Republic of the Union of Myanmar
Data Collection Survey on Modernization of the Financial System

FINAL REPORT
Summary

October 2012

Japan International Cooperation Agency (JICA)

Daiwa Institute of Research Ltd.
NTT Data Corporation
Fujitsu Limited

1 R
J R
12-070

Republic of the Union of Myanmar
Data Collection Survey on Modernization of the Financial System

FINAL REPORT
Summary

October 2012

Japan International Cooperation Agency (JICA)

Daiwa Institute of Research Ltd.
NTT Data Corporation
Fujitsu Limited

TABLE OF CONTENTS

1. Outline of the Study 1
1.1. Background and Objectives 1
1.2. General Outline and Implementation 2
1.3. Composition and Assignment of the Study Team 2
2. Overview of Myanmar Financial Sector 4
2.1. Historical Background 4
2.2. Financial Sector Overview 5
2.3. Capital Market 6
2.4. Current Situation and Issues of Financial Sector 7
2.5. Cooperation by Other Entities 10
3. Current Situation of Financial Institutions 12
3.1. Central Bank 12
3.2. Commercial Bank 20
3.3. Securities and Exchange Market 24
4. ICT Environment in Financial Market 27
4.1. ICT system in CBM 27
4.2. ICT Infrastructure in the Financial Sector 30
5. ICT Business Environment 33
5.1. ICT Environment 33
5.2 Education of ICT Human Resources 36
6. Proposal of Grand Design and Development Scenario 37
6.1. Significance of ICT technologies in financial system 37
6.2. The Result of the Analysis of the Financial ICT System for the Business Operation 37
6.3. Benefits of Modernization by the ICT System 43
6.4. Proposal for Grand Design 46
6.5. Step-by-step Development Scenario for Modernization of Myanmar Financial ICT System 51
6.6. Development of Common System Infrastructure Platform (cloud-based) for the Financial Sector (Project 1) 53
6.7. Development of Central Bank OA System (Project 2) 57
6.8. Development of Central Bank Core System (Project 3) 59
6.9. Development of Securities System (Project 4) 62
6.10. Development of Commercial Bank System (Project 5) 65
Appendix. Interviewees 67

Map of Project Site

Abbreviations

List of Figure

MAP OF PROJECT SITE

ABBREVIATION

ASEAN	Association of the South East Asian Nations
BOJ	Bank of Japan
CBM	Central Bank of Myanmar
CLMV	Cambodia, Lao PDR, Myanmar and Vietnam
CMDC	Capital Market Development Committee
CSO	Central Statistical Organization
EFT	Electric Funds Transfer System
FSA	Financial Service Agency
FTP	File Transfer Protocol
ICT	Information and communication technology
IMF	International Monetary Fund
MADB	Myanmar Agricultural Development Bank
MCF	Myanmar Computer Federation
MEB	Myanma Economic Bank
MFTB	Myanmar Foreign Trade Bank
MICB	Myanmar Investment Commercial Bank
MIT	Myanmar Information Technology Pte Ltd
MOFR	Ministry of Finance and Revenue
MPT	Myanma Posts and Telecommunications
MPU	Myanmar Payment Union
MSEC	Myanmar Securities Exchange Centre Co., Ltd.
OA	Office Automation
ODA	Official Development Assistance
PTD	The Post and Telecommunications Department
SPW	Security Printing Works
SWIFT MT	Society for Worldwide Interbank Financial Telecommunication Message Type
UPS	Uninterruptible Power Supply

LIST OF FIGURE

Figure 1-1-1	Main steps in conducting study
Figure 1-2-2	Flow chart
Figure 2-1-1	Key historical events
Figure 2-2-1	Key organizations of Myanmar financial sector
Figure 2-4-1	Financial depth comparison amongst CLMV
Figure 2-4-2	Share of cash amongst M2, CLMV comparison (2011)
Figure 2-4-3	Major issues regarding Myanmar financial sector
Figure 2-4-4	Image of how financial system modernization could bring about economic development
Figure 2-5-1	Recent cooperation by oversea countries and institutions
Figure 3-1-1	Organization chart of CBM
Figure 3-2-1	List of banks 1
Figure 3-2-2	List of banks 2
Figure 4-1-1	Results of survey of CBM's OA environment
Figure 4-1-2	Offices with no computers, room piled high with mountains of paper
Figure 4-1-1	Offices with no computers, room piled high with mountains of paper
Figure 4-2-1	Major financial networks in Myanmar
Figure 4-2-2	The current state of the financial network centered on the CBM
Figure 4-2-3	Concentration of 'people', 'things' and 'places' through cloud-computing
Figure 5-1-1	Percentage share of individuals using internet, ASEAN and Japan (2011)
Figure 5-1-2	ICT companies visited in Myanmar
Figure 5-1-3	Issues and countermeasures
Figure 5-2-1	Total classes (week) and PC sufficiency rate of Universities/Colleges and private computer schools
Figure 6-2-1	Issues for CBM operation
Figure 6-2-2	Issues for CBM and commercial banks
Figure 6-2-3	Issues for commercial banks
Figure 6-2-4	Issues for securities trading
Figure 6-2-5	Issues for infrastructure at CBM
Figure 6-2-6	Issues for data security at CBM
Figure 6-4-1	Configuration of the grand design
Figure 6-4-2	Image of the overall modernized ICT system in Myanmar
Figure 6-4-3	Effect of adopting advanced virtualization technology
Figure 6-5-1	Overview of projects for "Data collection Survey on Modernization of the Financial System in Myanmar"
Figure 6-5-2	Example of the schedule of each project
Figure 6-6-1	An overview of a common system infrastructure platform (cloud-based)
Figure 6-8-1	Image of computerization of CBM (1)
Figure 6-8-2	Image of computerization of CBM (2)
Figure 6-9-1	Image of the integrated system which makes possible the speedy, low-cost development of a capital market
Figure 6-10-1	Image of services offered by commercial banks

1. Outline of the Study

1.1. Background and Objectives

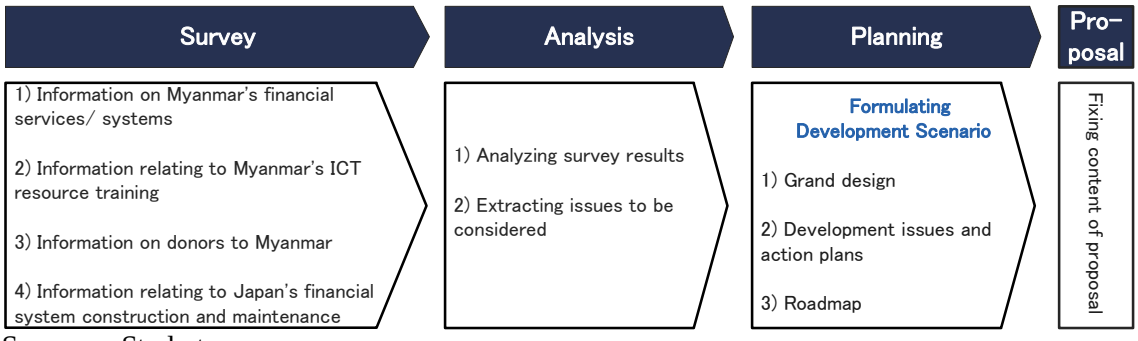
On March 30, 2011, a new administration was formed in Myanmar. The President Thein Sein announced that the government focuses the market oriented economy and facilitates the economic growth through foreign investment. However, there are a number of challenges ahead. Especially in the financial sector, the urgent need of modernization is pointed out under the Article IV consultation of International Monetary Fund (IMF).

Modernization of Myanmar's financial sector is one of the issues which Japan considers necessary to push ahead with its cooperation. In order for the financial sector to develop, it is necessary to establish financial information and communication technology (ICT) systems which will be a basis of the modern financial market.

Given these circumstances, this study was conducted 1) to understand outlines of current financial ICT systems and identify issues, then 2) investigate methods of adopting ICT systems to address the development issues identified, and finally, 3) propose a medium-term approach for developing Myanmar's financial ICT systems.

Progress with the modernization of financial system will bring major advantages to Myanmar. Financial services to nations will be much improved. Fund circulation in the market will be facilitated, leading to the economic development. The establishment of the capital market will accelerate the growth and development of the local companies, which will find it much easier to expand their operations rapidly as raising funds becomes less problematic and more flexible as a result of their ability to make use of the capital market.

Figure 1-1-1. Main steps in conducting study



Source: Study team

1.2. General Outline and Implementation

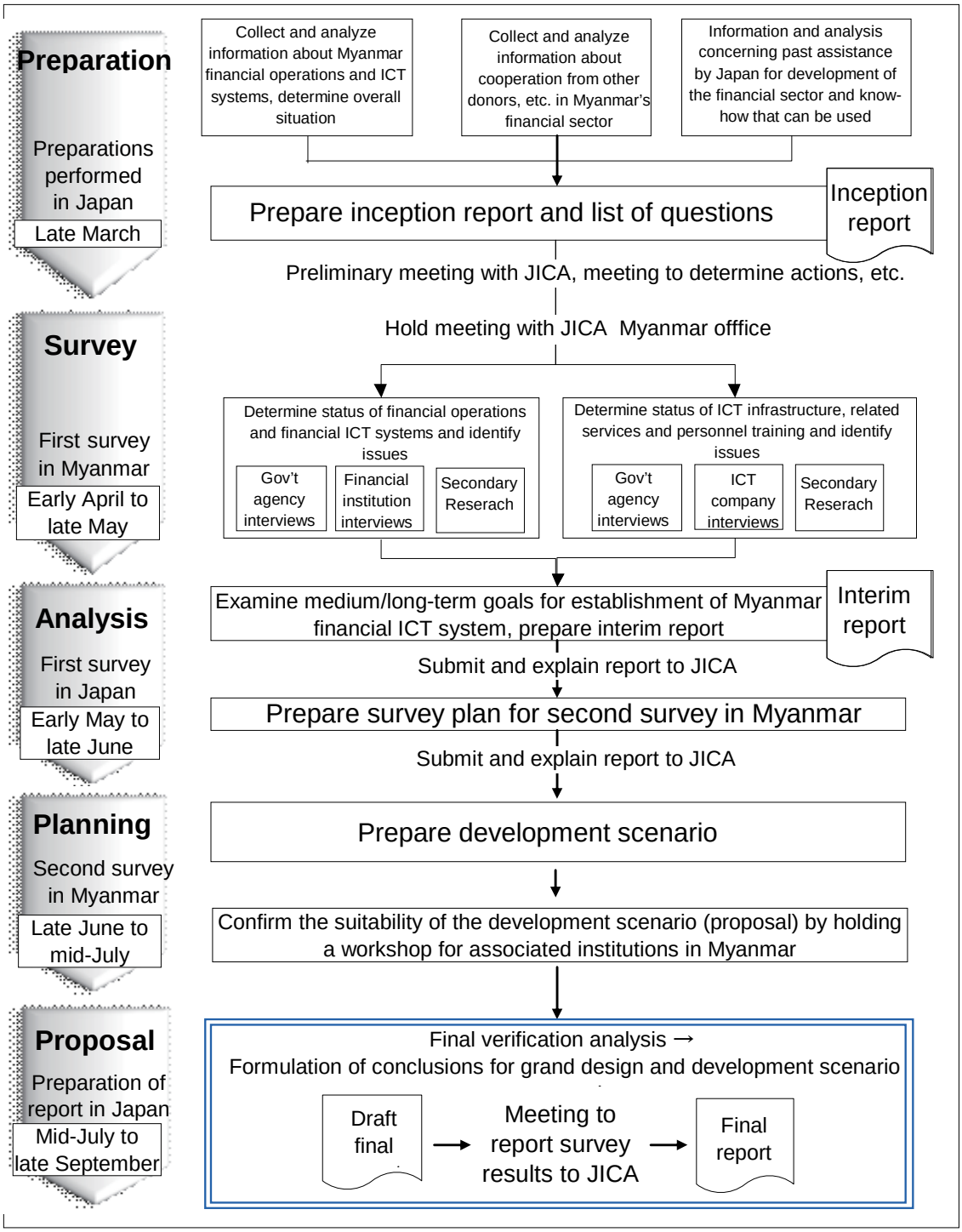
The survey was conducted from March to November in 2012. The study team visited government institutions as well as banks and ICT companies including Central Bank of Myanmar (CBM), Ministry of Finance and Revenue (MOFR), Myanmar Banking Association, state-owned banks, all commercial banks, ICT companies.

This report highlights major issues found in the concerned sector, and proposes a blueprint for developing Myanmar's financial ICT system. The blueprint was made to reveal issues of Myanmar's financial system and future direction, and to be shared between Myanmar and Japan to establish their long-term collaboration,

1.3. Composition and Assignment of the Study Team

For this study, Daiwa Institute of Research Ltd. (DIR), NTT Data Corporation (NTT Data), and Fujitsu Limited (Fujitsu) formed a consortium for the study. The study team conducted local survey effectively, by making the best use of their knowledge and experience in their specialist area such as system of central bank, commercial banks, and securities, as well as their local network of relationships with the government.

Figure 1-2-2. Flow chart



Source: Study team

2. Overview of Myanmar Financial Sector

2.1. Historical Background

1) Historical background

After independence from UK, state-owned banks and commercial banks had co-existed under the Union Bank of Burma, the central bank.

Major historic episode dates back in 1963 when all the private commercial banks had been nationalized. During this regime, numbers of reform had been taken place such as the demonetization and the dual banking system. Demonetization of currency, enforced three times (in 1963, 85 and 87), greatly ruined the reliability of financial system. Since old bank notes were not exchanged to new ones in 1987, nations gave vent to their dissatisfaction, leading to the riot in the next year.

