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## THE SUPERVISORY IMPACT OF TECHNOLOGY ON SEACEN FINANCIAL INSTITUTIONS: ISSUES AND CHALLENGES IN TAIWAN

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### 1. Introduction

#### 1.1 Background and Objectives

Technology has played a major part in the broadening and deepening of the financial markets. Financial institutions implement technology to reduce the cost of operation as well as provide better services. IT has become an integral part of banking operations.

The technological transformation of the banking sector presents unique challenges to bank supervisors. It not only requires the creation of new supervisory tools for many newly developed areas such as e-banking, but also the evolving banking technology and its inherent risks can render the prevailing supervisory framework obsolete and inadequate rapidly. Bank supervisors, therefore, must continually strive to keep up with the changing technology-driven environment to harness new technology in their effort to ensure a safe and sound banking system.

In light of the above and the need to increase the awareness of IT supervision for financial institutions, SEACEN established this collaborative research project with the following objectives:

- To assess banks' financial risks in relation to the payment and settlement systems and overall financial stability;
- To examine country experiences with regard to the supervisory impact of technology; and
- To develop the research output into a case study relevant to SEACEN training courses.

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## 1.2 Summary

There are 388 banking institutions in Taiwan. The usage of IT is unavoidable in the banking sector. The applications of IT in these banking institutions can be classified into three categories:

- Category A: This category covers the computerisation of the core business of the banking institutions, such as deposits, loans, foreign exchange, treasury, trustee, credit cards, remittance, ATM, etc. Almost all the banking institutions in Taiwan are in this category.
- Category B: This category encompasses e-Banking and covers the banking products and services that are distributed through electronic channels. Continuous technological innovation and competition among the existing banks have spurred the rapid development of e-banking over the last decade. It is apparent that Internet banking has emerged as the master stream. Today all the domestic banks are engaging in Internet banking.
- Category C: This category consists of Management Information Systems (MIS) that are implemented by banks to improve the quality of their management in the face of keen competition. The MIS are implemented in the areas of Asset and Liability Management, Risks Management, Performance Management and Data Warehousing.

The major risk in IT implementation is operational risk. This is in spite of the advancement of IT usage in the banking industry. IT-related incidences in Taiwan's domestic banking sector reveal that most of the risks in IT implementation manifest from improper strategy, improper design, improper management, improper operation, and criminal acts.

The board and senior management of the banking institutions should be responsible for identifying, managing and monitoring the risks in IT implementation. The banking and financial institution supervisors face a rapidly changing landscape in the aspects of technology and customer service innovation, and it is essential for them to stay abreast of the developments and continually enlarge and upgrade their capacity and competencies. Banks are experiencing competitive pressure to roll out new business applications in very compressed time frames. The competition intensifies the supervisory and management challenge to ensure that adequate risk assessments and security reviews are properly carried out prior to the implementation of the new applications.

As Internet banking provides low cost, convenient and efficient services to customers, banks continue to promote products and services via the Internet. As the Internet threats grow rapidly, security consideration becomes an issue of major concern. The customers of Internet banking have the responsibility to manage and

secure their own computing environment, but most of them lack the knowledge and technical know-how to safeguard themselves against malevolent intruders. The supervisory authorities should be concerned with the coverage of the security measures provided by banks to protect customer privacy.

Technically, the system architecture of Internet banking consists of bank server systems, Internet connection and customer-computing environment. Customers play an important role in maintaining a secure e-banking operating environment. While the behavior and conduct of the customers do not fall under the purview of the supervisory authority, they do have an impact on the banking system.

The measures taken by banks today are too passive for them to reap the benefits of Internet banking. Eventually the Internet will enter the main stream of human life. In the development of Internet banking, the challenge to the banks is that they should constructively address and resolve the obstacles and security issues faced by customers in using the Internet services.

## 2. Overview of the Banking Institutions in Taiwan

The banking institutions in Taiwan include 39 domestic banks, one trust and investment company, 27 credit cooperatives, 289 credit departments of farmer's and fishermen's associations, and 32 local branches of foreign banks. The total number of branches reached 5,836 as at the end of June 2008.

**Table 1**  
**Number of Banks and Branches**

Categories of Banking Institutions	HeadOffice	Branches
Domestic banks	39	4,556
Trust & investment Co.	1	6
Credit cooperatives	27	270
Credit department of farmers' & fishermen's associations	289	852
Local branches of foreign banks	32	152
Total	388	5,836

Source: Financial Statistics Monthly at the end of June 2008

Domestic banks are relatively large in terms of their assets. They accounted for 85.6% of total assets of banking institutions as at the end of June 2008. The asset share of the banking institutions are shown in Table 2.

**Table 2**  
**Assets of the Banking Institutions in Billion of NT\$**

Categories of Banking Institutions	Assets	Share of Total Assets
Domestic banks	30,589	85.6%
Trust & investment Co.	15	0.1%
Credit cooperatives	596	1.7%
Credit department of farmers' & fishermen's associations	1,516	4.2%
Local branches of foreign banks	3,004	8.4%
Total	35,720	100.0%

Source: Financial Statistics Monthly at the end of June 2008

## 2.1 Condition and Performance of Domestic Banks

### 2.1.1 Major Income Components

The sector's net income (excluding interest) before tax in the first quarter of 2008 grew dramatically compared with the same period of 2007. The major income components are tabulated as follows.

