Act facilitates computerised transactions by giving electronic messages and electronic signatures legal status. The Act makes hacking and software piracy a crime and provides for privacy and confidentiality. It is modeled on the UN Commission for International Trade Law (UNCITRAL) Model Law on Electronic Commerce to enhance international uniformity and enforcement. Implementation of the law is expected to help facilitate operations, reduce the cost of doing business and integrate local industries into the global business networks.

#### **Electronic Banking**

Section 59 of the General Banking Law enacted in May 2000 provides the Banko Sentral ng Pilipinas (BSP) the specific legal basis to regulate the use of electronic devices in the operations of financial institutions under its supervision including the delivery of electronic banking products and services to customers. Prior to the enactment of the law, however, the BSP has already been closely monitoring global and local developments in electronic banking particularly the growing number of Philippine banks offering this service.

As the supervisory and regulatory authority of the banking industry, the BSP is concerned that competitive pressures might encourage banks to engage in electronic banking without the necessary operational controls in place, thus undermining the soundness of the banking system. To date, the BSP has issued three prudential guidelines on the conduct of electronic banking, namely:

- Circular No. 240 dated 5 May 2000, which requires banks to seek prior BSP approval before they can be allowed to provide electronic banking services. Applicant banks must essentially prove to the BSP that they have in place a risk management system that is adequate to assess, control and monitor risks arising from the proposed electronic banking activities.

- Circular No. 268 dated 5 December 2000, which prescribes the rules and regulations to implement Section 55.1 of Republic Act No. 8791 (General Banking Law of 2000) on the outsourcing of banking functions.
- Circular No. 269 dated 21 December 2000, which amends BSP Circular No. 240, adopts new guidelines to fast track the procedure for processing electronic applications. Under the revised procedures, applicant banks are pre-qualified for financial strength and track record of compliance with prudential regulations. Pre-qualified banks may then immediately launch their electronic banking services on a conditional approval basis provided that the bank president has certified that basic risk management requirements related to its electronic banking product have been met. Final approval by the Monetary Board is granted after market launch upon applicant bank's full compliance of all risk control requirements, as determined by the BSP in a formal review process.

As of June 2002, the BSP has given the go-signal to 35 banking institutions to provide electronic banking services. These electronic banking applications were either approved per Circular No. 240 or conditionally approved under Circular No. 269.

### B.7.2 Specific Questions

	1996	1997	1998	1999	2000
<b>1. No. of Internet Users</b> (in thousands)	NA	NA	823	1,090	1,540
<b>4. Payments and Settlements</b>					
<b>Paper-based: Cheques</b>					
- Vol. of transact (millions)	111.98	116.71	112.84	116.21	117.59
- Value of transact (Peso, millions)	1,099.22	2,580.37	2,096.51	4,138.66	24,107.69
<b>Electronic-based: Credit Cards</b>					
- Value of transact (Peso, millions)	NA	NA	25,931.52	30,404.35	33,614.77

## **B.8 Singapore**

### **B.8.1 General Questions**

#### **1. Development of E-money**

The CashCard, a smartcard-based multipurpose stored value card (SVC), was issued by a consortium of banks<sup>27</sup> in November 1996. The CashCard is a bearer SVC containing stored value and is widely accepted by retailers in Singapore as a convenient mode of cashless payment. In addition, some of the debit cards issued for use at electronic funds transfer at point of sale (EFTPOS) terminals and automated teller machines (ATMs) also have CashCard features. The stored value can be topped up at ATMs, major petrol stations, or through HomeNETS, mobile phones and the Internet. At the end of 2000, about 4.7 million CashCards were in circulation.

More recently, in August 2001, NETS launched the Virtual Card<sup>28</sup>, a network-based e-money scheme which allows the user to initiate payment via the Internet or mobile phone. The stored value can be topped up via direct debit from the user's bank account or Interbank GIRO.

#### **2. Banking Supervision**

##### ***E-money***

Under the Banking Act, only banks in Singapore may issue multipurpose SVCs, with the approval of MAS. The Banking Act also requires banks to maintain reserves and liquid assets against the proceeds arising from the issuance of multipurpose SVCs. In addition, banks that issue multipurpose SVCs are required to provide monthly reports on the amount of SVC proceeds outstanding as part of their regular reporting to MAS.