In 1990, after the new government was formed, the financial sector developed rapidly as the relevant laws such as *the Central Bank of Myanmar (CBM) Law* enacted. Under *the CBM Law*, CBM was granted to own the privilege to execute the monetary policy, while under *the Financial Institution of Myanmar Law*, banking operation was permitted to commercial banks. During this period, economy as well as financial system developed rapidly.

The Asian financial crisis of 1997 brought a period of macro-economic instability, and after the 2003 bank crisis led banks into a bank run, the financial authority has imposed restrictions to the banking sector. Under the new government established in March 2011, however, series of multiple new policies and relaxation and modification of existing policies in the financial sector has been seen along with other major economic reforms. Several significant policies have been implemented to enhance the banking sector, including the issuance of foreign currency exchange licenses.

2) Law and regulations

In 1990, after the new government was formed, the financial sector developed rapidly as the relevant laws such as *the Central Bank of Myanmar (CBM) Law* enacted. Under *the CBM Law*, CBM was granted to own the privilege to execute the monetary policy, while under *the Financial Institution of Myanmar Law*, banking operation was permitted to commercial banks. During this period, economy as well as financial system developed rapidly.

Currently, it is believed that *the Central Bank of Myanmar Law* is under review and the new *Securities Exchange law* is being prepared.

Figure 2-1-1. Key historical events

Year	Key events in financial sector	Other historical events
1963	All commercial banks **nationalized**	
1964	**Demonetization policy** (also in 1985 and 1987)	
1969	**Monobank system** implemented (Integration into the People's Bank of Union of Burma)	
1976	**Two-tier banking system** introduced (central bank and commercial bank functions split)	
1988		8888 uprising: pro-democracy protests SLORC took power
1990	**Financial sector reform** via new relevant legal framework such as the CBM Law	General election held, result in victory of NLD
1992	**Financial sector develops** rapidly as the private commecial banks were given license to operate	
1997	Asian Financial Crisis After this, fnancial sector **development slows down** with restrictions	
2003	**Bank run occurs** amongst several big commercial banks and restriction imposed	
2010	**New bank licences** issued to 4 banks	General election held, result in USPD victory
2011	Several financial reform under the new government: ◆**Foreign currency exchange licences** issued to six commercial banks ◆**Collatereal** options for bank loans increased ◆**Deregulation of depository** in banks from 10 to 16 times of capital	U Tein Sein elected as preseident in the parliament
2012	◆Four commercial banks begin exchange services overseas. ◆**Managed floating exchange rate** implemented	

Source: various media and information

2.2. Financial Sector Overview

1) Organization of the financial sector

The financial sector in Myanmar is regulated under the supervision of the Ministry of Finance and Revenue (MOFR). Central Bank of Myanmar (CBM) is currently under MOFR. Besides CBM, there are 23 banks in operation. Amongst them, 4 banks are state-owned namely, the Myanma Economic Bank (MEB), the Myanma Foreign Trade Bank (MFTB), and the Myanma Investment and Commercial Bank (MICB) as well as Myanma Agricultural Development Bank (MADB) which is established under the Ministry of Agriculture and Irrigation jurisdiction by nature.

Other 19 banks are either joint venture banks between private and public institutions or purely private banks including the newly established 4 banks in 2010. In addition, CBM is also responsible in supervising other institutions such as Myanmar Securities Exchange Centre Co., Ltd. (MSEC).

2) Bank balance and bond issuance

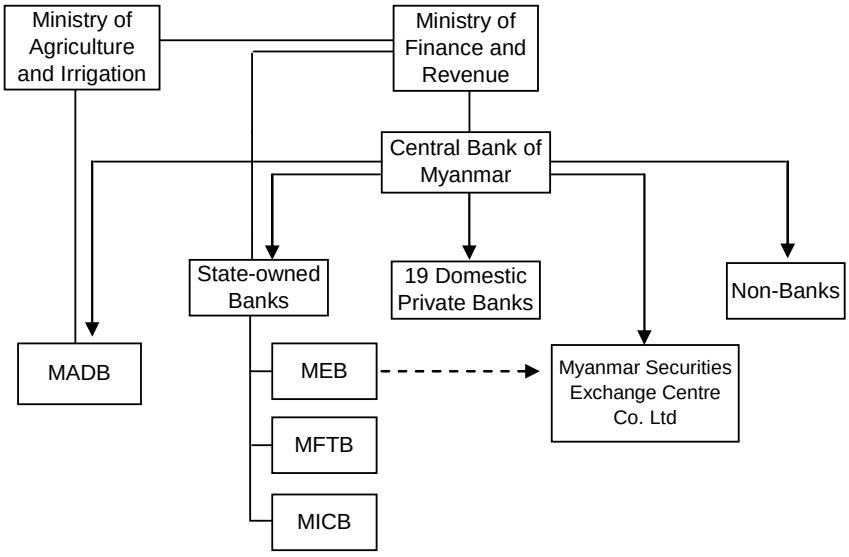
The total bank balance increased at a relatively faster pace of annually 44% between 2007 and 2010 from one trillion to over three trillion Kyats.

As for government bonds, currently there are three types, two-year government bonds (starting from 1st January 2010), those of three-year (starting from 1st December 1993) as well as those of five-year (starting from 1st January 1997). Myanmar's banks directly purchase government bonds from CBM, and others including retail investors buy at MSEC or eight branches of MEB.

Outstanding amount of government bonds issued increased substantially from less than two hundred billion Kyats to more than 1.2 trillion Kyats fore past several years. This is primarily due to Myanmar's worsening government budget deficit.

Secondary market of government bonds, however, is not developed.

Figure 2-2-1. Key organizations of Myanmar financial sector



Source: Modified from "Myanmar's Economy in Transition, IDE-JETRO No.546"

2.3. Capital Market

The Myanmar government commenced consideration of introducing capital market into the country from mid-1990's. MSEC was set up in 1996 as an organization designed to be positioned as a forerunner for the future exchange. However, the 1997 Asian financial crisis

triggered sharp declines in the currencies, which resulted in enthusiasm for the Myanmar government's plans for the development of securities markets waning.

Since the ASEAN Community shall be formed by 2015, Myanmar undertakes to prepare for regional integration and cooperation. To facilitate the development of financial markets, Capital Market Development Committee (CMDC) was organized in 2008.

The committee was assigned to submit information to carry out the development of capital market. CMDC submitted a development roadmap with precise schedule of itemized tasks and policies to be implemented in three phases from 2008-2015. This roadmap covers various policy items in capital market development as a whole to be implemented including stipulating necessary legal framework, establishing regulatory authorities, relevant securities market institutions and infrastructure.

According to the CBM and members of the CMDC, most of the targeted tasks are accomplished in the first phase between 2008 and 2009. Yet, their observation is that a few of the tasks such as increasing numbers of public companies and issuance of corporate bonds may still remain to be enforced. Several tasks scheduled during the second and third phase still seem to be under preparation.

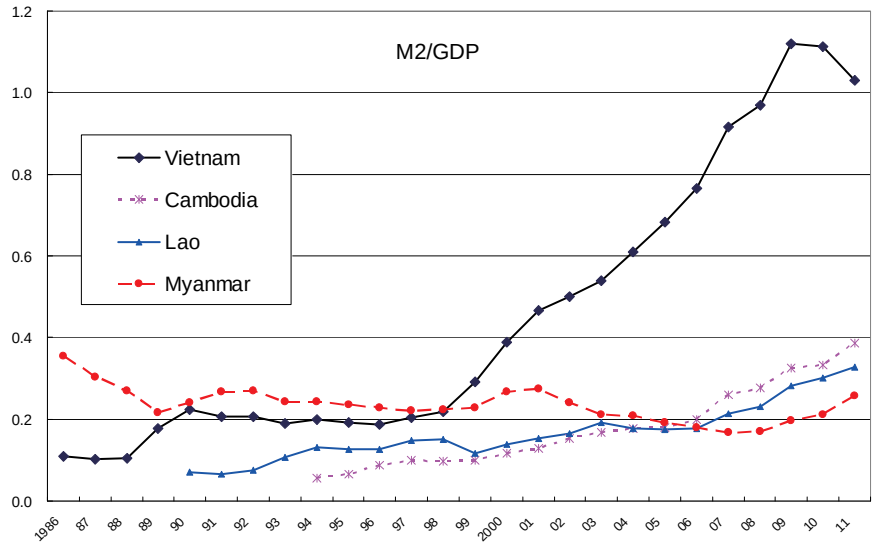
2.4. Current Situation and Issues of Financial Sector

1) Current situation

Due to historical and political reasons, the financial sector in Myanmar has not much developed, compared to other neighboring countries. For instance, the financial depth of Myanmar merely changes over the recent twenty years (Figure 2-4-1). Looking at the share of cash amongst the total money stock M2, Myanmar has higher liquidity of cash in circulation than other CLMV countries in 2011 (Figure 2-4-2). This implies that cash is yet a primary means for any kind of economic transaction and settlement in Myanmar.

Myanmar has yet plenty of rooms left to improve the households' accessibility to financial institution.

Figure 2-4-1. Financial depth comparison amongst CLMV



Source: IMF, ADB, compiled by study team

Figure 2-4-2. Share of cash amongst M2, CLMV comparison (2011)

	Vietnam	Cambodia	Lao PDR	Myanmar
Cash	11.9	15.2	18.3	43.2
Local Currency Deposit	70.9	3.0	35.8	56.8
Foreign Currency Deposit	17.2	81.8	46.0	
Total（M2）	100.0	100.0	100.0	100.0

Source: IMF

2) Current issues

There are numbers of key issues that need consideration in order for the financial sector to develop. Study team categorized them into four major issues (Figure 2-4-3).

First issue is the law and regulation. The overall masterplan in the financial sector is unclear. In addition, there exists no legalized regulation towards capital market as well as any kind of enforcement for securities transaction as of today.

Second issue is the supervisory function. Since CBM is currently a subsidiary organization of MOFR, CBM faces structural limitation in the level of independence. Moreover, Information sharing and communication between CBM and other banks are neither timely nor efficient.

Thirdly, there is an issue of accounting and auditing. Current Myanmar Accounting Standards comply with the IFRS (International Financial Reporting Standards), which is a set of

accounting standards developed by the International Accounting Standards Boards (IASB). However, Myanmar Accounting Standards are applied only for limited number of local companies, such as public companies as well as banks.

Limitation of modernized ICT infrastructure is the forth issue. The actual settlement relies on manual processes which are time consuming and highly probable human errors. Furthermore, the settlement of funds is an inevitable adjunct to economic activities. In Myanmar, however, the ICT required for accomplishing the actual settlement is not yet in place. This factor could be one of the bottlenecks to the smooth transaction of business operations.

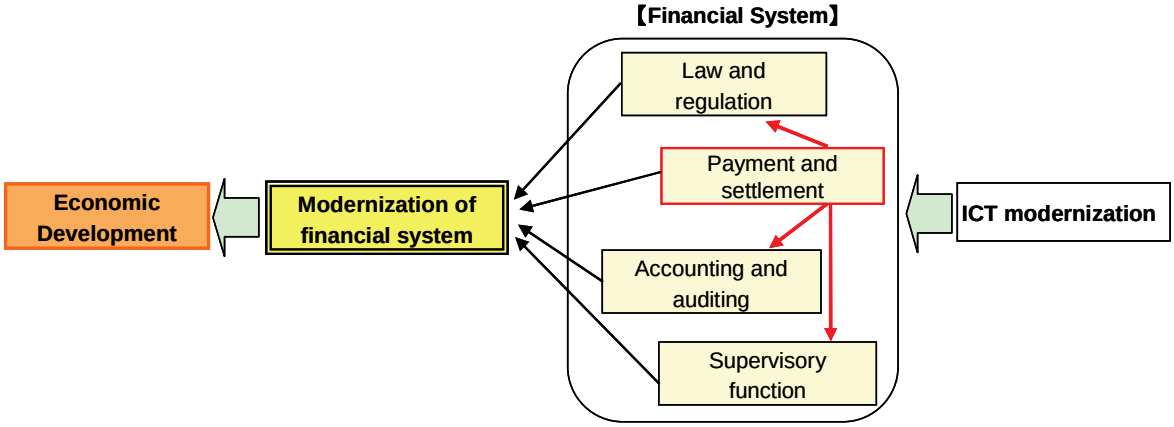
It is an indispensible prerequisite in achieving economic development on track that the financial system infrastructure is established and strengthened. Starting with the law and regulation, along with accounting, auditing, supervisory, compliance and settlement functions are all equally important. The use of ICT to modernize the settlement function can be identified as a pre-eminent issue. Computerizing the settlement function will produce a ripple effect across the infrastructure in other areas through increasing the volume and the processing speed of the transaction. It is conceivable that enforcement of these key components of financial sector will effectively facilitate the modernization of the financial system as a whole (Figure 2-4-4).

Figure 2-4-3. Major issues regarding Myanmar financial sector

1) Law and regulation
No official financial development masterplan hence the future plan is unclear
Capital market development is undergoing but with limitation including lack of relevant laws such as the Securities and Exchange Law
2) Supervisory function
The central bank has limitation on the level of independence from the Ministry of Finance and Revenue
Information sharing and communication between Central Bank of Myanmar and other banks may not be timely and efficient
3) Accounting and auditing
The national accounting standards are designed based on international accounting standards
The actual practice and adoption of standards, however, is very limited to few companies
4) IT modernization
Insufficient modernized clearing and settlement structure reflects method of payment primarily through cash transactions
The actual settlement relies on manual processes which are time consuming and subject to human errors

Source: Study team

Figure 2-4-4. Image of how financial system modernization could bring about economic development



Source: Study team

2.5. Cooperation by Other Entities

Until recently, Myanmar received limited ODA for its financial sector. Annual foreign aid to the financial sector in Myanmar per country or entity has been less than USD 1 million. Japan provided ODA mainly in areas of "the financial sector policy and operations", and Korea has also provided ODA for "education in the banking and financial service". In general, there has been no proactive attempt to provide Myanmar with aid including the financial sector. However, ODA to the financial sector is on the rise since 2011.