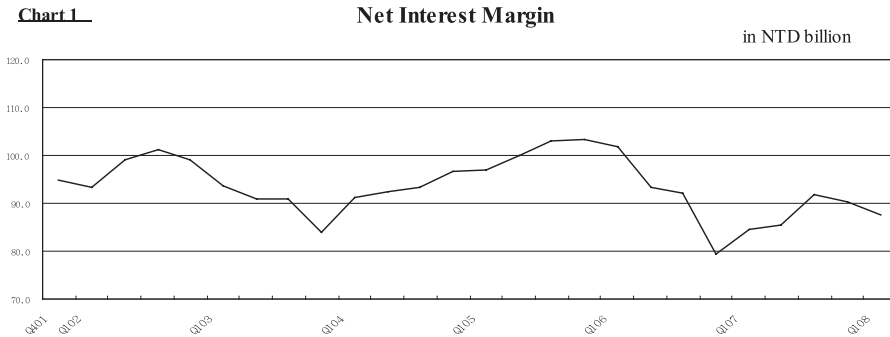
**Table 3**  
**Major Income Components**

	NT\$ billion		
	Jan.-Mar. 2007	Jan.-Mar. 2008	% Change
<b><i>Income</i></b>			
Net interest income	84.7	87.6	3.4
Net revenues other than interest	8.0	39.6	395.0
<b><i>Expense</i></b>			
Loan loss provision	31.0	25.3	-18.4
Other expense	66.3	74.8	12.8
<b><i>Net income</i></b>	-4.6	27.0	-

Source: Condition and Performance of Domestic Banks at First Quarter's End 2008 Central Bank of the Republic of China (Taiwan)

### 2.1.2 Net Interest Margin (NIM)

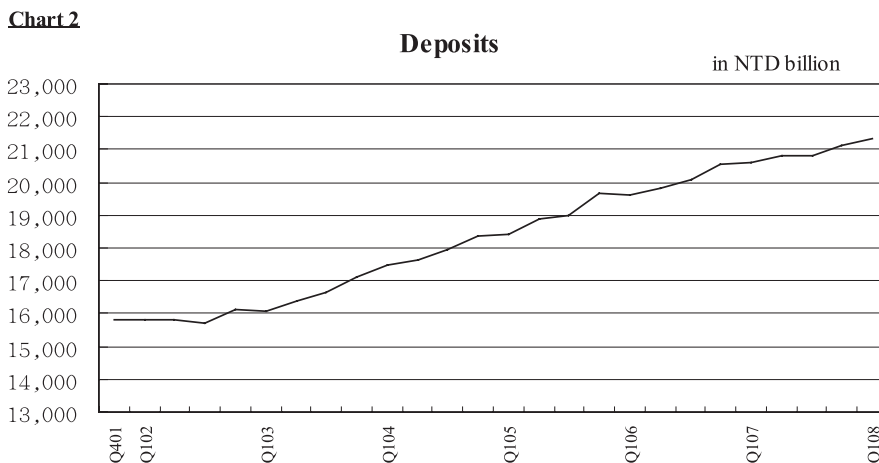
The NIM was NT\$ 87.6 billion during this quarter, slightly decreasing by NT\$ 2.7 billion (-2.99%) compared with the previous quarter (Chart 1).



Source : Condition and Performance of Domestic Bank's at First quarter's end 2008 Central Bank of the Republic of China (Taiwan)

### 2.1.3 Deposits

Total deposits as of the first quarter's end of 2008 were NT\$21,333.7 billion, increasing by NT\$ 197.1 billion compared with the preceding quarter. It was mainly due to the increase in time deposits. The annual growth rate of total deposits decreased 3.23 percentage points from 7.36% as at the end of the first quarter of 2007 (Chart 2).

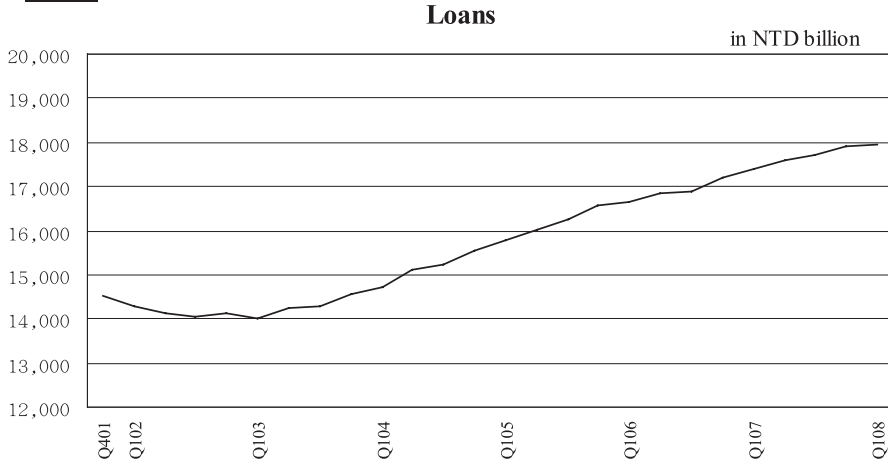


Source : Condition and Performance of Domestic Bank's at First quarter's end 2008 Central Bank of the Republic of China (Taiwan)

### 2.1.4 Loans

The total loans were NT\$ 17,958.0 billion as at the end of the current quarter, increasing by NT\$ 42.9 billion (0.24%) compared with preceding quarter. The annual growth rate was 2.18%, decreasing 4.78 percentage points from 6.96% as of the same period of 2007. The trend was mainly due to a slowdown of bank claims on government and private sectors (Chart 3).

**Chart 3**

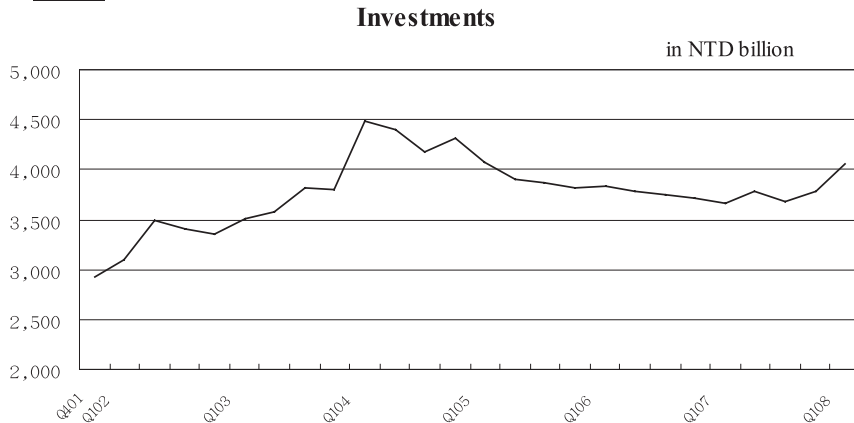


Source : Condition and Performance of Domestic Banks at First quarter's end 2008  
Central Bank of the Republic of China(Taiwan)

### 2.1.5 Investments

The total investments amounted to NT\$4,049.3 billion, increasing by NT\$ 269.5 billion (7.13%) compared with the previous quarter, mainly due to the increased purchase of Negotiable Certificate of Deposits (NCDs) issued by CBC (Chart 4).