In assessing applications by banks to issue SVCs, an important factor that MAS considers is whether the issuing bank has put in place adequate safeguards to protect cardholders. This includes a robust security system to prevent counterfeiting and fraud that could lead to losses by both stored

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27. The monetary value in the card is issued by the consortium of banks (DBS, OCBC and UOB), but the scheme is operated by Network for Electronic Transfers (S) Pte Ltd (NETS).

28. Also issued by the same consortium of banks.

value cardholders and merchants. A strong security system will build up cardholder confidence and encourage greater usage of such cards. MAS also requires the issuers to review their card distribution procedures regularly to deter the possibility of counterfeit multipurpose SVCs being sold.

### ***E-Banking***

The types of risk inherent in Internet banking do not fundamentally differ from those in traditional banking. However, some of these risks will be accentuated in Internet banking, and will require greater attention by the banks and by MAS when it supervises them. Given that there may be different models of Internet banking in play, a risk-focused supervisory approach in respect of individual banks is more suitable than “one-size-fits-all” regulation. It is the responsibility of bank management to have in place, on an ongoing basis, clear strategies and processes to manage the risks of Internet banking operations. MAS requires public disclosure of such undertakings, as part of its requirements for all banks to enhance disclosure of their risk management systems. Methods and tools of risk management and supervision will continue to evolve, in step with innovation in technologies and business strategies.

In consultation with the financial sector and technology industry, MAS developed and issued Internet Banking Technology Risk Management Guidelines for the banking industry in March 2001. These guidelines are designed to direct financial institutions to establish a sound and robust technology risk management process, strengthen system availability, security and recovery capability and deploy strong cryptography to protect customer data and transactions. Compliance with the guidelines is mandatory. Update of the guidelines is carried out from time to time.

## B.8.2 Specific Questions

	1996	1997	1998	1999	2000
<b>5. No. of Internet Users</b>	NA	NA	NA	764,680	1.3million
<b>6. E-commerce</b>					
- B2B Sales Value (S\$billion)	NA	NA	5.671	40,425	92.70
- B2C Sales Value (S\$million)	NA	NA	36	200	1,177
<b>7. EFT Data</b>					
- No. of transact (million)	42.39	50.85	57.90	65.74	76.93
- Value of transact (S\$billion)	2.79	3.44	3.53	4.10	4.7
<b>8. Payments and Settlements</b>					
<b>Paper-based: Cheques</b>					
- Vol. of S\$ Cheques (million)	82.50	87.52	87.34	92.18	91.26
- Value of S\$ Cheques (S\$ bill)	581.08	608.44	459.24	489.28	453.22
- Vol. of USD Cheques	105,510	185,471	275,003	374,986	390,336
- Value of U\$ Cheques(US\$ bill)	3.48	6.55	7.36	9.05	12.20
<b>Electronic-based</b>					
<i>Cash Cards</i>					
- No. of transact (million)	NA	0.68	26.32	76.98	100.10
- Value of transact (S\$million)	NA	9.36	36.23	87.28	172.60
<i>Credit cards</i>					
- Ave no. of main cards (million)	1.09	1.19	1.31	1.44	1.60
- Ave no. of supplementary cards (million)	0.56	0.61	0.66	0.71	0.75
- Total card billings (S\$ million)	1,746.50	1,978.80	1,922.30	2,237.10	2,639.30
<b>9. Internet Banking</b>					
- No. of Internet Banks <sup>1/</sup>	0	0	0	0	1
- Total no. of banks <sup>2/</sup>	143	152	154	142	14
- No. of Internet Banking users	NA	NA	NA	NA	1,137,868

1/ Includes pure Internet-only banks. Does not take into account banks which provide Internet banking services.