In May 2012, Daiwa Institute of Research and Tokyo Stock Exchange Group signed Memorandum of Understanding (MOU) with CBM for the purpose of developing a capital markets. Recently, corporation by oversea countries and institution are rapidly growing (Figure 2-5-2).

Figure 2-5-1. Recent cooperation by oversea countries and institutions

Date	Major Event
June 2010	TA for Myanmar's bond market development begins, funded by Japan-ASEAN Financial Assistance (JAFTA) Fund
Oct 2011	IMF starts support for Myanmar's financial system
Jan 2012	Singapore and Myanmar sign Memorandum of Understanding (MOU) on the Singapore-Myanmar technical cooperation programme
May 2012	Daiwa Institute of Research and Tokyo Stock Exchange sign Memorandum of Understanding (MOU) with CBM for the pupose of developing a capital market
May 2012	IMF publishes Staff Report for the 2011 Article IV Consultation
Jul 2012	CBM signs a memorandum of understanding (MOU) with Thailand's central bank on technical cooperation
Aug 2012	Policy Research Institute in Japan signs Memorandum of Understanding (MOU) with CBM
Aug 2012	ADB, World Bank open Myanmar office World Bank is preparing $85 million in grants to support reforms
Aug 2012	Asian Development Bank (ADB) publishes Myanmar country report

Source: Study team

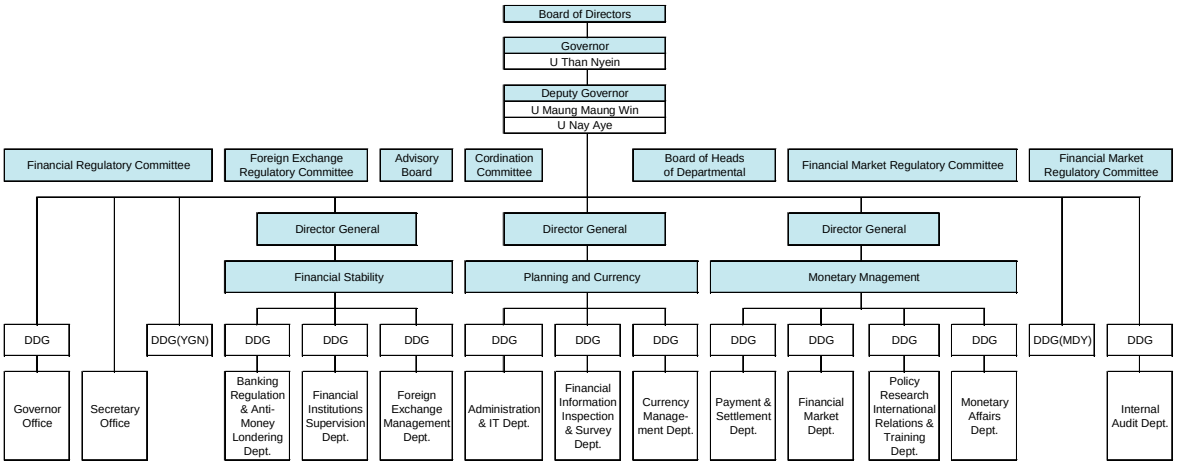
3. Current Situation of Financial Institutions

3.1. Central Bank

With a view to becoming independent of MOFR after the revision of the law, CBM is preparing to play an active role as an independent central bank, for example, through the establishment of a “Monetary Policy Department”. This change can imply that the current administration of Myanmar expects CBM to enact monetary policy independently. Thus, modernization of CBM can be identified as the top-priority task which could support CBM’s essential role and contribute further to modernize overall financial sector.

Besides, given the planned economic integration within the ASEAN countries from 2015, the financial system modernization in Myanmar is regarded as urgent task to stabilize not only Myanmar's economy but also the regional economies. Under the assumption that Myanmar will conduct economic activities not only at home but also abroad as a member of the international community, stabilization of the financial system in Myanmar should have a significant effect.

Figure 3-1-1. Organization chart of CBM



Source: Study team
Note: As of end-Sep 2012. Organizational changes are taking place.

1) Management of currency

The currency unit in Myanmar is the Kyat. The Currency Department is responsible for

issuing and controlling bank notes. Physical production of currency is conducted by Security Printing Works (S. P. W.), a governmental organization. The department receives newly-printed notes from S.P.W. and in-use notes from commercial banks. The department sorts and counts them. After that, the department checks the notes for reuse or disposal based on given rules. Only for the assessment operations, 74 persons are allocated in Naypyitaw head office, 120 in Yangon, and 90 in Mandalay Branch.

In Myanmar, cash settlement is still a primary payment practice, cash needs are relatively higher than other non-cash payment methods. The largest bank note, 10,000Kyat, was newly introduced in June 2012. When a large amount is settled between companies, etc., a bunch of bank notes are required for payment. People have to deliver physically and manage them. Therefore, it is assumed that the average life of bank notes is shorter due to their frequent use in payment. The inefficiency and the operational risks are likely to increase assuming that the assessment operations continue to be carried out by hand.

2) Management of fund

(1) Account structure of CBM

The Account Department controls and manages the current accounts at CBM, including the fund settlement. The structure of the current accounts of participating financial institutions held by CBM is significantly different from the situations of central banks in other countries. Not only each commercial bank's head office but also each branch of the bank holds a current account at CBM. Even between head office/branches in the same bank, fund transfer is executed via current accounts with CBM. In particular, Myanma Economic Bank (MEB) with a large number of branch offices holds nearly 100 accounts by the CBM Yangon Branch.

In addition, the CBM head office and each CBM branch office hold accounts by each other as similar to correspondent accounts. Fund transfer between head office and branches is implemented through these accounts.

Regarding foreign currency, the financial institutions that are allowed to handle foreign exchange and operate foreign currency exchange (17 banks) may hold foreign currency accounts.

General ledger is managed electrically, but it is far from ideal. Since automatic recording system is not available, daily final account balance is simply input on hands. In parallel with this inefficient management, account balances are also recorded on paper as well.

(2) Electronic Funds Transfer System (EFT)

EFT is in place for the payment of accounts between the CBM and the financial institutions. EFT is an application operated on the Banking Network[1], connecting CBM and each commercial bank's head office for fund transfer between current accounts at CBM. As of May 2012, the system is in a test phase where 5 to 6 banks participate. CBM has notified all banks to participate in the system in future.

EFT is designated to three types of fund payments: fund transfer, treasury bond and bill, and deposit/withdrawal. Available fund transfers are confined to those current account held by head office and branch offices within the same bank and those between current accounts held by two different banks with the same branch of CBM (Naypyitaw, Yangon or Mandalay) due to the operational practice. EFT is available for eligible foreign currencies other than Kyat.

With regard to the specific fund transfer workflow, the procedure is automatically executed in each transaction. However, EFT is just a telegram message transmission and reception system, and the actual approval and deposit/withdrawal records are not automated.

In EFT managed via systemized operations, the ledger for EFT is also systematized. However, it is not coordinated with the general ledger. In addition, as there is no coordination between EFT and the general ledger, no efficient and obvious effects have been achieved via fulfillment of coordination, an advantage of systemization. Furthermore, in order to verify the actual account balance, it is not enough to rely on only the EFT ledger due to the absence of coordination. Therefore, under the current situation, it is necessary to confirm the account balance manually. It is far from a complete automation.

While EFT is in test phase, the number of banks participating in EFT remains small. In addition, the total number of transactions per day is not large (approximately 10 transactions per day) and the volume of total transactions per day is as small as 10 billion Kyats. Given that fund transfer through current accounts with CBM is not actively utilized, it is estimated that funds do not circulate smoothly in Myanmar.

3) Fund settlement before introduction of EFT

Under the current situation, where EFT has not been introduced fully, checks drawn on CBM are commonly used. It is also possible for commercial banks to submit a request for fund transfer at CBM counters.

[1] The Banking Network is the circuits connecting the CBM Naypyitaw headquarter and the Yangon Branch office with E1 circuits whilst the other commercial banks are connected to CBM by ADSL circuits.

4) Clearing house

Each commercial bank brings checks to the clearing house set up in each branch of CBM (Naypyitaw, Yangon and Mandalay), and check clearance is executed through reimbursement and the netting of the current accounts held by each commercial bank with the CBM branch. The calculation result through netting is settled through the current account of CBM. However, as Myanmar does not have national-scale clearing houses like Japan, it usually takes more time to deliver a check for settlement in a rural area or remote place. In addition, as there is no unified standard for checks in Myanmar, each commercial bank issues a different-formatted checkbook. This situation is likely to become an obstacle preventing the automation in the future.

There are clearing members participating in each clearing house. They represent each commercial bank. However, only the MEB has several branches participating in each clearing house. This may be because MEB has the largest number of branch offices nation wide and coordination within MEB is not sufficient.

The average settlement at clearing houses per day totals 3,000 transactions in number and 70 billion Kyats in volume.

There is no penalty system comparable to the Japanese system in the case when a company dishonors a check. According to the interviews with CBM, there have been very few cases where companies in Myanmar dishonored checks in the past because those who are eligible to issue checks are confined to companies with exceptionally good credit standing.

In case of default, the corresponding bank shall contact the drawer for the verification of the result and notify CBM to refrain from settlement, if necessary.

5) Foreign currency management

The Foreign Exchange Management Department is responsible for foreign exchange control. In addition, the Monetary Policy Department is also involved in the supervision of the exchange rate.

Prior to April 2012, there were multiple rates consisting of the official parity rate and the market conversion rate in Myanmar. However, Myanmar adopted a managed floating currency system which came into effect from April 2012. After the introduction of the managed floating currency system, foreign exchange rates are determined on the basis of market demand. Commercial banks with the authority to deal foreign currencies quote bid and ask prices for

foreign currencies to CBM on a daily basis for the purpose of determining the reference foreign exchange rates. This is only applied to the U.S. dollar exchange rate.

Under the present rule, bid/offer prices are notified from 8:30 to 9:00 every day by facsimile, the bid opening is conducted via a bidding system introduced by the IMF, and the result is informed to each commercial bank by facsimile. Final settlement is carried out through the Kyat account/foreign currency account of each commercial bank against the Kyat account/foreign currency account of CBM at 16:00. When a commercial bank does not have a sufficient account balance, the bank will not be allowed to participate in the bidding.

In addition, when a bid is widely different from the rate of the previous day, CBM may refuse the quote at its discretion. CBM aims to keep the reference rate within a certain range of fluctuation by taking such action to each commercial bank.

CBM holds correspondence accounts abroad and uses SWIFT Network for instructions for bank transfer to the account.

CBM is also involved in the export process. An exporter must apply to the Myanmar Foreign Trade Bank (MFTB) and customs authorities for approval to export products. CBM verifies that information in these applications is the same.

Managed floating currency system has just started in Myanmar. Staffs of the foreign exchange management department said that they need more knowledge to manage currency system. They do not have general information of foreign exchange intervention to make market more stable. Japan, who has a lot of experience with intervention, can transfer the operational knowledge of it with ICT system.

6) Credit/collateral management

CBM lends money to commercial banks against collateral of treasury bonds for the purpose of providing liquidity. The actual amount of loan is determined by the commercial bank applying for the loan. The lending period is fixed at 90 days with a lending rate of 10% per annum.

As there is no secondary market for treasury bonds in Myanmar, the face value of treasury bonds is assessed as the collateral value of the loan. If a treasury bond secondary market develops in Myanmar in the future, it should be required to assess a proper collateral value and manage accompanying additional collateral.

Both credit management and collateral management are executed with the use of a hand-written record book.

7) Treasury bond management

In Myanmar, there are three types of treasury bonds with 2, 3 and 5 year maturities and treasury bills with 3 month maturity. Myanmar treasury bonds are not scripless and are issued in paper form. Although, financial institutions hold 95% of outstanding treasury bonds, which are managed as registered bonds for which CBM acts as a registrant. However, the management record is handwritten.

When Myanmar treasury bonds are issued, MEB and the Myanmar Securities Exchange Centre (MSEC) participate in the bidding of the treasury bonds. The two participants are also involved in the treasury bond market as direct participants having direct accounts with CBM. The other holders of Myanmar treasury bonds are treated as indirect participants.

Since a secondary market has not developed, most of the treasury bonds are bought to be redeemed as buy and hold investment.

Interest is paid from the account held by the Budget bureau of MOFR to each corporate and individual holder's account. Redemption proceeds are drawn from the government account and paid to each corporate and individual holder's account.

As described above, there are currently just four types of interest-bearing treasury bonds. However, it seems that a wider variety of treasury bonds, such as discounted treasury bonds, will be studied in CBM in order to meet market demand in the future.

8) Information collection and analysis

(1) Online financial report

This is an application working on the Banking Network which is utilized by the Internal Audit and Bank Supervision Department. In particular, it is used for off-site monitoring operations. Commercial banks report summary of daily operation data in Excel or other formats to CBM. When CBM receive the report, staffs of CBM re-enter the information to their local computers. It is currently in test phase.

Looking at the actual documents submitted by commercial banks to CBM, there is no unified documenting format. In addition to Excel files, Word and PDF files are also used. In particular, some PDF files are submitted as image documents, which cannot be directly embedded into the system.

(2) On-site monitoring

In CBM, there are seven teams in charge of on-site monitoring. CBM stays on average for three weeks per year for one time of an audit at commercial banks.

9) Monetary policy

As the secondary market for treasury bonds is inadequate, the Monetary Policy Department, a newly established organization, has no effective measures for financial adjustment due to its inability to conduct treasury bond operations. An adjustment of the bank reserve ratio can be also considered as other monetary control means, but it is fixed at 10%.