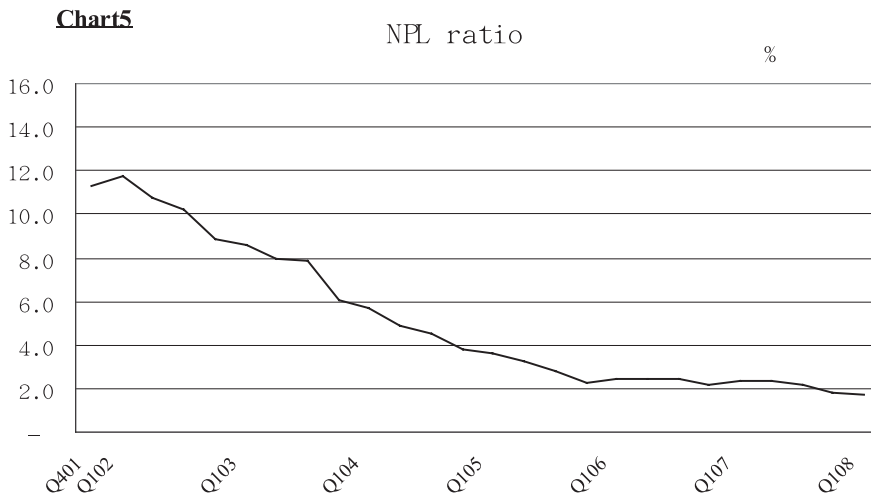
**Chart 4**



Source : Condition and Performance of Domestic Banks at First quarter's end 2008  
Central Bank of the Republic of China(Taiwan)

### 2.1.6 Asset Quality

The average NPL ratio at the end of this quarter went down by 0.15 percentage points to 1.68% from previous quarter. Along with the efforts to enhance risk management, the asset quality of the overall banking sector remains healthy. The average provision coverage ratio was 72.32%, 4.32 percentage points up from 67.0% as at the end of the previous quarter. The sector's average provision coverage ratio stayed on an upward trend strengthening in the capacity capacity of risk management (Chart 5).

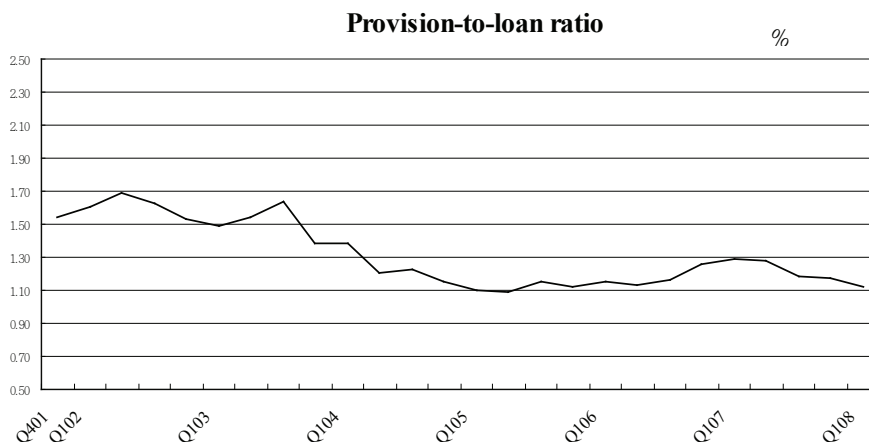


Source : Condition and Performance of Domestic Banks at First quarter's end 2008  
Central Bank of the Republic of China(Taiwan)

### 2.1.7 Provision-to-Loan Ratio

The provision-to-loan ratio was 1.13%as at the end of the current quarter, slightly leveling off from 1.17%as of the preceding quarter. It was due to the slight decrease of loan loss provisions and increase of loans, reflecting the banking sector's optimistic attitude in loan policy (Chart 6).

**Chart 6**

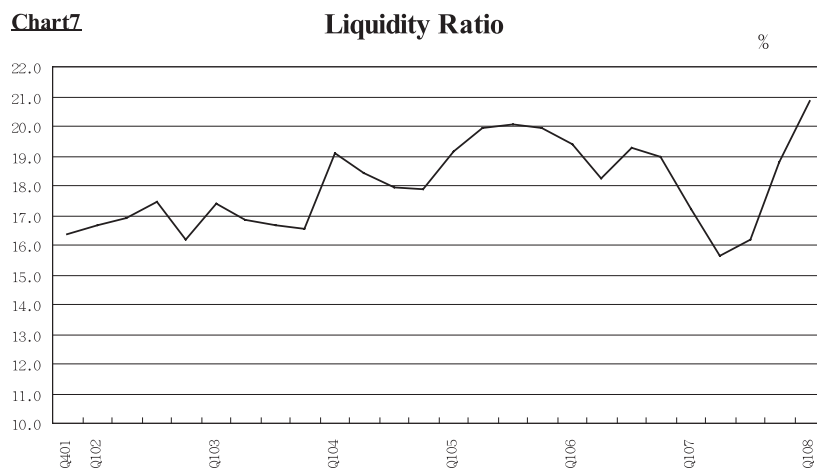


Source : Condition and Performance of Domestic Banks at First quarter's end 2008  
Central Bank of the Republic of China(Taiwan)

### 2.1.8 Liquidity Ratio

The liquidity ratios of all the domestic banks exceed the statutory minimum ratio (7%) in March 2008. The average liquidity ratio was 20.86%, increasing by 2.08 percentage points from 18.78% in December 2007. Overall, the domestic banking sector had ample liquidity. All the data was in terms of the average of the last month of quarters (Chart 7).