2/ As at end-March



## **B.9 Sri Lanka**

### **B.9.1 General Questions**

#### **1. IT Environment**

##### **(a) IT Development from 1982 to 2001**

- In late 1982, the President of Sri Lanka appointed a Committee to develop a national computer policy and to encourage the usage of computer technologies.
- The Committee's report led to the early creation of the Computer and Information Technology Council of Sri Lanka (CINTEC), the apex body responsible for formulating and implementing computer and IT policy directly under the President of Sri Lanka.
- In 1992, CINTEC initiated the establishment of the Sri Lanka Computer Vendors' Association (SLVCA), followed by the Sri Lanka Association for the Software Industry (SLASI) and the Association for Computer Training Organisations (ACTOS).
- In 1995, a central organisation, the Federation of the IT Industry Sri Lanka (FITIS) was formed to co-ordinate the activities of the industry.
- The Board of Investment (BOI) has been actively engaged in attracting investment in this field while the Sri Lanka Export Development Board (EDB) has spearheaded an export drive which has included participation in IT trade fairs and marketing missions.
- The Government of Sri Lanka, on the recommendation of CINTEC and the Ministry of Science and Technology declared 1998 as the Year of IT, with the theme "Exploiting IT for National Development". The Government of Sri Lanka has identified IT as one of the major thrust areas in its development plan. IT is essential for all our development goals such as increased productivity and competitiveness in international trade and commerce, and for facing up to the challenges of globalisation. CINTEC held an International IT Conference in October 1998, as part of IT Year activities.
- In 1998, duty on computer and communications equipment was completely removed. In the Budget of 1999, it has also been proposed to allow a 100 percent deduction on IT purchases made to remedy the Y2K problem.
- In April 1998, the Science and Technology Development Act No.11 of 1994 was implemented.

**(b) National IT Infrastructure**

***Internet:***

The Internet penetration in Sri Lanka is as follows:<sup>29</sup>

The number of Internet and e-mail connection as at July 2001 was 50,020. The number of Internet Service Providers (ISPs) in Sri Lanka is 29 (as at July 2001). The most common Internet access method(s) in Sri Lanka are dial up connection and leased circuits.

In Sri Lanka the Internet readily accessible from:

- (1) Some of the urban areas hospitals
- (2) A few urban area National secondary schools
- (3) Universities
- (4) Major metropolitan centers
- (5) Internet café
- (6) Mobile phones (WAP)

ISPs in Sri Lanka need to obtain licenses. In the early stage, individual Licenses for ISPs were issued by Telecommunication Regulatory Commission of Sri Lanka (TRCSL). Class Licenses are issued for ISPs at present. Sri Lanka too participates in the Hague Convention on International Jurisdiction and the Recognition and Enforcement of Foreign Judgments in Civil Matters: International Electronic Commerce.

Lack of information and knowledge is a barrier to take up e-commerce. Unavailability of the Internet services in native languages (Sinhala and Tamil) and the unavailability of telephone services in rural areas in Sri Lanka are the other barriers to popularise Internet facilities.

Setting up LISPA and the domestic Internet Exchange:

The Internet Committee was instrumental in setting up the Licensed Internet Service Providers Association (LISPA). LISPA has now established the Internet Exchange (IX) in Sri Lanka, to route local traffic in Sri Lanka, thus saving bandwidth on the international circuit.

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29. Source: Telecommunications Regulatory Commission.

The IX provides an interconnection for members of ISPS to exchange Internet traffic through an agreement and allows them to easily interconnect within Sri Lanka thereby improving connectivity and service to customers. The domestic IX was formally launched by CINTEC and the LISPA on 18 June 2001.

The Open University of Sri Lanka, the Institute of Computer Technology, University of Colombo, the non-Governmental Organisations, Sarvodaya, in collaboration with several ISPs, are working on setting up a Pilot Project for establishing tele-centres for use in rural areas to facilitate distant learning. Communication will be through the Internet. The International Telecommunications Union has assisted in conducting an initial feasibility study. The setting up of tele-centres is also addressed in the proposed telecommunications plan.

### ***EDI/e-commerce:***

Establishment of the National EDI/EC Committee:

In August 1995, CINTEC established a National EDI/EC Committee. Cabinet approval was obtained to recognise the National EDI/EC Committee as the National body/focal point for EDI in Sri Lanka, with technical, administrative and financial support from CINTEC and the Secretariat is based at CINTEC.

Registration Authority:

The Sri Lanka Export Development Board joined the network of World Internet Secure Key (WISeKey SA) affiliated registration authorities in partnership with the International Telecommunications Union. The procedural aspects of the establishing the registration authority are being finalised and it is expected to be operational by end 2001.

Sri Lankan Airlines:

Sri Lankan Cargo's fully automated system for management of cargo logistics, provides customers with an integrated network of information and business support system. It enables customers to use the Internet to check schedules and space availability, make bookings on line, print airway bills, communicate with people, update status and track each consignment through every stage of its journey.

Since the Sri Lankan Airlines is the sole cargo handling agent at Colombo Airport, the new system allows any shipper consignee or airline to track their shipments to find out the status of their shipments at Colombo Airport.