They are hard to collect information required for decision-making in monetary policy through sufficient analysis. They are urgently required to achieve a structure to collect information of target benchmarks as rationale for decision-making in monetary policy, while a market operation or adjustment of bank reserve ratio would be important as monetary means.

Staffs have no experience of monetary policy operation. So they are exploring how to build new operations for monetary policy. Some staffs also pointed that they need to learn the advanced techniques of Bank of Japan (BOJ). It is considered that it is important to develop human resource as well as ICT system in the future.

10) Others

(1) Chest box management

The Currency Department of CBM is also responsible for overseeing money management handled by MEB. According to the explanation by CBM, MEB plays the role of the agent of CBM and it holds money that should originally be handled by CBM.

A vault called the “Chest Box” is in place at a police station located near each MEB branch office. CBM and police work together for the delivery to a police station. Each MEB branch office withdraws cash from the Chest Box before the commencement of daily operations and deposits cash in the Chest Box after the close of daily operations. In daily operations, each MEB branch office manages the aggregate amount of money composed of money owned by MEB and money at the Chest Box. Each branch is obliged to notify the balance at opening, the amount of cash withdrawn from the Chest Box, the amount of cash deposited in the Chest Box, and the balance at closing to CBM on a daily basis. However, it takes a week or so for some MEB branch offices located in remote places to notify these data to CBM due to the lack of

communication infrastructure, according to a CBM staff.

(2) Bank mail and file transfer protocol

An application called “Bank Mail and File Transfer Protocol” is implemented on the Banking Network, which is used as an application for email and file transfer in all the bureaus of CBM. This application, for instance, is used for making files which is reported from commercial banks to share among the staffs.

(3) Reporting formats

Due to a lack of unified format, reporting formats and daily operations vary widely among commercial banks. Therefore CBM staff should re-write to their local record. The aspect of modernization, a lack of unification makes inefficiency. These problems should be addressed through regulations that should be formulated by CBM, a supervisory authority governing financial institutions in Myanmar so as to unify the formats under systemization project.

3.2. Commercial Bank

Further modernization of the financial system will require certain amount of efforts to remove constraints such as insufficient network infrastructures, regulation on business operation, and lack of people in financial system.

More than half of the commercial banks have already implemented core banking functions for domestic financial processes. Compared to commercial banks, state-owned banks are slow to implement ICT systems and clearly behind in their operational efficiency. The gap between state-owned banks and commercial banks will be a large barrier for moving forward with the development of interbank settlement solutions.

Unexpectedly the core banking functions, to some extent, has already been introduced to most of the commercial banks in Myanmar. Also, some of the larger banks have ATMs and deliver the 24 hour services supported by the maintenance services of 24 hour, although the service is limited to withdrawal. As the consequence of the study, however, it is foreseen that further modernization of the financial system will be required because of insufficiency for truly modernized financial system which can contribute to and underpins Myanmar's economic growth as well as convenience for the people, and therefore measures to mitigate the constraints found throughout this study. The core banking systems of commercial banks primarily consist of domestic applications basically and seem to have risks: the current systems could only meet the domestic affairs established in the past. These banks will need to introduce systems that could meet international compliance requirements as the Myanmar financial market globalizes in the future. As to core banking function for international service, still most of the banks do not have the systems. Since Asian financial crisis in 1997, such business had been restricted by CBM, and it is likely to take some time for all the banks to equip such systems. However, each bank's preparation has rapidly advanced: for instance, they invite the specialist from overseas, dispatch their staffs to the foreign banks etc. after the international business restriction was lifted in 2012.

1) The constrains

Unstable/ insufficient electrical and communications network infrastructure

Rolling blackouts occur routinely. The satellite communication system (current banking network backbone) is also unstable because of frequent disconnection caused by weather

conditions.

Regulations on business operation

After new government of 2010 started, deregulation is promoted. However the obsolete restrictions given during military regime era have not been abolished completely yet, while some permissions are given as special cases. CBM is still partially independent organization and need to act under the control of MOFR. No specific master plan of financial system is authorized.

Lack of the trust of the people in national financial system

Investment is not prosperous because of inconvenience and uncertainty of financial services quality and stability.

Bank run occurred in the past and the people saw the bankruptcy of the largest private bank. Concern of uncertainty still remains, although gradual improvement of financial services are in progress.

2) The inspection of CBM, and reports required

CBM conducts the regular inspection twice a year which covers almost all the aspects of commercial banks such as management, business, and so on. Also the commercial banks are required to send reports to CBM every day by 17:00 regarding daily balance, and amount of receivables and payables of deposit/ loan, as well as cash balance.

In addition to annual statements, the commercial banks need to submit periodical reports for CBM as follows:

- liquidity ratio and reserve position on weekly basis;

- balance sheet, statement of income, and capital adequacy ratio on monthly basis; and

- situation of nonperforming loan every 3 month.

The titles of the main statements are: Deposit Account Balance, Trial Balance, Daly Progressive Record, Total Deposit Payment, Statement of Reserve Position, Statement for the Liquidity ratio, Capital Adequacy Measurement, Loan & Advances Due from Banks, and Balance Sheet.

So far, above statements are submitted by papers to be posted and sent by fax or e-mails, while a new reporting system via the Banking Network has been developed and under testing, with which the reports are sent in electrical form such as Excel.

Figure 3-2-1. List of banks 1

	Category	Name of banks	Established	Headquarters
(1)	Semi-governmental	Co-Operative Bank	1992	Yangon
(2)	Semi-governmental	Innwa Bank	1997	Yangon
(3)	Semi-governmental	Myanma Industrial Development Bank *1	1996	Yangon
(4)	Semi-governmental	Myanma Livestock and Fisheries Development Bank	1996	Yangon
(5)	Semi-governmental	Myanmar Citizen Bank	1992	Yangon
(6)	Semi-governmental	Myawaddy Bank	1993	Yangon
(7)	Semi-governmental	Sibin Tharyaryay Bank *2	1996	Naypyitaw
(8)	Semi-governmental	Yadanarbon Bank	1992	Mandalay
(9)	Semi-governmental	Yangon City Bank	1993	Yangon
(10)	Private	Asia Green Development Bank	2010	Yangon
(11)	Private	Asia Yangon Bank	1994	Yangon
(12)	Private	Ayeyarwady Bank	2010	Yangon
(13)	Private	First Private Bank	1992	Yangon
(14)	Private	Kanbawza Bank	1994	Yangon
(15)	Private	Myanma Apex Bank	2010	Yangon
(16)	Private	Myanmar Oriental Bank	1993	Yangon
(17)	Private	Tun Foundation Bank	1994	Yangon
(18)	Private	United Amara Bank	2010	Yangon
(19)	Private	Yoma Bank	1993	Yangon
(20)	State-owned	Myanma Agricultural Development Bank	1979	Yangon
(21)	State-owned	Myanma Economic Bank	1976	Yangon
(22)	State-owned	Myanma Foreign Trade Bank	1977	Yangon
(23)	State-owned	Myanma Investment and Commercial Bank	1978	Yangon

*1. The bank name is changed to Small & Medium Industrial Development Bank in July, 2012.
*2. The bank name is changed to Rural Development Bank in October, 2012.
Source: Study team

Figure 3-2-1. List of banks 2

Name	Number of Branches	Customer	Systems			
		Target segments	Core Banking System	ATM	MPU EFT	Network Method
Co-Operative Bank	10	The bank mainly targeting retail customers. But large depositors are only 2-3% of retail customers.	Implemented	Implemented	Planning	IP Star, ADSL(ATM)
Innwa Bank	32	Most of depositors is retail. Most of loan customers is corporate which owns civil engineering and construction industry.	Implemented	Implemented	Testing	Telephone,Fax
Sibin Tharyaryay Bank	2	Most of depositors is retail. Most of loan customers is corporate.	Implemented	Planning	Participated	N/A
Myanma Industrial Development Bank	15	Most of depositors is retail. Most of loan customers is corporate which owns small medium entities.	Implemented	Implemented	Planning	IP Star,ADSL
Myanma Livestock and Fisheries Development Bank	60	Customers of Deposit and loan are mostly retail. But majority of retail customers is entrepreneur, 40% of which owns livestock and fisheries.	Implemented	Testing	Participated	IP Star
Myanmar Citizen Bank	7	The bank mainly targeting retail customers.	Implemented	Implemented	Planning	ADSL
Myawaddy Bank	19	Customers of Deposit and loan are mostly retail. The number of account is 78,000.	Implemented	Implemented	Planning	N/A
Yadanarbon Bank	2	Customers of Deposit and loan are mostly retail.	Implemented	N/A	N/A	N/A
Yangon City Bank	2	Customers of Deposit and loan are mostly retail.	Implemented	Implemented	No	N/A
Asia Green Development Bank	18	The bank is targeting both retail and corporate. If any, the bank is promoting retail customers.	Implemented	Implemented	Planning	IP Star
Asia Yangon Bank	2	Customers of Deposit and loan are mostly retail.	Implemented	N/A	No	ADSL
Ayeyarwady Bank	26	Most of depositors is retail.	Implemented	N/A	Planning	ADSL,IP Star
First Private Bank	N/A	N/A	N/A	N/A	N/A	N/A
Kanbawza Bank	60	At this moment, the bank's account holders consists of employers, farmers, investors. The bank would like to acquire more employees.	Implemented	Implemented	Participated	IP Star
Myanma Apex Bank	15	N/A	Implemented	Implemented	Planning	IP Star
Myanmar Oriental Bank	19	Customers of Deposit and loan are mostly retail.	N/A	Testing	Testing	N/A
Tun Foundation Bank	N/A	N/A	Implemented	Implemented	Planning	N/A
United Amara Bank	10	Most of depositors is retail. Most of loan customers is corporate.	Implemented	Implemented	Testing	N/A
Yoma Bank	51	N/A	Implemented	N/A	Planning	IP Star
Myanma Agricultural Development Bank	205	Farmers who have agricultural land less than 10 acres.	Not Implemented	N/A	Planning	Fax,Email
Myanma Economic Bank	327	Both corporate customers and retail customers. But main target is retail customers.	Implemented	Implemented (Under testing)	Planning	Fax,Email
Myanma Foreign Trade Bank	1	Both corporate customers and retail customers.	Implemented	N/A	Planning	Fax
Myanma Investment and Commercial Bank	2	Both corporate customers and retail customers. But main target is corporate customers.	Implemented	Implemented (Under testing)	Planning	N/A

Source: Study team

3.3. Securities and Exchange Market

1) Current situation of the securities exchange system

Myanmar Securities Exchange Centre Co., Ltd. (MSEC) was founded in June 1996 as a joint venture company between Daiwa Institute of Research Ltd. and MEB as an organization designed to be positioned as a forerunner for the future exchange. Currently, shares of two companies are traded over-the-counter, and in addition retail investors can buy government bonds at MSEC.

The ASEAN Community shall be formed by 2015. To facilitate the development of financial markets, Capital Market Development Committee (CMDC) was organized in 2008. CMDC designed the development roadmap of capital market, which covers various issues including legal framework.

Currently shares of two companies are traded over-the-counter at MSEC although the trading volumes are very low. Under Myanmar's *Company Act*, there are only twenty or so public companies which are allowed to transfer ownership of shares. *The Securities and Exchange Law* is not enacted yet in Myanmar and there are no rules to prevent public companies shares to be traded outside of MSEC.

Business operations related to transactions conducted at the MSEC have not yet been systematized and a lot of inefficiencies are observed.

Government bonds are only bonds available in Myanmar currently. There are no other types of bonds. Similar to stocks, investors need to visit MSEC or MEB's eight branches to buy government bonds or receive coupons. Payments are made by cash or cheque.

2) Framework for capital market

Developing capital markets in Myanmar has not made much progress in the past. As the government aims to open the securities exchange in 2015, it is necessary to develop the supporting system infrastructure urgently.

In developing the capital market and its system infrastructure, it is not appropriate just to copy and introduce the ICT system used in the developed countries. In general, the transaction volume is not large at the early stage of the development of the market. It is reasonable to first introduce simple ICT system in Myanmar then renew when the market grows. The system should be carefully designed so that it will be compatible with other financial systems which

may be introduced in the future.

Prior to developing the system for the securities exchange, it is necessary to define the requirements for trading rules, commission fee structure, regulations etc.

It is critically important to set forth the basic ideas for the following five issues which are prerequisite for the systemization of the exchange and critical to determine the appropriate direction of the development.

(1) Taxation systems
(2) Listing requirements and standards
(3) Profile of commission structures
(4) Scripless securities
(5) Transaction reports for clients

In considering those issues, comparison with the markets in ASEAN countries is useful as Myanmar will be integrated into ASEAN economic community in 2015 and as some of the markets at ASEAN countries are just about to take off, which can be a reasonable benchmark for Myanmar.

(1) Taxation systems

Currently, there is only stump duty for securities trading in Myanmar. Myanmar may need to take into consideration of the structure of the taxation systems adopted in the ASEAN nations. Introduction of a new securities-related tax scheme will increase government revenues. On the other hands, incentives such as lowering the corporate income tax rates and introducing tax benefits for listed companies would encourage a lively market for securities transactions.

(2) Listing requirements and standards

A balance must be struck between rendering the quantitative standards for listing relatively loose to protect investors properly whilst at the same time ensuring that the qualitative criteria are maintained at a high level to make companies easy to be listed. Currently, MSEC's criteria for the company to be traded over-the-counter is 1) the entity is registered as a public company, 2) minimal capital of 50m Kyats, 3) more than 100 shareholders.

Important points for quantitative requirements are: (1) profitable in the past couple of years; (2) share capital is above a certain level; and (3) there are a certain number of shareholders.