**Chart7**



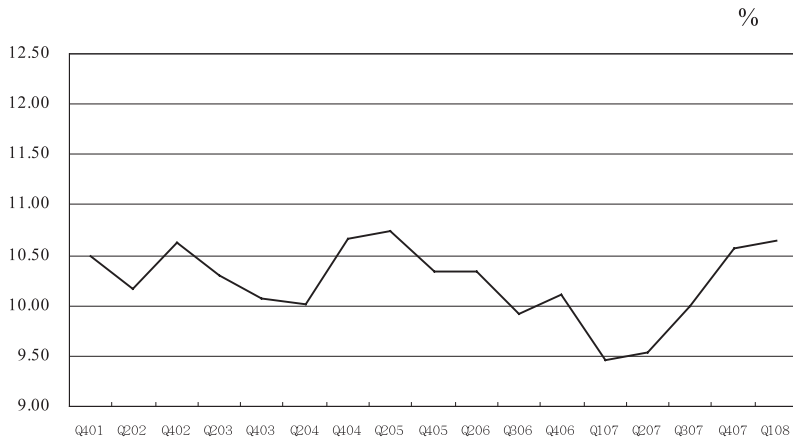
Source : Condition and Performance of Domestic Banks at First quarter's end 2008  
Central Bank of the Republic of China(Taiwan)

### 2.1.9 Capital Adequacy Ratio

The average BIS capital adequacy ratio was 10.64% as at the end of March 2008, increasing by 0.07 percentage points from 10.57% as at the end of December 2007. Taken as a whole, most of the domestic banks have adequate capital. The average capital adequacy ratio has been published quarterly since the third quarter of 2006. The data disclosed was based on unaudited reports (Chart 8).

**Chart 8**

#### Capital Adequacy Ratio



Source : Condition and Performance of Domestic Banks at First quarter's end 2008  
Central Bank of the Republic of China(Taiwan)

## 2.2 ATM and Credit Card

In Taiwan, ATMs (Automated Teller Machines) provide round-the-clock service, seven days a week. Customers of banks can use a financial card at any ATM machine with the mark of the Financial Information Service Co., Ltd (“FISC”) to make interbank withdrawals, account transfers, bill payments, tax payments, and balance inquiries. They can use VISA or MasterCard credit cards at any ATM machine with the “VISA” or “MASTERCARD” marks to take a cash advance. They also can use VISA or MasterCard debit cards at any ATM with the “Plus” or “Cirrus” logo to make cross-border cash withdrawals in the local currency. The ATM statistics are shown in Table 4.

**Table 4**  
**ATM Statistics**

End of Period	No. of ATM installed	ATM card Issued (in 1000)	Circulated ATM card (in 1000)	Count of Transactions (in 1000)	Amount of Transactions (in million NT\$)
1994	8,528	26,164	19,769	257,751	2,894,272
1995	9,536	32,512	23,658	308,061	3,498,559
1996	10,459	38,893	27,986	356,021	4,044,204
1997	11,296	46,100	32,563	398,265	4,801,748
1998	12,633	53,930	36,781	427,326	5,186,950
1999	13,683	61,639	41,698	475,666	5,882,658
2000	14,894	70,524	47,512	525,610	6,729,964
2001	15,951	79,116	53,249	539,301	6,377,504
2002	16,787	87,548	58,368	566,911	6,909,313
2003	19,097	96,898	63,760	610,372	7,180,615
2004	21,449	113,592	68,247	688,879	8,469,841
2005	24,212	130,297	73,372	727,235	9,073,712
2006	24,783	136,298	71,905	727,020	8,749,668
2007	25,121	145,178	74,252	751,266	9,440,966
2008					
Jan.	25,019	142,183	72,904	68 053	930,398
Feb.	24,989	141,070	72,678	58 325	888,881
Mar.	25,138	140,047	72,457	64 718	905,890
Apr.	25,271	140,601	72,781	62 840	926,051
May.	25,402	141,207	73,127	64 210	953,673
Jun.	25,461	141,816	73,322	63 380	980,495

Source: Financial Supervisory Commission, Executive Yuan, R.O.C

The largest credit card networks in Taiwan are Visa and MasterCard. The National Credit Card Center also provides credit cards that are only available in Taiwan. The credit card statistics are shown in Table 5.

**Table 5**  
**Credit Card Statistics**

End of Period	Circulated Credit Cards (in 1000)	Amount of Credit Card Transactions (in million NT\$)		
		Total Tran.	Local Tran.	Overseas Tran.
1994	2,709	131,553	—	—
1995	3,676	190,653	—	—
1996	5,467	272,387	227,386	45,001
1997	7,665	374,425	322,480	51,945
1998	10,640	491,097	441,505	49,592
1999	13,575	597,786	545,830	51,956
2000	18,276	719,770	660,934	58,836
2001	24,135	771,861	716,162	55,699
2002	31,591	873,599	813,492	60,107
2003	37,850	998,885	941,637	57,248
2004	44,182	1,254,482	1,177,015	77,467
2005	45,494	1,420,984	1,341,336	79,648
2006	38,324	1,380,462	1,299,164	81,298
2007	36,437	1,413,455	1,329,901	83,554
2008				
Jan.	36,163	129,524	122,678	6,845
Feb.	35,988	109,103	103,110	5,993
Mar.	35,947	106,360	99,848	6,512
Apr.	35,723	112,181	105,260	6,921
May.	35,576	113,625	106,697	6,928
Jun.	35,446	134,505	127,809	6,696

Source : Financial Supervisory Commission, Executive Yuan, R.O.C

### **3. Survey of IT Implementation**

#### **3.1 The Development of Technology Infrastructure**

##### ***3.1.1 Communication & Internet***

Chunghwa Telecom is the major provider for communication infrastructure in Taiwan. It provides the following communication facilities:

- Leased Line
- Dedicated Line
- Broadband Networks
  - ADSL
  - DSL
- ATM (Asynchronous Transfer Mode) Service
- Frame Relay Service
- WLAN Services
- ISDN Dial-up
- FTTx (which includes all fiber technologies from fiber-to-the-kerb to fiber-to-the-home, such as FTTN, FTTC, FTTB and FTTH)
- Satellite ( iDirect VSAT satellite and mesh networks rental services)

The results of the 2007 survey of the current state of demand for broadband, mobile and wireless applications among Taiwanese households, conducted by the Institute of Information Industry and sponsored by the Industrial Development Bureau of the Ministry of Economic Affairs, reveal that, as of August 2007, 79% of households in Taiwan own computers; 71% of households have Internet access; 69% of households have broadband access and 96% of online households are using broadband connections.