Standards:

ISO 9735 Version 4 Electronic Data Interchange for Administration, commerce, and Transport (EDIFACT)—application Level Syntax Rules (Syntax Version Number 4) has been adopted as a Sri Lanka standard.

The National ED/E-Commerce Committee of Sri Lanka, which was extended by the Council for Information Technology, (CINTEC) presently functioning under the Ministry of Posts Telecommunications and IT, sought the views of organisations represented at the Committee at stakeholders. Based on the findings, CINTEC recommended to the Sri Lanka Standards Institutions to adopt ISO 9735 Version 4 as a Sri Lanka standard. The Sri Lanka Standards Institution has accepted the recommendation and has adopted ISO 9735 Version 4 as voluntary Sri Lanka Standard.

## **2. E-money Developments**

A commercial bank, namely, the People's Bank has introduced a Smart Card based Electronic Purse/Money products in 1998. This card may be used for multiple purposes, e.g., electronic Purse, Saving Accounts, Credit Card, Loyalty Card and also ATM card.

## **3. Banking Supervision**

There is no special supervision policy on e-money/e-banking/e-commerce. However, examination and evaluation of the adequacy and effectiveness of the internal control system in the banks form one of the important aspect during on-site inspection by the Central Bank of Sri Lanka.

## B.9.2 Specific Questions

	1996	1997	1998	1999	2000
1. Number of Internet users	n.a.	n.a.	18,984	25,535	40,492
3. Electronic fund transfer Data <sup>1/</sup>					
- number of transactions (in thousands)	211	293	496	834	1,081
- value of transactions (Rs billion)	n.a.	n.a.	n.a.	1042.7	1245.8
4. Payments and settlements					
- Paper based settlements <sup>2/</sup>	27,708	29,262	31,356	32,664	34,586
- Electronic based settlements <sup>3/</sup>	n.a.	n.a.	n.a.	2,007	3,335
5. Internet Banking					
- number of internet banks	n.a.	n.a.	n.a.	n.a.	3
- total number of banks	26	26	26	26	26
- number of Internet banking users <sup>4/</sup>	n.a.	n.a.	n.a.	n.a.	506

1/ Off-line electronic funds transfer system (see Annex 1)

2/ No. of cheques (in thousands)

3/ Credit card outstanding at end of year (Rs Million)

4/ As of October 2001, there were 6 internet banks with 3,214 internet bank users.

### (i) *Electronic Fund Transfer Data*

At present, there is no on-line electronic fund transfer system. The Sri Lanka Automated Clearing House (SLACH) of the Central Bank of Sri Lanka (CBSL) introduced an off-line electronic fund transfer system namely, "Sri Lanka Interbank Payment System (SLIPS)" in 1994. Under the SLIPS, commercial banks forward their payment instructions to the SLACH in magnetic tapes or diskettes. The SLACH process those payment instructions and transmit the multilateral net balances of each bank to the CBSL's main computer system for the final settlement of the net balance of each bank on commercial bank settlement accounts with CBSL, at the end of the day. The details of the payment instructions of individual banks are submitted to Head Offices of the respective banks by SLACH, in computer diskettes for the settlement of individual transactions on customers' accounts.

### (ii) *SWIFT (Society for Worldwide Interbank Financial Telecommunications)*

The SWIFT system was introduced in 1994 to enable electronic transfer of funds internationally. All commercial banks have become members of the system. This system increases the link with international financial markets and facilitates trade finance, foreign exchange operation, custodial services,

and transfer payment of funds electronically. Summary of transactions are available for 2000 and 2001.

FX Transactions	<u>2000</u>	<u>2001(as of Oct. 2001)</u>
No. of Deals	18,791	21,387
Messages	56,373	64,161

### ***(iii) RTGS (Real Time Gross Settlement)***

The Central Bank is in the process of implementing RTGS system by early 2003. This will be a fund transfer system (gross settlement) linked with all commercial banks, primary dealers and the Central Bank for their transactions. As the system involves transaction cost to the participating institutions, it has been decided to bring 'high value critical transfers' to the system at the initial stage. However, primary dealers' transactions through this process are limited to the government securities. In addition, the system is in the process to link with Scripless Trading system for government securities.

## **B.10 Taiwan**

### **B.10.1 General Questions**

#### **1. IT Environment**

In order for the government and the private sector to join forces in promoting the information industry and information application development and usage, a non-profit organisation named the Institute for Information Industry (III) was founded in 1979. Over the years, the III has collaborated with software firms for the deployment of important national information systems, which has provided efficient services to the people. These included the Residential Information System, Weather Information and Forecasting System, Agriculture Product Market Information Reporting System (AMIS), National Healthcare Information Network, etc.