Key points for qualitative standards are: (1) sustainability and profitability of the company; (2) soundness of the company; (3) corporate governance and internal control scheme; (4) disclosure framework; and (5) other factors.

(3) Profile of commission structures

MSEC receives commissions from clients for carrying out services including brokerage of stocks upon buy or sell transactions. It will be necessary to carefully determine the best way to create a commission structure in preparation for the establishment of a securities exchange.

(4) Scripless securities

Shares and government bonds are issued by paper in Myanmar. Scripless trading is not implemented in the securities market. Myanmar needs to go scripless when a stock exchange opens in 2015. Clearly, it would be desirable to take advantage of the fact that the volume of securities certificate issuance is still tiny by introducing the scripless securities as soon as possible.

(5) Transaction reports to clients

At MSEC, while the transaction notes are issued at the counter when the transaction is made, they are not in the form of electronic media, but of the physical paper. It is clearly far preferable that use be made of electronic transmission to send electronic files across the internet to deliver trading reports etc. than that they be sent as post in the mail.

4. ICT Environment in Financial Market

4.1. ICT system in CBM

1) PCs

CBM constitutes of more than ten departments, but the four main departments that use computer terminals are the Currency Department, the Internal Audit and Bank Supervision Department, the Accounts Department, and the Administration Department.

The total number of computer terminals in the bank is less than 150 consisting of 89 terminals at the Naypyitaw headquarters and 55 terminals at the Yangon branch office. The ratio of terminals per capita remains at the level of less than 10% (Figure 4-1-1).

Figure 4-1-1. Results of survey of CBM's OA environment

Place	Department	No. of staff	No. of PC	BankNW※2	Internet※3	No. of printer	No. of file server	OS	LAN
Naypyitaw	Internal Audit and Bank supervision ※1	79	23	0	1	1	1	Windows7	available
			20	0	0				
	Account	60	16	3	2	4	0	Windows7 WindowsServer2003	available
	Admin	90	21	2	5	5	0	Windows7	not available
	Currency	100	9	1	1	4	0	Windows7	not available
Yangon	Internal Audit and Bank supervision ※1	27	9	2	1	3	0	WindowsXP WindowsServer2003	not available
		58	17	3	3	7	2	Windows7 WindowsServer2003	available (8 PCs only)
	Admin	94	21	0	7	19	0	WindowsXP	not available
	Currency	197	8	2	1	4	0	Windows7 WindowsXP	not available

※1 There is a plan to split this department in the future.
※2 Network web linking the commercial banks and the CBM.
※3 It is possible to use the circuits of both providers (MOFR and MPT). Management teams simultaneously use both circuits.
※As of April 2012
Source: Study team

Staffs of the departments share PC terminals set up in common-use areas as they do not have their own PC. While such setting enables those wishing to access PC whenever necessary, it is not recommendable in terms of efficiency and security. Many users share same user ID and password when they want to use the terminal. It causes inefficiency as the flow of business operations is interrupted by the delays (Figure 4-1-2).

Figure 4-1-2. Offices with no computers, room piled high with mountains of paper

Source: Photograph taken on local field survey

Huge volumes of paper are piling up in the offices as a result and taking up a great deal of space. The consolidations of the amount of space needed for the storage of documents are considerable challenges. The fact that procedures for carrying out manual operations still remain, illustrates that there is still plenty of room for improving operational efficiency by the introduction of automation through the use of computers.

Simple UPS (Uninterruptible Power Supply) units are installed as a countermeasure to deal with the effects on computer terminals of power outages.

There is one file server installed in the Internal Audit and Banking Supervision Department at Naypyitaw headquarters and two file servers are installed at the Accounting Department of the Yangon branch office. In other departments without file servers installed, data is transmitted and received by USB in which possible leakage of confidential information to third parties could occur, hence security issues must be well addressed.

2) Printers

There are fourteen printers installed at the Naypyitaw headquarters and nineteen at Yangon branch office. However, most of these printers are not connected to the bank's internal LAN and thus directly connected to PCs.

3) LAN

The LAN network at Naypyitaw headquarters connects network equipment in the machine room with network equipment located in every office by fiber optic cables. Media convertors

located in the offices convert the transmission media of the data which is then relayed by network equipment inside the offices themselves to the individual PCs which are linked by LAN cables running through mouldings.

In contrast, the Yangon branch office's LAN connects network equipment installed inside the machine room with the network equipment in each office by a direct Category 5 cable link. Because this cable has a limit to its effective transmission distance due to its technical specifications, Yangon branch office terminals which can connect to the network are not located any further away from this particular room. The LAN environment within the office space is virtually identical to that at the Naypyitaw headquarters. As a result, significant numbers of the PCs are not connected to the network.

4) Internet & email

Regarding the external network connectivity environment for the computer terminals installed at the bank, the Banking Network, a network which links CBM and the commercial banks, was introduced in 2006. However, only limited number of terminals is connected with Banking Network. There are only six of such terminals at the Naypyitaw headquarters and seven terminals at the Yangon branch office making a total of thirteen. Additionally, the total number of computer terminals that can be linked to the internet is very limited with just nine at the Naypyitaw headquarters and twelve at the Yangon branch office.

Only highly ranked bank officers are assigned their own mail accounts at the the Myanma Posts and Telecommunications (MPT) domain and working-level staffs use of the webmail. It weakens supervisory function and increases security risks, such as missing files and data. Therefore it is expected that CBM should consider in designing its own internal mail system.

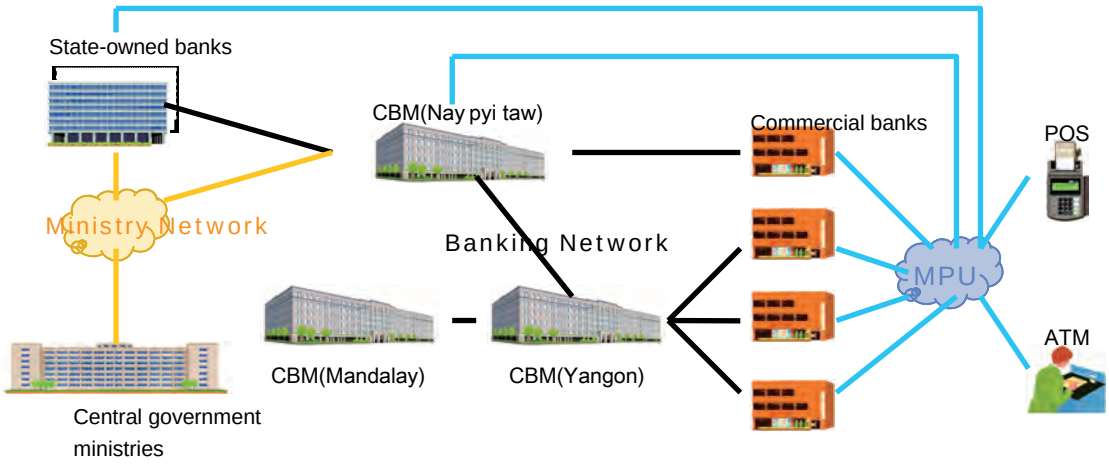
4.2. ICT Infrastructure in the Financial Sector

The establishment of a capable ICT infrastructure that could meet an expected increase in the volume of business operations is clearly an urgent priority for the financial institutions. Currently, the head offices and branches of only six banks are connected online and the transmission of data is conducted by phone and fax at the state-owned banks.

1) Major financial networks in Myanmar

The three major financial networks that exist in Myanmar: (1) the Banking Network, (2) the MPU network, and (3) the Ministry Network (Figure 4-2-1).

Figure 4-2-1. Major financial networks in Myanmar

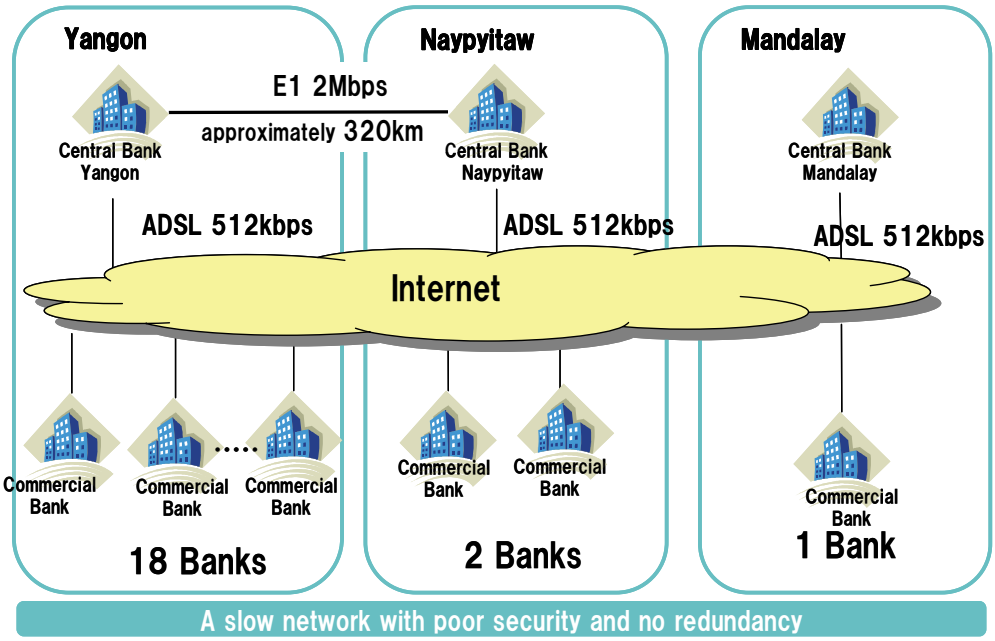


Source: Study team

(1) The Banking Network

The circuits in the Banking Network connecting the CBM Naypyitaw headquarter and the Yangon Branch office with E1 circuits whilst the other commercial banks are connected to CBM by ADSL circuits (Figure 4-2-2). On the other hand, the CBM Mandalay branch is also connected by ADSL circuits. However, both lines are low speeds as well as low quality of transmission.

Figure 4-2-2. The current state of the financial network centered on the CBM



Source: Study team

(2) The Myanmar Payment Union (MPU)

The other important financial network is the Myanmar Payment Union (MPU) network. It was built by consortium of CBM and commercial banks, to connect up its ATM and credit card network. MPT is the Internet Service Provider (ISP) and the membership of the network is made up of fourteen banks (CBM, Myanmar's state-owned banks and commercial banks).

In 2012, mutual ATM connection system as well as debit card system is scheduled to be incorporated into this network, according to MPU. In 2013, credit card system will be built in addition. However, both of them are greatly behind schedule. As for the settlement function, it is not fully introduced in this network as of now.

(3) The Ministry Network

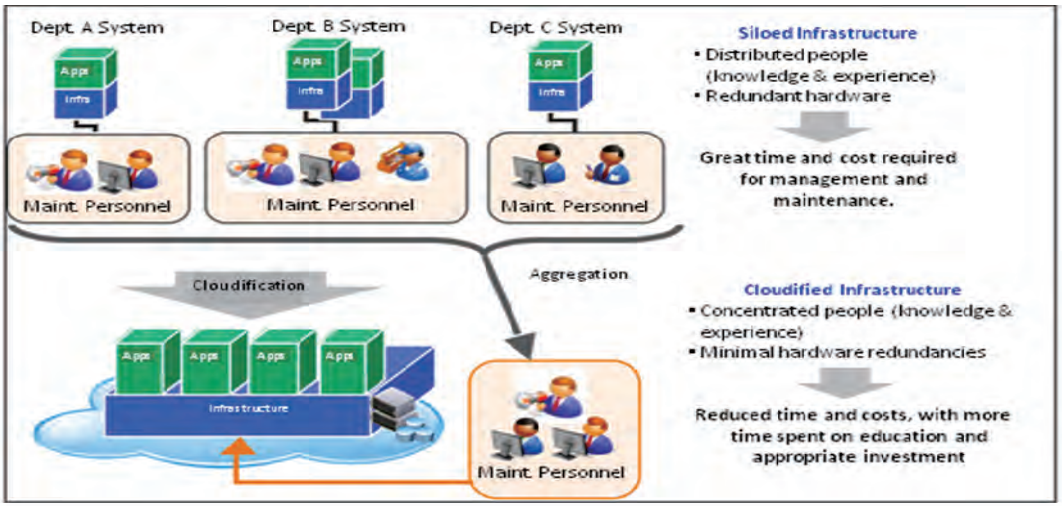
The Ministry Network is the network system that links the central government ministries and agencies, the state owned banks and CBM. Within this, the network linking the Ministry of Finance and Revenue (MOFR), the state owned banks and CBM is known as the Ministry of Finance and Revenue network (MOFR Network) and it is connected together by E1 circuit.

This network is used for government ministries mainly to have contacts with state-owned banks, but is not used to exchange financial data. Furthermore, it has nothing to do with other financial networks. Therefore, it is not important in the financial sector.

2) Silo-type infrastructure

Adopting a cloud-based strategy would be one of the solutions to the problem. It would gather together the scattered ICT equipments and workforce and enable the whole system to be controlled in an integrated fashion. This would reduce the time and costs to maintain separate, overlapping systems (Figure 4-2-3). In addition, expansion of systems in the future will become much easier.