The statistics released by the National Communications Commission (NCC) indicate that there were a total of 24.3 million mobile phone subscribers (including 2G, 3G and PHS) in Taiwan as of December 2007. This represents an increase of approximately 660,000 subscribers or 2.8% compared with the first half of 2007. The mobile phone penetration rate had climbed up to 106%, 3% higher than the first half-year. Table 6 shows the communication infrastructures installed in Taiwan.

**Table 6**  
**Communication Infrastructures Installed in Taiwan**

<u>No.</u>	<u>Item</u>	<u>Yes/No</u>
1	Communication Network	
	Cable (Phone line)	Yes
	Satellite	Yes
	Fiber Optic	Yes
2	Use of Cellular Phone	
	Is it relatively wide spread?	Yes
3	Use of Internet	
	Is it relatively wide spread?	Yes

Source: Survey of this research project

### **3.1.2 Payment Systems**

There are five major payment systems in Taiwan:

- CBC Interbank Funds Transfer System

The CBC Interbank Funds Transfer System (CIFS) was established in 1995. It is operated and governed by the Central Bank of the Republic of China (Taiwan), hereafter referred as the CBC. The participants of the CIFS comprise banks, investment and trust companies, and bills finance companies. The banking and financial institutions which maintain transaction accounts with the CBC may directly use the CIFS to transfer funds. Payment instructions are also sent over the CIFS for settling obligations on cheque clearing, adjusting reserve account balances, or making payments associated with interbank loans, bill/bond transactions.

Previously, the CIFS is operated a dual system of designated-time netting and real-time gross settlements. To minimise settlement risk, the CBC abolished designated-time settlements in September 2002. That is, the CIFS is embedded with real-time gross settlement (RTGS) function. Payments are processed through the CIFS individually and continuously during the day in real time.

- Interbank Remittance System

The Interbank Remittance System (IRS), launched in August 1987, is operated by the FISC. The IRS provides remittance services to the general public, government agencies, and banks.

- Credit Card and Shared ATM System

The largest credit card networks in Taiwan are Visa and MasterCard. The interbank settlements of credit card transactions between card-issuing banks and the retail merchants' banks are made by the FISC, or the National Credit Card Center.

The Shared ATM System is operated by the FISC. All the participants in the IRS can join the Shared ATM System to provide 24-hour service transactions with regard to cross-bank withdrawal, balance inquiry, funds transfer, credit card cash advance, and IC card loading. Net positions are settled daily through a special account maintained at the CBC.

- Clearing House System

The CBC supervises the Taiwan Clearing House System which handles clearing and settlement of cheques, promissory notes, and drafts among banks. All banks in Taiwan using these facilities are required to open reserve accounts at the CBC where the net settlement balances will be debited or credited to these accounts. The head office of the Taiwan Clearing House System is located in Taipei and it has 15 local clearing houses outside the Taipei area.

The participants of the system include banks, credit cooperative associations, credit departments of farmers' associations and fishermen's associations. The CBC is also one of the participants in the Taiwan Clearing House System.

- Central Government Securities Settlement System

Since the introduction of the Central Government Securities Settlement System (CGSS) in September 1997, central government bonds have been issued in the book-entry form. In October 2001, treasury bills were added to the system and have been issued in the book-entry form since then. The CGSS is a real-time gross settlement system (RTGS) for the issuance, transfer, redemption, and interest payment of central government bonds in the form of accounting entries on computer records.

The ownership of book-entry central government securities is recorded in a two-tier system of accounts. Only the clearing banks are eligible to have book-entry bond accounts and fund accounts (also serve as reserve balances) directly with the Treasury Department of the CBC. All other individuals or entities are required to hold such accounts with the clearing banks.

Currently, book-entry transactions within a clearing bank can be made on a delivery-versus-payment (DVP) basis while those between clearing banks cannot. To reduce the settlement risk in interbank transactions, the CBC plans to link the CGSS with the CIFS to allow clearing banks to handle related settlements on DVP basis. Table 7 shows the information of payment systems in Taiwan.

**Table 7**  
**Information of Payment Systems in Taiwan**

No.	Item	Yes/No
1	National Payment System	
	Operated by government agency / central bank	Yes
	Operated by an independent or private company	Yes
2	Automated/Computerised Payment System	Yes
3	RTGS	Yes
4	National Securities Settlement System	
	Operated by government agency / central bank	Yes
	Automated/Computerised Settlement System	Yes

Source : Survey of this research project

### **3.2 The Presence of Technology-supported Financial Products and Services**

Banks are highly competitive in Taiwan. All the domestic banks provide Internet Banking service, including WebATM which provides ATM services (except cash withdraw) via the Internet. Table 8 shows the presence of technology-supported financial products and services in Taiwan.

**Table 8**  
**Technology-supported Financial Products and Services**

<u>No.</u>	<u>Item</u>	<u>Yes/No</u>
1	Credit Card	
	National (only used in the country)	Yes
	International	Yes
2	Debit Card	
	National (only used in the country)	Yes
	International	Yes
3	ATM	
	Individual bank	Yes
	Nationally-Shared ATM	Yes
	Internationally-Shared ATM	Yes
4	Electronic Fund Transfer (EFT)	Yes
5	EFT at Point of Sale	
	National (only within the country)	Yes
	International	Yes
6	Remittance Service	
	Domestic companies	Yes
	International companies	Yes
7	Phone Banking	
	Informational	Yes
	Transactional intra bank	Yes
	Transactional inter bank	Yes
8	Mobile/SMS Banking	
	Informational	Yes
	Transactional intra bank	Yes
	Transactional inter bank	Yes
9	Internet Banking	
	Informational	Yes
	Transactional intra bank	Yes
	Transactional inter bank	Yes
10	Pre-paid card	Yes

Source: Survey of this research project

### **3.3 The Heterogeneity/Homogeneity of the Technology Implemented in the Financial Institutions.**

In the 1970's, most of the banks in Taiwan began to develop IT-related applications. With the encouragement of the relevant authorities, all the domestic banks set up their core banking systems in the 1980's, operating mainly in the deposit and loan business of the banks.