In addition, the government of the Republic of China, Taipei, set up the National Information Infrastructure (NII) group in 1994 to promote the construction of information network and the innovative applications of information technology. By 1998 this group has reached its goal of increasing the number of Internet users to 3 millions within 3 years. Since then, the number of Internet users has been expanding dramatically. It reached 6.26 million persons by the end of 2000, which was more than double that of 1998.

The government also approved a programme in 1999 to foster the development of automation and e-business in domestic enterprises. This programme provides tax exemption, technical assistance and training so as to assist domestic enterprises in implementing electronic commerce, with a view to reducing production costs and enhancing competitiveness. The goal is to help more than 50,000 enterprises (at least 80 percent of them will be small and medium-sized enterprises) or more than 200 systems to fully utilise electronic commerce in B2B activities, within 5 and a half years. This programme will also give priority to establishing an electronic commerce demonstration system for the information industry.

With regard to electronic commerce, both B2B and B2C have been growing remarkably in the past three years. According to a survey made by the Market Intelligence Center of the III in 2000, 46 percent of the enterprises in the service sector implemented electronic commerce, although only 18 percent of them actually used or accepted on-line ordering. On the other hand, purchases by customers via Internet have increased significantly. The scale of such purchases reached NT\$360 million in 1997, NT\$631 million in 1998 and NT\$1,634 million in 1999.

## **2. E-money Developments**

Under the current *Banking Law* revised in November 2000, only banks are allowed to issue multiple-purpose stored value cards. Up to now many banks have issued multiple-purpose stored value cards developed by the Financial Information Service Center, but the use of such cards is not popular. This may be due to the substitution effect from the services provided by the ATM network and the lack of shops that accept payments by such cards.

If non-bank financial institutions issue multiple-purpose stored value cards, they violate Article 29 of the *Banking Law* for absorbing money from the general public. According to the *Banking Law*, they are subject to the penalty listed in Article 125 (any person who violates the first paragraph of Article 29 hereof shall be imprisoned for a term of not less than 3 years but not more than 10 years, and may be fined not more than 100 million NT dollars.)

The two reasons for the above regulations are (i) non-bank financial institutions are less regulated than banks, so if they were allowed to issue multiple-purpose stored value cards, this would cause unfair competition to banks and (ii) restricting the right to issue multiple-purpose stored value cards to banks can ensure the control of monetary aggregates and bank

credit, and the reserve requirement policy can be implemented under the current legal structure.

### 3. Banking Supervision

There are explicit security measures for banks to follow with regard to bank supervision policies on e-money/e-banking. Bank examiners will make regular cheques on whether banks abide by these measures.

#### B.10.2 Specific Questions

	1996	1997	1998	1999	2000
<b>1. Number of internet users</b> (in million persons)	0.60	1.66	3.01	4.80	6.26
<b>2. E-Commerce</b>					
<b>-Business to Business (B to B)</b>					
• %of enterprises in the service sector that implement e-commerce	-	-	-	-	46%
• ratio of electric ordering to total transaction value in the service sector	-	-	-	4.8%	9.8%
<b>-Business to Customer</b>					
• value of transactions via Internet (in million NT dollars)	-	360	631	1,634	-
<b>3. Interbank electronic Fund Transfer Data</b> -value of transactions (in billion NT dollars)	35,148	56,507	60,961	62,299	76,065
<b>4. Payments and Settlements</b> (in billion NT dollars)					
-paper based settlements(e.g. cheque, draft)	51,183	54,957	53,492	41,489	40,835
-credit card settlements	272	374	491	598	720
-ATM settlements	4,044	4,801	5,187	5,883	6,730
<b>5. Internet Banking</b>					
-number of internet banks	-	-	-	-	17
-total number of banks	-	-	-	-	53

### B.11 Thailand

#### B.11.1 General Questions

##### 1. IT Environment

The development of the Infrastructure of the Payment Systems in Thailand is as follows:

The history of the Thai payment systems has been driven by a determination to transform the systems to become the electronic based. As a consequence, among five significant payment systems in the country, three systems are fully electronic based while the rest are semi-electronic ones. The details of each payment systems can be summarised as follows:



Payment Systems	Settlement	Owner & Operator	Nature of services
<b>SEMI- ELECTRONIC BASE</b>			
1. ECS (Electronic Cheque Clearing System) - Started on July, 1996	Net Settlement	Bank of Thailand (ECH- the Electronic Clearing House)	- Electronic cheque clearing in Bangkok and its metropolitan areas. The system relies on the electronic data read off the cheque for purpose of calculating net clearing positions and customer account posting.
2. Provincial Cheque Clearing - Started on May, 1996	Net Settlement	Bank of Thailand	- Clearing and settlement of provincial cheque. The system uses an off-line computer systems developed by BOT for purposes of supporting member banks and clearing house operations.
<b>FULLY ELECTRONIC BASE</b>			
3. ATM Network	Net Settlement	Commercial Bank	- The network is processed by Processing Center Co. (PCC) which acts as the Switching Center for the interbank ATM network.
4. Media Clearing - Started on January, 1997	Net Settlement	Bank of Thailand	- Interbank retail funds transfer. The system uses an off-line Media Clearing retail funds transfer system developed by the BOT for purposes of supporting customer in making interbank preauthorised debit/credit transactions.
5. BAHTNET - Started on May, 1995	RTGS	Bank of Thailand	- Using an automated high-value transfer network which is a financial infrastructure that supports payment system developments required for an international financial center. Presently the system has been enhanced its services to cover the clearing and settlement of government securities on Real Time Gross Settlement called delivery versus payment (DVP) basis.

## 2. E-money Developments

To date, there are two multipurpose electronic money schemes. One is MicroCash which was first introduced in 1996 while the other is a closed-system electronic money scheme introduced by the Siam Commercial Bank, Advanced Vision Systems Co. Ltd., Chulalongkorn University and other universities launched in May 1999.

**MicroCash** The scheme has been implemented on a full-scale in the Bangkok Metropolitan Area. The issuer of MicroCash cards in the early stage from 1996 to 1998 was a non-bank institution, the Bangkok Payment Technology Company (BPT). The company was a joint venture of four participants – a public bus provider, a computer/software distributor, an ATM processing centre company and the DBS Thai Danu Bank Public Company Ltd. (DTDB), which held a 10 percent stake. In early 1999, DTDB acquired all the assets and liabilities of BPT and proposed to develop and implement smart card business and technology as an alternative financial instrument. DTDB foresees that smart card will be a potential payment product in the near future.

The MicroCash card is a reloadable anonymous electronic purse. The system architectures are those of Finland's Avant scheme. The MicroCash card can be used to pay for goods and services at designated merchants such as retail stores, petrol stations, bookstores and school shops. Direct consumer-to-consumer transfer features are not available. The value stored on the card is denominated only in Thai baht.

**SCB Smart Card** The Siam Commercial Bank, Advanced Vision Systems Co. Ltd. and Chulalongkorn University have cooperated to provide smart cards and software, including online registration via the University's intranet. Issued to various users such as students, lecturers and officers, SCB Smart Card is used as an identity card as well as an ATM/debit card for small-value payments in shops such as the campus's bookstore. One year after its launch, an electronic purse feature was added to the smart card in May 1999. The maximum loading amount is approximately USD 250. Due to its successful implementation, this programme has been extended to other universities in Thailand and more than 40,000 cards have now been issued.

### Recent Developments

C.P. Seven Eleven Public Co. Ltd., a convenience store which has many branches and a large customer base, in co-operation with a consortium of

three leading banks are considering the implementation of an electronic purse to help reduce cash handling costs by the last quarter of year 2002.

The Bank of Thailand is aware that multipurpose electronic money provided by non-bank institutions would not be subject to regulation and supervision under the Bank of Thailand's authority. However, it is also realised that imposing any regulations at this early stage, for example allowing only commercial banks to issue multipurpose electronic money, could hinder or distort private initiatives or innovation, particularly given the potential advantages in technology adoption and marketing incentives of non-bank institutions over commercial banks. Still, it is important to maintain the stability of the payment system. Therefore, the policy stance regarding provider issues is currently under revision.

### **3. Banking Supervision**

#### ***E-money***

Up to now, electronic money has not been addressed by specific provisions within the legal framework. The Bank of Thailand is collaborating with relevant authorities to lay down a legal framework for regulating the issuance of multipurpose electronic money. Moreover, the Bank of Thailand is proposing an amendment to the Bank of Thailand Act and Payment System Act that will more explicitly empower the Bank to oversee payment instruments and their issuer institutions, including those of electronic money.