Figure 4-2-3. Concentration of ‘people’, ‘things’ and ‘places’ through cloud-computing



Source: Study team

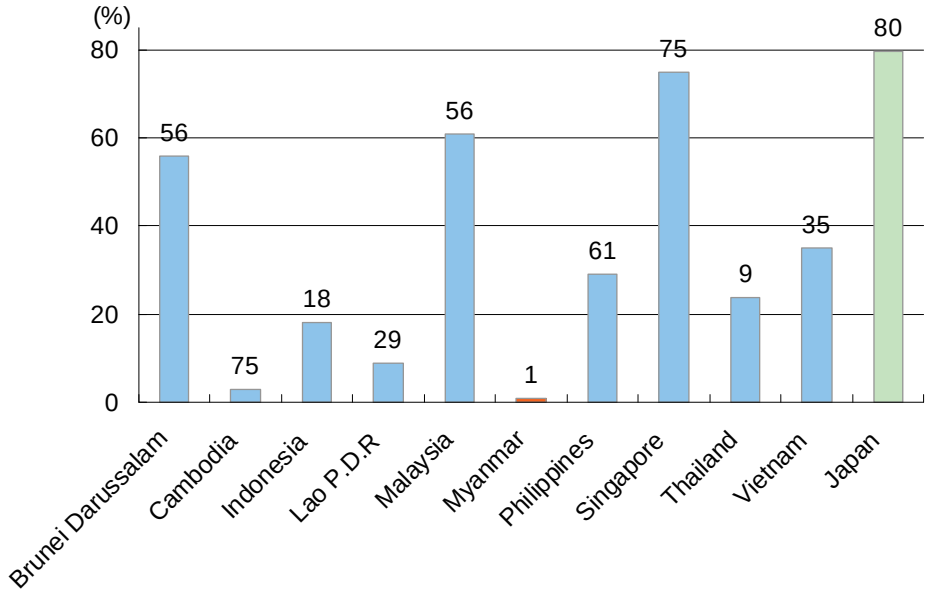
5. ICT Business Environment

5.1. ICT Environment

1) ICT environment

The ICT industry in Myanmar has grown steadily in the past couple of years. However, percentage share of internet users is at less than 1% (Figure 5-1-1). Most nations do not have opportunities for ICT experience.

Figure 5-1-1. Percentage share of individuals using internet, ASEAN and Japan (2011)



Source: International Telecommunication Union (ITU)

2) Human resources and capacity

(1) ICT companies

Myanmar Computer Federation (MCF), an ICT industry organization, pointed out that shortage of skilled ICT engineers is one of the issues to be addressed. Global Technology conducts in-house training but it has little expertise in advanced areas like cloud computing, and it appears that they need further training in these areas. In Myanmar Information Technology Pte Ltd. (MIT), one of issues is shortage of engineers who are capable of handling upstream processes and lack of clear division of roles and responsibilities for system development (Figure

5-1-2).

Figure 5-1-2. ICT companies visited in Myanmar

Company name	Core business	Head Office	Establish ment	Number of employees	Out-sourcing develop-ment from foreign country	Customers
ACE	Software Development	MICT Park,Yangon	1992	200	○	Air Mandalay, Kanbawza Bank, Hotel Nikko Royal Lake Yangon, etc.
MIT	Software Development	MICT Park,Yangon	1997	200	○	Central Bank of Myanmar, Ministry of Foreign Affair, Myanma APEX Bank, Yangon Airwarys, etc.
Global Technology	Network Services	MICT Park,Yangon	2002	65	×	Central Bank of Myanmar, Ministry of Transport, Air Myanmar, Mitsui Sumitomo Insurance Co., Ltd, etc.
KMD	ICT Education	Kyauktada Township,Yangon	1986	637	-	Central Bank of Myanmar, etc.
MCC	ICT Education	MICT Park,Yangon	1989	over 300	-	-

Source: Study team

(2) CBM

Usage of ICT to facilitate CBM's operations is not high. Only few CBM staff is actively involved in the operations using advanced softwares. Rather, there is shortage of skilled staff with a basic level of ICT knowledge. In CBM, 'persons responsible for ICT' refers to users of computer terminals, instead of ICT experts. CBM heavily relies on the contracted ICT vendors for the development and management of the ICT system.

Other issue is the shortage of ICT literacy of users. For instance, in the machine room inside CBM, some of CBM staff brought beverages into a machine room, which is usually prohibited to avoid the risk of damaging the facilities. The training of ICT staff with the skills is needed. The types of staff that are specifically required are: user-side ICT project managers for the system building phase, data security management specialists, LAN and other network administrators, and systems infrastructure operators and managers.

There is no dedicated organization inside CBM and certain members of staff in each department are assigned as persons responsible for ICT. However, the Administration department is now working on an internal ICT system developing plan.

3) Issues and Countermeasures

Issues that study team identified by on-site surveys and possible countermeasures are summarized below.

Figure 5-1-3. Issues and countermeasures

	Issues and backgrounds	Countermeasures to be taken
(1)	Inefficient manual works ✓Insufficient number of PCs both in offices and homes ✓Low ICT literacy of users ✓Insufficient and unreliable infrastructure	Provide ICT environment easily available to users ✓Set up ICT development programs and allocate the budget for OA investment. ✓Review current business operations for systemization
(2)	Low ICT awareness of users ✓Poor understanding of efficiencies of ICT in business ✓Lack of concrete ideas of users to utilize ICT in financial business	Train users who can deliver business solutions and devise practical applications using ICT ✓Provide OA training program for the employees. ✓Train users in overseas, for instance in financial institutions in Japan, to learn the business improvement case studies using ICT
(3)	Lack of ICT knowledge and experience of ICT engineers ✓Lack of ICT job opportunities ✓Insufficient PCs and ICT environments in universities and colleges ✓Lack of practical ICT training at universities and colleges	Cultivate engineers with ICT skills ✓Government to formulate ICT industry development plan to produce ICT related employment opportunities ✓Government to allocate funds to improve the educational environment at universities and colleges. ✓Review the curriculum and increase more practical ICT courses in universities and colleges

Source: Study team

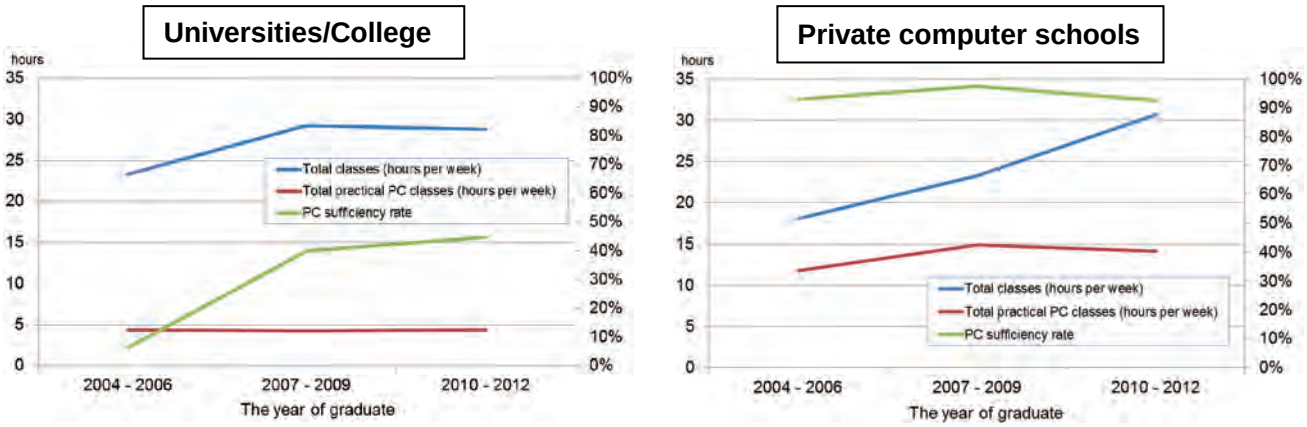
5.2 Education of ICT Human Resources

Since free elementary school education is provided in Myanmar, attendance rate of elementary school is quite high although it is not compulsory. However, attendance rate of high school is less than 50%, due partly to its rising educational cost. In fact, quite sizeable numbers of early-teens do not go to high school but work as sales staff. Moreover a percentage share of those going to university is less than 10%. Encouraging youngsters to gain higher education is necessary for future supply of potential workers.

In terms of ICT education in universities, taking University of Computer Studies Yangon (UCSY) as an example, its curriculum appears to be quite comprehensive, with coverage of ICT basics to practical applications. UCSY students can use PCs relatively often under its improving PC infrastructure. However, at many of computer universities, number of PCs available is insufficient for students, and they learn computer-related subjects mainly from written materials and lectures, not using PCs. Thus majority of fresh graduates from computer universities study computer, for instance at private computer school, before start working as ICT engineers.

To progress the capability of ICT human resources in Myanmar, it shall be needed to improve the curriculum of Universities/Colleges and to increase the length of practical PC lessons.

Figure 5-2-1. Total classes (week) and PC sufficiency rate of Universities/Colleges and private computer schools



"Total classes" and "Total practical PC classes" are the average number.

"PC sufficiency rate" is the ratio of the number of people who have had enough PCs for studying computer in private computer schools, to all.

Source: The result of a survey, target to employees (99 people) in certain ICT company, by the study team

6. Proposal of Grand Design and Development Scenario

6.1. Significance of ICT technologies in financial system

The financial system allows economic entities, i.e. government, firms, household etc., to deal with various financial transactions through financial intermediary institutions or the capital market. Functional finance system is indispensable to support economic activities of such entities through transfer of funds along with dispersion of risks, between savers and borrowers.

The efficient flow of funds will help distribute appropriately the funds necessary for the sound development of the economy. Thus, it is critical to establish robust basis such as laws and regulations that makes the financial system function effectively.

Nowadays, timeliness, reliability, and cost efficiency are required for financial systems. Without ICT system it is almost impossible to properly manage daily business operations such as payment and settlement.

ICT in the financial system facilitates the financial transaction among financial institutions, which leads to efficiency of the whole industry. At the same time, it enhances the competitiveness of each firm by improving service quality and differentiation. Improving the availability of services should contribute to the expansion of business opportunities both for retail and corporate clients.

ICT in the financial system should be considered as a core of the system.

6.2. The Result of the Analysis of the Financial ICT System for the Business Operation

Currently, CBM is still under the control of MOFR and has not been given a high degree of autonomy concerning monetary policy. It is said that several CBM policies taken in the past have negatively affected the public confidence against the financial system. However, recent movement of revision of *the CBM law* and planned introduction of *the Securities Exchange Law*, along with the series of modification and relaxation of the policies in the financial sector implies that building of the financial system has finally started in full swing.

The ICT system in Myanmar financial system is still at the early stage of development. Findings and analyses of the current issues relating to the development of the Myanmar’s ICT system are as follows.

1) CBM and commercial banks

Most business operations in banks are handled on paper, thus huge volumes of paper are piling up in the offices, taking up a great deal of space. Manual operation may lead to inefficiency and inaccuracy.

A primary payment practice for settlement is still with cash, therefore a bunch of bank notes are required for payment when a large amount is needed for settlement. The inefficiency and the operational risks are likely to increase assuming that the assessment operations continue to be carried out by hand.

As for system integration, general ledger at CBM is partially managed electrically, but it is far from ideal. Since automatic recording system is not in place, daily final account balance is simply input on hands. In parallel, account balances are also recorded on paper as well.

With regard to the specific fund transfer workflow, the procedure is automatically conducted in each transaction. However, Electronic Funds Transfer (EFT) is just a telegram message transmission and reception system, and the actual approval and deposit/withdrawal recording processes are not automated.

The ledger for EFT is managed electrically, but neither the ledger for EFT nor EFT itself is linked with the general ledger. Therefore, it is necessary to confirm the account balance manually. This is far from a complete automation.

Figure 6-2-1. Issues for CBM operation

Category	Current issues
Manual processing	Operations, including the general ledger, are not automated and mostly done manually, which is rather inefficient. There are also potential operational risks.
Settlement	Transactions are typically settled in cash, due to a low reliability on the intermediary function and the CBM's poor settlement system. Consequently, there is no smooth circulation of funds in Myanmar's economy.
System integration	EFT and the general ledger are not integrated, resulting in a dual management system. There is also no integration between EFT and SWIFT terminals, which requires double entry of data in each system.

More than half of the commercial banks have already introduced core banking ICT system for domestic financial procedures. However, core banking ICT systems at commercial banks primarily use domestic applications that could only meet the local circumstances established in the past. These banks will need to install ICT systems that meet international standards as the Myanmar financial market globalizes in the future.

As for payment and settlement for banks, only limited banks use MPU network.

Compared to commercial banks, state-owned banks are slow to introduce ICT systems, and are clearly left behind in terms of operational efficiency. It has no core banking system except for limited branches in urban area, and communications between the main office and branches appear to be paper-based such as FAX. In moving forward with the development of interbank settlement solutions, there is a concern about the widening ICT gap between state-owned banks and commercial banks.

ATMs have been installed at several banks, providing 24 hour a day service and support, although the only service available is cash withdrawal

Figure 6-2-2. Issues for CBM and commercial banks

Category	Current issues
Current accounts	Each commercial bank branch has a separate current account by branch at the CBM, and authorized banks can have a foreign currency account. These structures are not in accordance with international operational standards.
Branch Integration	The settlement system and network are weak. Coordination between the CBM and commercial banks takes time, as it does between branches of the CBM.
Forms/documents	Bank check formats are different by banks and not standardized. Reports from commercial banks to the CBM are not standardized either. Therefore, the CBM has to deal with each bank individually.
Monitoring	There is an online financial report for CBM's monitoring, but it is in the test stage. Currently, data created by each bank is aggregated separately by hand.
Payment and settlement	EFT for fund payments between CBM and commercial banks, operating on Banking Network, is currently being tested only in several banks. Fund transfer with EFT is limited and thus inconvenient.

Figure 6-2-3. Issues for commercial banks

Category	Current issues
Core banking Systems	Core banking system is introduced at some commercial banks, but not at state-owned banks. Data exchange between head offices and bank branches, and with other banks is still mainly done by phone and fax.
ATM	ATMs are only for withdrawing paper currency (No function for deposits and transfers).
Payment and settlement	Only limited banks use MPU network.

2) Securities trading

Developing capital markets in Myanmar has not made much progress. As the government aims to open the securities exchange in 2015, it is necessary to develop the supporting system and infrastructure urgently.