In 1986, the Financial Information Service Co., Ltd (FISC) introduced Cross-Bank Systems, which provide Cross-Bank shared ATM and Cross-Bank remittance service. Banks had to develop their own cross-bank systems to provide these services to their customers. The banks joined the Cross-Bank network gradually. Finally, all the banking institutions including the credit departments of farmers' and fishermen's associations took part in the network. This is an important milestone in the development of payment infrastructure for convenient and automatic banking services in Taiwan.

The relevant authorities encourage the banks to computerise their core business. As a result, banking business in the areas of deposit, loan, foreign exchange, credit cards, investments, trustee, securitisation, derivative and structure products are all supported by technologies.

To further improve management capability and to comply with Basel II, banks also develop technologies to support various types of risk management, such as credit risk, market risk, operational risk, asset and liability management, etc.

Table 9 shows the requested survey regarding the implementation of IT-related applications in addition to IT-related products.

**Table 9**  
**Implementation of IT-related Applications**

<u>No.</u>	<u>Item</u>	<u>Yes/No</u>
1	Core Banking: General Ledger, Third Party Fund, Loan, and Consumer Information File	Yes
2	Treasury	Yes
3	Remittance	Yes
4	Trade Finance	Yes
5	Corporate Online Service	Yes

Source: Survey of this research project

### **3.3.1 Heterogeneity**

- The banking institutions use different platforms to implement technologies and adopt different security management policies and procedures. It is not easy to impose a common security standard for different platforms, and that certainly increases the difficulty in supervisory tasks. The management of banks should be responsible for monitoring the adequacy in security control.

- Commercial banks are highly competitive. They develop technologies to provide state-of-the-art services to customers, while limited-sized banks still adopt technology as automatic calculator.

### 3.3.2 Homogeneity

- Most of the domestic banks develop technologies on their own to support their core business. The core business context supported by technologies has close similarities.
- Almost all the domestic banks adopt centralised architecture to implement technologies.

## 4. Impact of IT Implementation on Financial Institutions

### 4.1 Risks Assessment

The usage of IT is unavoidable in the banking sector. The banking institutions in Taiwan require IT support for them to increase efficiency, provide better services, obtain better profits and compete for markets. The implementation of IT applications by the banking institutions in Taiwan can be classified into three categories:

**Table 10**  
**Categories of IT Implementation in Banking Institutions**

Category	Scope of IT Implementation
Category A	Core Banking
Category B	e-Banking
Category C	Management Information System

Source: Survey of this research project

Category A: Core Banking covers the computerisation of the core business of the banking institutions, such as deposit, loan, foreign exchange, treasury, trustee, credit cards, remittance, ATM, etc. Most of the banking institutions in Taiwan fall under this category.

Category B: e-Banking collectively covers the banking products and services that are distributed through electronic channels, such as Phone Banking, Home Banking, Firm Banking, Mobile Banking, Internet Banking, etc. Continuous technological innovation and competition among the existing banks have spurred the rapid development of e-Banking over the last decade. It is apparent that Internet Banking has emerged as the master stream. All domestic banks are engaging in Internet banking.

Category C: This category consists of Management Information Systems (MIS) that are implemented by banks to improve the quality of their management especially in the areas of Asset and Liability Management, Risks Management, Performance Management and Data Warehousing.

The usage of IT carries risks for all industries, especially so for the financial industry. The implementation of IT applications not only broadens and deepens the financial institutions, but it can also influence the stability of the whole financial system.

#### **4.1.1 General Risks**

The major risk in IT implementation is operational risk. This is in spite of the advancement of IT usage in the banking industry. From a review of all the IT-related incidents in the domestic banks of Taiwan, we find that most risks in IT implementation are due to improper strategy, improper design, improper management, improper operation, and criminal acts. In general, we assess risks from the security objectives of IT implementation:

- Integrity: When data is incomplete or inaccurate, it may cause Operational Risk, Strategic Risk, Reputation Risk, Legal Risk and Compliance Risk.
- Confidentiality: When information is not protected or there is unauthorised access to the system, it may cause Operational Risk, Reputation Risk, Legal Risk and Compliance Risk.
- Availability: When the system is not available for use, it may cause Operational Risk, Reputation Risk, Strategic Risk and Compliance Risk.
- Effectiveness & Efficiency: When the system does not deliver an expected function or cause a sub-optimal use of resource, it may cause Operational Risk.

#### **4.1.2 Specific Risks**

An IT system that is implemented to support the management of specific risks, such as Liquidity Risk and Credit Risk, may actually bring about the specific risks, if the IT system does not function according to its design, as planned.

## 4.2 Risks and Impact of IT Usage on Supervisory Practices

Table 11 shows the risks that need to be addressed and controlled in the financial system.

**Table 11**  
**IT-related Risks in Financial System**

<u>No.</u>	<u>Item</u>	<u>Yes/No</u>
1	Operational Risk	Yes
2	Liquidity Risk	Yes
3	Credit Risk	Yes
4	Strategic Risk	Yes
5	Reputation Risk	Yes
6	Legal Risk	Yes
7	Compliance Risk	Yes

Source: Survey of this research project

Currently, the banking institutions in Taiwan do not have any quantitative approach in measuring the risks in IT implementation. As is generally acknowledged, the board and senior management of the banking institution should be responsible for identifying, managing and monitoring the risks in IT implementation. They should establish proper procedures to ensure that the risks are assessed and are adequately managed, and that the banking operations are compliant with the regulations.

In Taiwan, the banking institutions are required to acquire the approval of the relevant authorities before introducing a brand-new product or service to their customers, especially a product or service with technological innovation. The relevant authorities are tasked to ensure that the risks are adequately assessed and the management plans are in place to mitigate the risks, before approval is given for the launching of a brand-new product or service.

The banking and financial supervisors face a rapidly changing banking environment as banks innovate with IT technology to compete in the marketplace. It is essential for them to keep abreast of the developments and continually enlarge and upgrade their capacity and competencies. Banks are experiencing competitive pressure to roll out new business applications in very compressed time frames. The competition intensifies the supervisory and management challenge to ensure that adequate risk assessments and security reviews are conducted prior to implementing new applications.