Currently the Bank of Thailand has been referring to the conclusion of the G10 Task Force on Security of Electronic Money as a reference for an assessment of the technical security of an electronic money system. Since there are no specific measures to prevent money laundering through such instruments, the Bank of Thailand has a plan to allow only electronic money denominated in Thai bath.

The Bank of Thailand has been periodically meeting with the card issuers to encourage and recommend them to have electronic money designed to meet with Thailand Smart Card Working Group standard and to take the issue of consumer protection into account.

#### ***E-banking***

The Bank of Thailand has imposed the Internet Banking Technology Risk Management Guidelines, which were developed from the Bank for Interna-

tional Settlement's Risk Management Principles of Electronic of Basel Committee on Banking Supervision. The commercial banks have to comply with these guidelines to meet the BIS Standards for the security control and risk management in e-banking operation.

There are 14 principals for the e-banking operation guidelines, which are divided into three main parts: 1. Board and Management Oversight. 2. Security Controls and 3. Legal and Reputational Risk management.

### ***E-commerce***

The Thai government has been in the process of drafting five laws in order to facilitate e-commerce business in the country. These five laws are as follows:

- (1) Electronic Transaction Law which is also incorporated the Electronic Signature Law
- (2) Data Protection Law
- (3) Computer Crime Law
- (4) Electronic Fund Transfer Law
- (5) National Information Infrastructure Law

It is expected that the Electronic Transaction Law will be enacted by early 2002 while the other laws are still under the drafting process.

### **B.11.2 Specific Questions:**

	1996	1997	1998	1999	2000
3. Electronic Fund Transfer Data <sup>1/</sup>					
- Number of transactions					
- Value of Transactions (Billions of Baht)	100,922 8,177.40	452,388 22,845.5	1,648,743 75,323.5	3,041,949 9 87,902.4 0	4,746,789 182,391.30 0
4. Payments and Settlements					
- Paper based settlements (e.g. cheque, draft) (Billions of Baht)	124,176	139,510	77,336	67,142	27,125
- electronic based settlements (e.g. ATM, credit card) (Millions of Baht)	806,309	930,206	965,671	1,090,095	1,457,014
5. Internet Banking					
- Number of internet banks	-	-	-	N.A	N.A
- Total number of banks	29	35	34	34	34

1/ The figure source is from BAHTNET and Media Clearing.

## Appendix C: Money Multiplier with E-Money Effect

The effect of e-money on the money multiplier is cited from BOJ (2000). Money supply (M) without e-money is defined as:

$$M = C + D, \quad (1)$$

where C is cash and D is bank deposit. High-powered money (H) is defined as:

$$H = R + C, \quad (2)$$

where R is the reserve balance. The money multiplier (M/H) is

$$\frac{M}{H} = \frac{C+D}{R+C} = \frac{\frac{C}{D}+1}{\frac{R}{D} + \frac{C}{D}} \quad (3)$$

Note that  $C/D$  is the ratio of cash to deposits and that  $R/D$  is the required reserve ratio.

When e-money appears, the definition of money supply is changed, including e-money (E):

$$M' = C' + E + D'. \quad (4)$$

Note that  $C'$  and  $D'$  represent cash and deposit respectively, after the introduction of e-money. The adjusted money multiplier is therefore:

$$\frac{M'}{H'} = \frac{C' + E + D'}{R' + C'} = \frac{\frac{C'}{D'} + \frac{E}{D'} + 1}{\frac{R'}{D'} + \frac{C'}{D'}} \quad (5)$$

It is likely that the reserve ratio ( $R'/D'$ ) will be equal to  $R/D$  prior to the introduction of e-money. To derive conclusions, two cases are taken into account.

If e-money is substituted for cash, then the ratio of cash to deposits ( $C'/D'$ ) would be lower than the previous ratio ( $C/D$ ). The value of  $(C+E)/D'$  would be almost equal to the value of the previous ratio ( $C/D$ ). Accordingly, the money multiplier with e-money will be higher than that prior to e-money introduction.

If e-money is substituted for deposits, then e-money issuers could save on required reserves, so the total reserves ( $R'$ ) will decline. There will be no change in  $C'$  (that is,  $C=C'$ ) and  $E+D'$  will be almost equal to the previous  $D$ . Thus, the money multiplier will rise.