Currently, shares of two companies are traded at Myanmar Securities Exchange Centre (MSEC). Retail investors can buy government bonds at MSEC. Business operations related to transactions conducted at the MSEC have not been systematized and a lot of inefficiencies still remain. Shares and government bonds are issued by paper and scripless trading is not implemented in Myanmar's securities market. Investors basically need to visit MSEC upon buying, selling shares or receiving dividends.

The Securities and Exchange Law has not been enacted in Myanmar and there are no rules to prevent public companies' shares to be traded outside of MSEC.

Figure 6-2-4. Issues for securities trading

Category	Current issues
Securities Trading	Securities transaction and receipt of dividends can only be done at the counter at MSEC. Stock certificates and client accounts are managed on paper.

3) Infrastructure

Both the power and communication infrastructure are fragile. Power failure frequently

occurs on a daily basis all over the country, which makes it difficult to secure the continuous power supply for computers. Capacity of communication cables are not enough either. For example, the bandwidth of network connecting the CBM with commercial banks is narrow (512Kbps ADSL) and there is no backup line.

Current ICT environment does not have sufficient capacity or quality to run appropriate system applications. Without appropriate systems, there is a high possibility of serious errors with critical operations, which may result in data loss and, in worst case, a halt to operations.

Figure 6-2-5. Issues for infrastructure at CBM

Category	Current issues
Electricity	There occurs frequent power outages and it is difficult to secure continuous power supply via on-site generators. Voltage varies from 100V to 300V and is unstable. High risk of data loss due to power outage.
ICT	Equipment, configuration, and operations management structures vary by systems, and there is no integration between each system. There is no comprehensive ICT management mechanism.
Communications	Most client terminals are standalone (limited number of terminals with local or external network connections). The bandwidth of network connecting the CBM with commercial banks is narrow (512Kbps ADSL), and there is no backup line.
Facilities	Tiled floors make it difficult to underlay network cable. Without appropriate data centers, there is a high risk of data loss or crashes caused by heat.

4) Data security

From the security point of view, there is also a risk of fatal information leaks when carrying out tasks and operations under current system configuration. The awareness of the staff about information security does not seem high either.

For instance, most employees at CBM use webmail such as g-mail for daily work. Although it is very convenient, it weakens supervisory function and increases security risks. In global practice, webmail usage in business is rather rare amongst financial institutions in particular.

In the departments without file servers installed, data is transmitted and received by USB in which possible leakage of confidential information to third parties or data being falsified could occur, hence security issues must also be well addressed everywhere regardless of servers installed.

In the CBM's data centers located at Naypyitaw and Yangon, none of the security measures such as IC card or biometric identification security checks that are common in Japan or in developed nation has been installed at the entrances to these rooms for the purpose of checking and confirming the status of those entering and leaving the facility.

Figure 6-2-6. Issues for data security at CBM

Category	Current issues
Data security	Documents are stacked on desks and shelves.
	Desktop PC terminals are installed in dedicated rooms for common use. User IDs and passwords are not personally allocated.
	Most PC terminals are not connected to local network (LAN). Data and files are exchanged by using USB memory sticks.
	There is no proper entrance control for the server rooms.

6.3. Benefits of Modernization by the ICT System

With 2015's ASEAN Economic Community approaching, it is an imminent issue to reform the financial system, the core of the economic activities. Thus, it is necessary to implement the ICT system in parallel with improvement and development of laws and regulations, industry structure, scope of the business for each category of institutions. As shown in Fig. 6-3-2, the ICT system to be aimed at is such that the smooth financial transaction takes place in the network where CBM, various financial institutions, financial and capital markets are connected.

The introduction of ICT system is expected to bring valuable benefits to financial institutions, financial industry, government authorities, economy and society, and the client, that is, the user of the financial services.

1. Increasing work efficiency
   - ✓ Business in the finance industry is indivisible from information processing in nature. Thus, the utilization of ICT system will naturally increase the work efficiency. At the same time, streamlining the handling of a large volume of the business transaction will improve the cost efficiency capacity of the job processing.

2. Increasing safety and reliability
   - ✓ In handling information such as the financial assets the clients possess, accuracy is a must. Use of ICT is expected to reduce the incidents of unexpected human errors.
   - ✓ Payment and settlement risk such as settlement failure due to the time lag will be reduced as timely information transmission is realized.

3. Benefits to the management of financial institutions
   - ✓ The management of the financial institutions is required to assess the internal capital adequacy to match its business and its risk profile. Use of ICT will make it possible to measure and grasp the appropriate risk amount quantitatively and strengthen the management capability.
   - ✓ Clients receive the financial products and services through ICT system. Thus, varieties of the products and services will be offered as the ICT system develops.
   - ✓ As the manual business operations are replaced by the computers, workforce engaging such manual labor can be reallocated to more value-added jobs (i.e. financial advisers for the clients, etc.)
   - ✓ Increase in productivity increase will help improve capability of work processing as well as the quality of the products and services. As a result, overall productivity of the

financial institutions will increase.

4. Benefits to the clients
   - ✓ Clients receive the financial products and services through ICT system. Thus, adoption of ICT system will bring about better access to the services and greater choices of highly value-added products for the clients.

5. Benefits to the financial industry
   - ✓ Interlinking the whole financial industry by ICT system will realize the smooth financial transaction, which will lead to reduction of the transaction cost among the financial institutions.
   - ✓ Large size automatic transaction among the financial institutions will be done safely and efficiently instead of the use of the cash and the cheques
   - ✓ Financial industry is now globalized. Adoption of ICT will help manage the various issues derived from the globalization, i.e., securing the safety and efficiency of cross-border cash and securities payment and settlement, conforming to the international standards and systems, etc.

6. Benefits to the government agencies
   - ✓ As CBM is the center of the financial sector, adoption of ICT system will facilitate the increase of efficiency and stability of the whole financial system of the whole industry.
   - ✓ CBM will be able to conduct swift and flexible monetary policy, given that cash and securities payment and settlement will become more efficient.
   - ✓ CBM will be able to obtain timely and reliable financial information and the capability of CBM to analyze and evaluate the risks will improve such as credit risk, market risk, liquidity risk, and operational risk undermined in the institutions participating in the financial system. Moreover, CBM will be able to assess risks posed to overall financial systems in timely and accurate manner. As a result, the management capacity of CBM to monitor and maintain the stability of the financial system is expected to improve.

7. Benefits to the national economy
   - ✓ Reliable and accessible financial services brought by the adoption of ICT system will strengthen incentives for firms as well as individuals to undertake the financial transaction, stimulating the activities such as fund raisings and investments. As a result, robust economy and sound economic growth could be achieved.
   - ✓ The achievement of the smooth financial transaction by the adoption of ICT system will

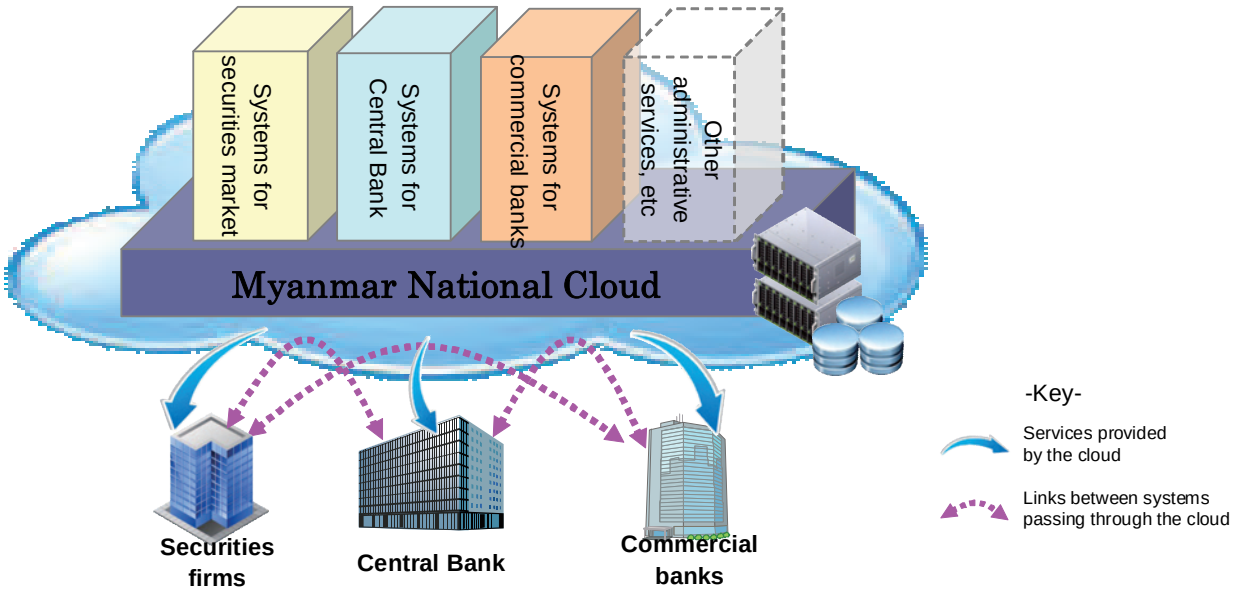
bring the significant cost reduction of financial transaction and efficient control and management of the funds to the clients of financial institutions. As a result, economic and social activities will become more cost effective and efficient

.

6.4. Proposal for Grand Design

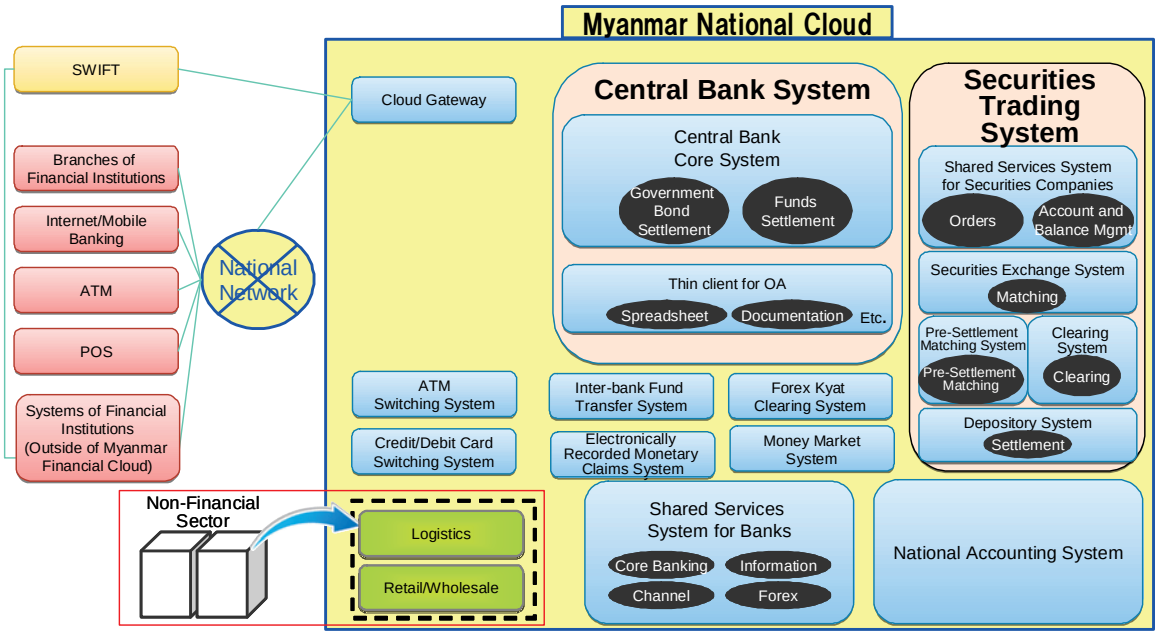
To realize the grand design of Myanmar financial ICT system, a standard platform, which is open to various kinds of ICT equipment and software application, with a view to scalability, cost effectiveness and management efficiency shall be developed first. Then, financial application for the central bank, commercial banks, and capital market should be built on the platform. Such sequence will make it easier to maintain the interconnectivity between the different application systems and to accommodate future expansion and upgrades.

Figure 6-4-1. Configuration of the grand design



Source: Study team

Figure 6-4-2. Image of the overall modernized ICT system in Myanmar



Source: Study team

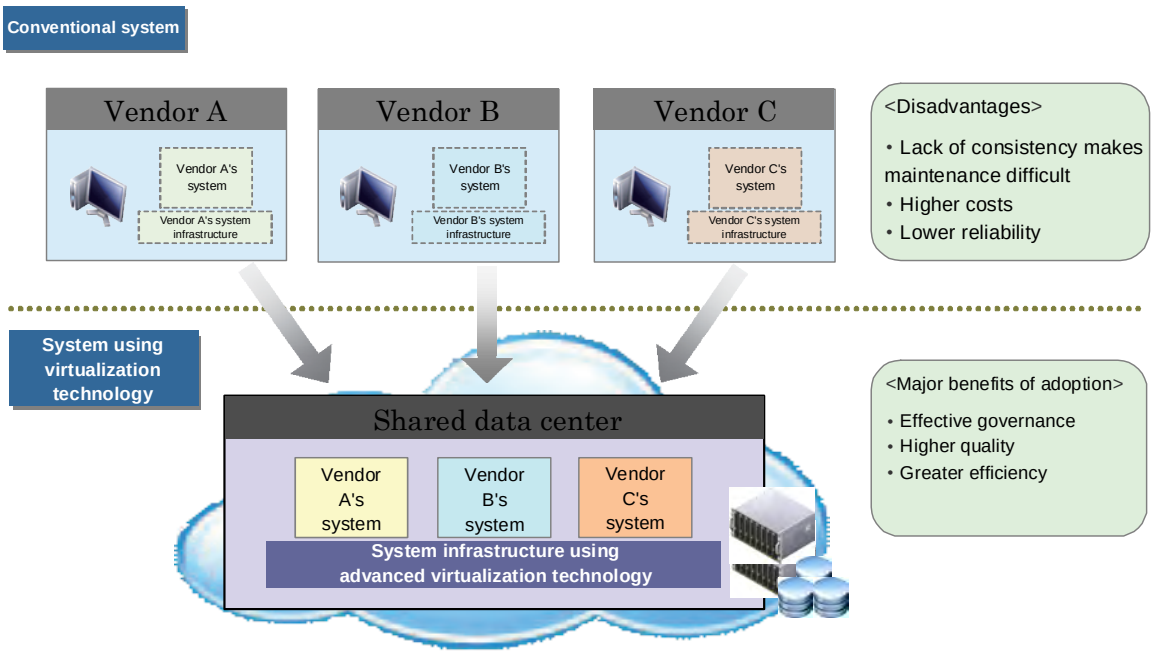
1) Infrastructure - Standard platform

The grand design assumes a consistent system infrastructure as a platform for the individual systems. This way, each sub-system, i.e., central bank system, commercial bank system, capital market system will be interconnected and integrated on the same platform. The concept of the consistent platform takes into consideration of future expansion to other administrative services.