## **5. The Prevailing IT Supervisory Framework and Regulations**

### **5.1 Principles**

In order to ensure the stability and safety of the financial markets, the following principles are adopted in all aspects of supervision (including IT supervision):

- To maintain the soundness of the banking system with a liberal and predictable legal environment;
- To protect the interest of depositors;
- To develop the banking sector and enhance its market competitiveness; and
- To establish a financial management system in line with international norms and standards.

### **5.2 Regulatory Framework and Regulations**

#### ***5.2.1 Legal Framework***

The Banking Law, Financial Holding Company Law, Securities & Futures Law, and Insurance Law are the main pillars of the legal framework for the domestic financial market. In addition, there is a separate Offshore Banking Act that governs offshore banking units and the Law governing Credit Cooperatives which regulates community financial institutions.

To improve the legal framework and prevent technology-related crimes, new legislations have been developed to reinforce the foundation of the legal system of Taiwan, such as Criminal Law, Consumer Protection Law, Money Laundering Control Act, Data Protection Law, Electronic Signature Law, etc.

#### ***5.2.2 Regulatory Agencies***

- Financial Supervisory Commission

Pursuant to the Regulation Governing the Establishment and Organisation of the Financial Supervisory Commission of the Executive Yuan, enacted on 10 July 2003, the Financial Supervisory Commission (FSC) was inaugurated and commenced operation on 1 July 2004. The authority of financial supervision was shifted from the Ministry of Finance (MOF) to the FSC since then.

The primary function of the Commission is to consolidate the supervision and examination of the banking, securities and futures, insurance as well as the financial holding companies under one supervisory authority with greater independent power. The FSC functions as an independent agency that directly reports to the Executive Yuan. Its responsibilities include supervision, examination, and inspection of the financial market.

- The Central Bank of the Republic of China (Taiwan)

The Banking Law and the Law Governing the Central Bank of the Republic of China mandates the Central Bank of the Republic of China (CBC) to implement monetary policy and foreign exchange regulations. The CBC adjusts the national money supply to promote its policy goals of price stability and sound economic growth. The CBC is also concerned with the sound operation of banks and exchange rate stability.

Since the FSC was set up on 1st July 2004, the CBC stopped carrying out regular full-scope on-site examinations of individual financial institutions. To facilitate the implementation of the Central Bank's policies, the Bank retains the authority to carry out target examinations on issues related to monetary, credit and foreign exchange policies and payment system. In addition to on-site target examinations, the Bank implements off-site monitoring to identify the weaknesses of individual financial institutions and to grasp the whole picture of the financial system in order to respond appropriately in a timely manner.

- Bureau of Agricultural Finance (BOAF), Council of Agriculture

The BOAF is responsible for supervising agricultural finance institutions, including the credit departments of farmers' and fishermen's associations.

### **5.2.3 Regulations**

In addition to the laws legislated to prevent technology-related crimes, the major regulations applied in technology supervision are as follows:

- Rules Governing Information Security Management of Executive Yuan and Organisations under the Yuan;
- Implementation Rules for Internal Audit and Internal Control System;
- Information System Security Standards for Financial Institution;
- Risk Management Principles for Electronic Banking; and
- Guidelines for Security Measures of Financial Institutions for Electronic Banking Services.

**Table 12**  
**IT Supervisory Framework**

<u>No.</u>	<u>Item</u>	<u>Yes/No</u>
1	Is IT Implementation reported regularly?	No
2	Is IT audit conducted?	Yes
	By bank / IT supervisors from supervisory authority	Yes
	Off-site	No
	On-site	Yes
	By internal or external (third party) auditors (on-site)	Yes
	Special IT audit/examination outside regular examination (on-site)	Yes
3	Does the formal framework exist?	Yes
4	If yes, is it stipulated in a regulation?	Yes
5	Is there minimum requirement in IT Implementation?	Yes
6	Are the following items implemented: Active supervision by Top Management (IT Steering Committee)	Yes
	IT Policy and Standard Operating Procedure	Yes
	IT risk is included in the risk-based management	Yes
	System development life cycle	Yes
	All layers of IT system	Yes
	Internal control system for IT Implementation	Yes
	Business Continuity Plan and Disaster Recovery Plan	Yes
	Periodical IT audit (internal/external)	Yes
5	Because it involves supervision procedure, is IT outsourcing especially regulated?	Yes
6	Because it involves consumer protection, is e-Banking products especially regulated?	Yes
7	Are any IT-related laws (cyber law, e-commerce, m-commerce, digital signature) installed?	Yes

Source: Survey of this research project

### **5.3 References/Orientation for the Prevailing Supervisory Framework**

Prior to the establishment of the FSC, the original authority, the Ministry of Finance (MOF), in addition to its jurisdiction over national treasury, taxation and customs, was in charge of the supervision of Taiwan's financial market through its three major subordinate agencies, namely, the Bureau of Monetary Affairs (BOMA), the Securities and Futures Commission, and the Department of Insurance. Among the agencies, BOMA is responsible for the formulation and implementation of policies and regulations.

The authority for financial supervision was shifted from the Ministry of Finance (MOF) to the Financial Supervisory Commission (FSC) since 1 July 2004. Most of the IT supervisory framework remains unchanged.

### **5.4 IT Supervisory and Audit Practices**

There are three major layers of IT audit that are conducted in the banking institutions of Taiwan:

- Self-audit conducted by the Information Department itself;
- Internal-audit conducted by the Audit Department reporting to the Board of Directors; and
- External-audit conducted by the supervisory authority.

#### ***5.4.1 Self-audit***

The Information Department of the banking institution is required to conduct self-audits regularly. The Department has the responsibility to help the bank achieve security objectives in its IT implementations. Self-audit is a management approach for the department to conduct reviews to determine if the policies and procedures have been properly complied with.

The findings of the self-audit should be well documented. The Department should conduct full scope self-audits twice a year and carry out targeted self-audits ten times a year. The self-audit activities are monitored by the audit department of the Board of Directors.

#### ***5.4.2 Internal Audit***

Internal audits are conducted by the Audit Department reporting to the Board of Directors. The Department is required to conduct full-scope internal audit on site at least once a year. It should be conducted by specialised IT auditors, and the audit reports should be submitted to the supervisory authorities.

### 5.4.3 External Audit

IT examinations are included within regular full-scope on-site examinations conducted by the supervisory authority. The frequency of regular full-scope examination depends on the performance of the banks. The average frequency is once every 12 to 18 months. IT examinations are conducted by specialised IT auditors in accordance with the examination handbooks. Any finding in the examination would be recorded and followed up subsequently.

**Table 13**  
**Regarding On-site IT Audit**

No.	Item	Yes/No
1	Is it conducted regularly?	Yes
2	If not regularly, is it conducted case by case?	
3	If regularly, objects of audit:	
	Organisation and Management	Yes
	System development process	Yes
	Operation	Yes
	Software and Application, including e-Banking	Yes
	Security (authentication, authorisation and protection – including audit trails, encryption)	Yes
	BCP/DRP	Yes
	Communication Network	Yes
	Outsourcing process	Yes
	Internal Auditing	Yes

Source: Survey of this research project

### 5.5 Specialised IT Supervisors / Auditors

The Financial Supervisory Commission (FSC) is the sole statutory financial supervisor. The Commission has 17 specialised IT supervisors / auditors.

### 5.6 Coordination Among the Financial Institution Authorities

Pursuant to the Financial Supervisory Commission Act, there is a coordination mechanism among the financial authorities in place. The “Financial Supervision Coordination Group” which is composed of the senior officers of the FSC, the CBC and other related financial authorities meets every month, and when necessary, to coordinate and cooperate on issues of financial supervision, management and examination.

## 6 Issues and Challenges

### 6.1 “What Appropriate Measures have been Taken by the Banks to Ensure Adherence to Customer Privacy Requirements in Internet Banking?”

As Internet banking provides low cost, convenient and efficient services to customers, banks continue to promote products and services via the Internet. At the same time, the Internet threats are also growing rapidly, and security consideration is a major concern in promoting Internet banking.

Most of the banks providing Internet banking services stressed they have instituted these counter-measures:

- Adoption of security measures at the transaction level.  
Banks are using strong encryption supports to ensure message confidentiality, integrity, authentication, non-duplication and non-repudiation.
- Establishment of Security Policies and Operating Guidelines.  
Only authorised persons are allowed access to the systems and audit trails are preserved for any access attempts. Comprehensive security policies and operating guidelines are implemented, enforced and monitored by the management to achieve security objectives.
- Improvement of the reliability of the system.  
To improve the reliability of the computer system, computer systems are kept in operational conditional to provide high usability, and decrease the chances of non-availability.
- Protection of bank’s internal systems from malicious attacks.  
Measures have been taken to protect internal computer systems from malicious attacks, such as firewalls, virus detection software, and intruder detection systems, etc.

In March 2004, four commercial banks in Taiwan reported that their customers were infected by the “Trojan Horse” virus. Criminals were using the “Trojan Horse” to steal the passwords of customers that were used to access Internet banking services to transfer out funds in customers’ accounts. This event caused a temporary stoppage in non-previously-agreed fund transfers of all the banks. The supervisory authority requested the banks to reassess the risks and the measures in mitigating risks, and that banks are to resume this service with at least 2-factor authentication procedures. This event illustrates the intrusion of customer’s privacy in the customer’s own computing environment.

Though the customers of Internet banking have the responsibility to manage and secure their own computing environment, most of them lack the knowledge and technical capability. Their computer systems may be infected through the mere browsing of the web pages, or through opening an e-mail. It is glary that most of the bank customers lack the knowledge in technologies to prevent and protect themselves against malevolent intruders. There have been instances of intrusions where the customers might not even have been aware of them.

The Internet has become an important channel for banking business. The supervisory authorities should concern with the coverage of the security measures taken by the banks to protect customer privacy.

## 6.2 Challenges

### **“What are the Appropriate Measures that could be Taken by the Bank to Assist their Internet Banking Customers Manage their Own Computing Environments?”**

Banks that provide Internet banking services recognise the weakness existing on the customer’s side. To mitigate the risks, most of the banks take the following measures:

- Provision of security-related information to their customers.

The security-related information is provided in the form of booklets when customers apply for the Internet banking service. Most of the information provided is basic and not up to date.

- Having their customers declare in the agreements that they recognise the existence of risks and they have the responsibility of maintaining and securing their own computing environment.

Technically, the system architecture of Internet banking consists of bank server systems, Internet and customer computing environment. Customers have an important role to play in keeping a secure e-banking operating environment. Their conduct and behavior can have an impact on the banking system even though they do not come under the purview of the banking and financial institution supervisors.

The measures taken by banks today are too passive for them to reap the benefits of Internet banking. Eventually the Internet will enter the main stream of human life. In the development of Internet banking, the challenge to the banks is that they should address and resolve the

obstacles and security issues faced by customers in using the Internet services.

## **7. Policy Adoption**

The following major IT implementation policies have been adopted by the IT auditors of the Financial Inspection Division, Central Bank of Republic of China (Taiwan), while IT examinations are conducted of the financial institutions.

- **Organic policy**  
Proper segregation of duties is required, especially among operating system engineering, application System design, and data control.
- **Employee security policy**  
The employees should recognise and comply with security policies.
- **Information assets management policy**  
Important information assets should be managed by specified employees; risks and protection measures should be assessed periodically.
- **Software policy**  
The implementation of software should be conducted by a team which consists of members from IT, accounting, auditing and the end user. Risks should be assessed in advance, and all security measures should be made ready before on production.
- **Change policy**  
Any change in computing environment should be conducted under approval. Detailed evidences should be kept and reviewed regularly.
- **Data access security policy**  
Each application system should properly take into account the various access requirements to define various access rights.
- **Disaster Recovery Plan & Business Continuity Plan**  
DRP & BCP should be properly planned for each application system, and periodically exercised.
- **Physical and environmental security policy**  
Information security requirements should be considered in office areas and restricted areas, and enforced practically.

- Network security policy  
Secure data transmission in internal and external networks should be also properly planned and enforced.
- Outsourcing policy  
In case of outsourcing, risks should be assessed in advance. Proper risk mitigation measures should be planned in advance and enforced.
- Legal compliance policy  
Laws, regulations and any contracts that are applicable to IT-related activities should be periodically reviewed for compliance.
- Internal auditing policy  
Periodic internal auditing should be conducted to ensure the soundness and compliance in IT-related operations.

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