It is expected that the use of virtualization[2] and other advanced technology is an effective means of accomplishing this uniform platform. By adopting advanced virtualization technology, equipment can be shared for different tasks where different operating systems are needed. By using open source applications, cost of software and programs can be minimized. The adoption of state-of-the-art technology including virtualization technology and open source applications will also contribute to the training of high-level ICT staff in Myanmar.

2 Virtualization allows multiple operating system instances to run concurrently on a single computer. It is a means of separating hardware from a single operating system.

Figure 6-4-3. Effect of adopting advanced virtualization technology



Source: Study team

2) Application

(1) CBM

CBM has responsibility to ensure a smooth and steady monetary policy. Therefore, the modernization of CBM through computerization of business processes can be identified as the top-priority task which could support CBM's essential role and contribute further to modernize overall financial sector. Above all, installation of the system which supports essential business processes such as payment and settlement operation and the OA system application which supports basic daily banking business on the platform should have the highest priority.

(2) Commercial banks

System development for commercial banks is also a key to modernize the indirect finance functions. It is desirable that the modernization prioritizes principally on state-owned banks which are considered to have made little progress in modernization. By doing so, it is possible to re-define the state-owned banks as a model case in the process of financial system modernization. In developing the core banking system, it is desirable to incorporate advanced ICT systems such as virtualization technology to enable a uniform foundation for the system, and to utilize thin clients to enhance security through means such as centralized data

management.

The strategy of how to upgrade/incorporate existing network would be decided based on discussion with CBM. Current Banking Network which connects between CBM and commercial banks can be continuously used by reinforcing their function. Building brand-new network system from scratch would be also an alternative. In any case, considerable extent of bandwidth expansion is mandatory.

On the other hand, coordination with MPU, which connects among commercial banks, needs careful consideration since its configuration has not been examined.

(3) Securities exchanges and securities companies

Development of the capital market as direct finance function is essential to the market economy. The securities trading system includes wide variety of the processes such as payment, clearing, settlement as well as such functions as order matching and processing, account management, balance management etc.

3) Other consideration

While the necessity of system development for bank networks or core banking is discussed above, following points should be also noted in the course of future development of Myanmar financial sector.

① Introducing electronic transactions for retail customers. This will help the people of Myanmar realize that information technology is making progress and appreciate its merits. In the area of retail banking in particular, the late-mover (like Myanmar) advantage enables the adoption of financial services using advanced information technology, promoting both financial service literacy and information technology literacy among the public. Development of microfinance utilizing advanced ICT system, for example, should also help reduce the poverty in rural areas in Myanmar.

② Expanding applications running on the ICT infrastructure from financial sector to the other industries and government agencies. By installing the additional appications on an expanded common infrastructure platform, ICT resources will be operated and managed efficiently.

③ Envisaging a private cloud (national cloud) with the ICT infrastructure operated and

managed directly by the Myanmar government to accomplish the appropriate ICT management.

④ Establishing a dedicated data center at CBM for financial sector with emergency power supplies and eventually multiple data centers connected by dedicated links to provide backup. These robust ICT infrastructure should be capable of overcoming weaknesses of the current infrastructure, i.e. communications and electric power supply.

⑤ Utilizing the local system integrators in Myanmar for the maintenance work of the ICT infrastructure as well as the ICT system for CBM and each financial institutions after establishment. This will help expand employment, grow the size of the ICT market in Myanmar, and encourage the transfer of technology.

⑥ Formulating the long term ICT policy for education and industry development. The policy shall also take into consideration of necessary measures to raise ICT literacy and awareness among the public.

6.5. Step-by-step Development Scenario for Modernization of Myanmar Financial ICT System

For the realization of the grand design, it is recommended to take step-by-step approach, taking into the consideration of the urgency and the future plan of development.

The first step will be to develop the common infrastructure platform (cloud base) which accommodates the system for the business operation of CBM, the nucleus of the financial system, the system for the commercial bank and the system for the capital market.
The priority should be put on the system development urgently needed, that is; OA system development to support the basic business process and development of application software for core business function such as fund management and government bond management at CBM.

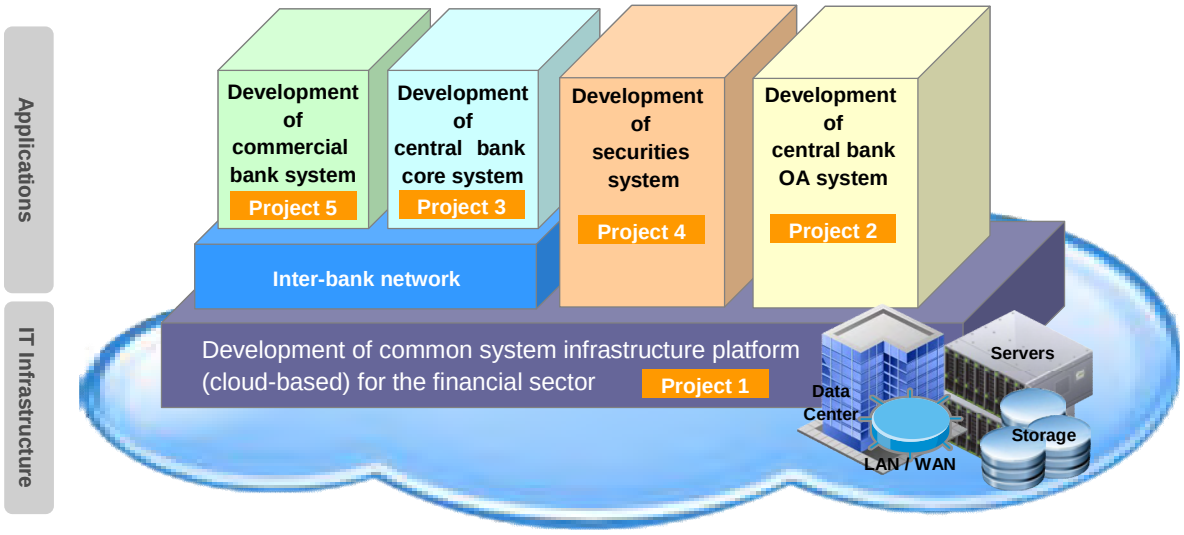
Then the expansion of infrastructure platform, expansion of application software at CBM, development of the capital market system, and the development of the commercial bank system will follow.

Financial ICT system needs to be kept upgraded as well as maintained and managed properly in order to keep up with the economic and financial development. Taking into account the fact that both human and financial resources are not sufficient for managing the ICT system, the system should require less cost and fewer ICT staff though it should be scalable for future system development and management.

The development scenario is divided into five projects as below:

1. Development of common system infrastructure platform (cloud-based) for the financial sector (Project 1)
2. Development of central bank OA system (Project 2)
3. Development of central bank core system (Project 3)
4. Development of securities system (Project 4)
5. Development of commercial bank system (Project 5)

Figure 6-5-1. Overview of projects for “the Study on the Modernization of the Financial System in Myanmar”



Source: Study team

Figure 6-5-2. Example of the schedule of each project

Project	Category		2013				2014				2015				2016				2017			
			Jan	Apr	July	Sep	Jan	Apr	July	Sep	Jan	Apr	July	Sep	Jan	Apr	July	Sep	Jan	Apr	July	Sep
1	Development of commercial bank system	Step1																				
		Step2																				
2	Development of central bank OA system	Step1																				
		Step2																				
3	Development of central bank core system																					
4	Development of securities system	Step1																				
		Step2																				
5	Development of commercial bank system	Model banks																				
		Roll out to other banks																				

Source: Study team

6.6. Development of Common System Infrastructure Platform (cloud-based) for the Financial Sector (Project 1)

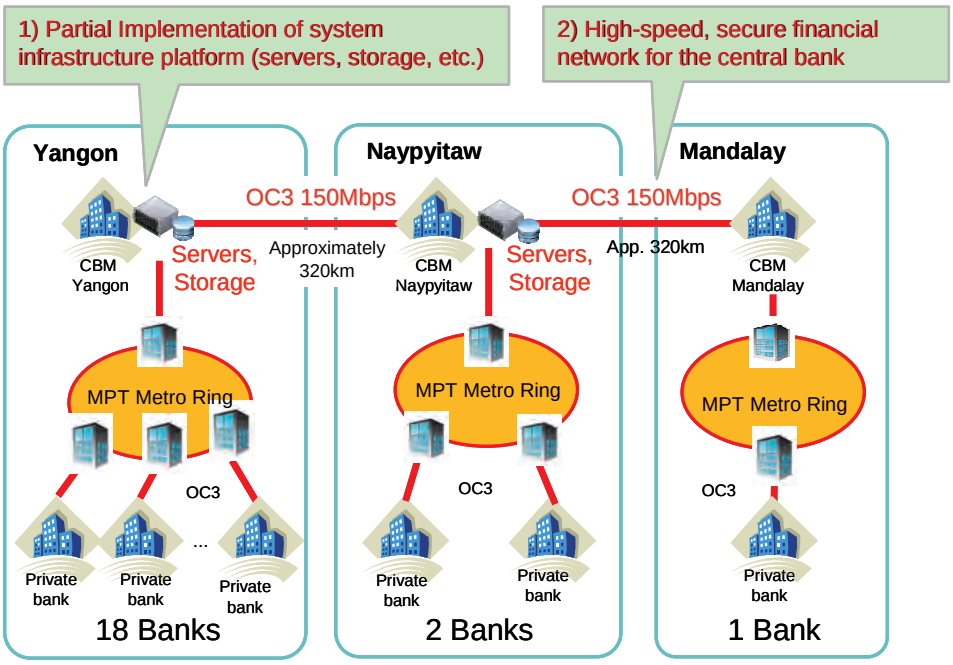
Project	Development of common system infrastructure platform (cloud-based) for the financial sector (Project 1)
Background and necessity	Currently several ICT systems have been developed separately based on individual system development projects. In order to develop the financial ICT system which will include various types of application software in a concerted manner, it is effective to build the common infrastructure platform which supports the efficient use of equipment as well as administration staff. This will also enable the future scalability of the system.
Purpose	To supply the necessary ICT system infrastructure for the financial sector and contribute to human resource development for the ICT infrastructure that is lacking in Myanmar today.
Overview	Building of a common-use system infrastructure (cloud-based) necessary for the operation of a financial ICT system for central bank systems, exchange systems, etc. 1. Implementation of a system infrastructure platform (servers, storage, networking equipment, data centers, etc.) 2. Development of a high-speed, secure financial network for the CBM (providing links between CBM locations, and between the CBM and commercial banks) 3. Provision of technical guidance to CBM ICT staff, commercial bank ICT staff, and local engineers in ICT enterprises engaging in ICT development with the CBM. Apart from the data centers, the system infrastructure platform and financial network will both be partially implemented, and relevant guidance will be provided to engineers.
Objectives	1. Systems - Implementation of system infrastructure in CBM (Naypyitaw and Yangon) - Installation of inter-site network (150 Mbps) 2. Capacity development

	- System users (in CBM and commercial banks) will have gained understanding of component technologies in the system infrastructure (e.g. data center security measures, reliability measures, etc.) - System managers (in CBM and local ICT enterprises) will have gained system experience in system resource management and scalability planning technologies - System operators (local ICT enterprises) will be able to independently provide system maintenance by gaining technical proficiency in troubleshooting issues and daily operation (to a level permitting autonomous maintenance by local staff at the completion of assistance)
Required resources	1. Equipment: cloud platform-related equipment, inter-location networking equipment 2. Dispatching of experts: for system infrastructure platform and inter-location network building-related issues
Project site(s)	Naypyitaw, Yangon, and Mandalay
Example Schedule	April 2013 to March 2015 (Step 1): about 24 months April 2015 to March 2017 (Step 2): about 24 months
Implementing organization and counterparts	CBM Administration Department Myanmar Posts and Telecommunications Corporation Local Myanmar ICT enterprises ICT departments from Myanmar commercial banks
Benefits	1. Reinforcement of ICT infrastructure facilities - Timely installation and centralized management of ICT infrastructure for the financial sector - Acquisition of system infrastructure equipment with high security and reliability - Fast and stable network environment appropriate for financial institutions 2. Capacity development for ICT infrastructure - Development of human resources with latest ICT infrastructure skills

Maintenance and management structure	1. Achievement of Sustainability: Implementation experts from Japan will provide on-the-job system maintenance and management training for CBM and local ICT enterprise employees. After completion of on-the-job training, these local staff will form a team to independently maintain the systems. 2. Achievement of Scalability: Key ICT infrastructure engineers will be developed in the course of this project, and an independent human resource training system for the ICT infrastructure will be established.

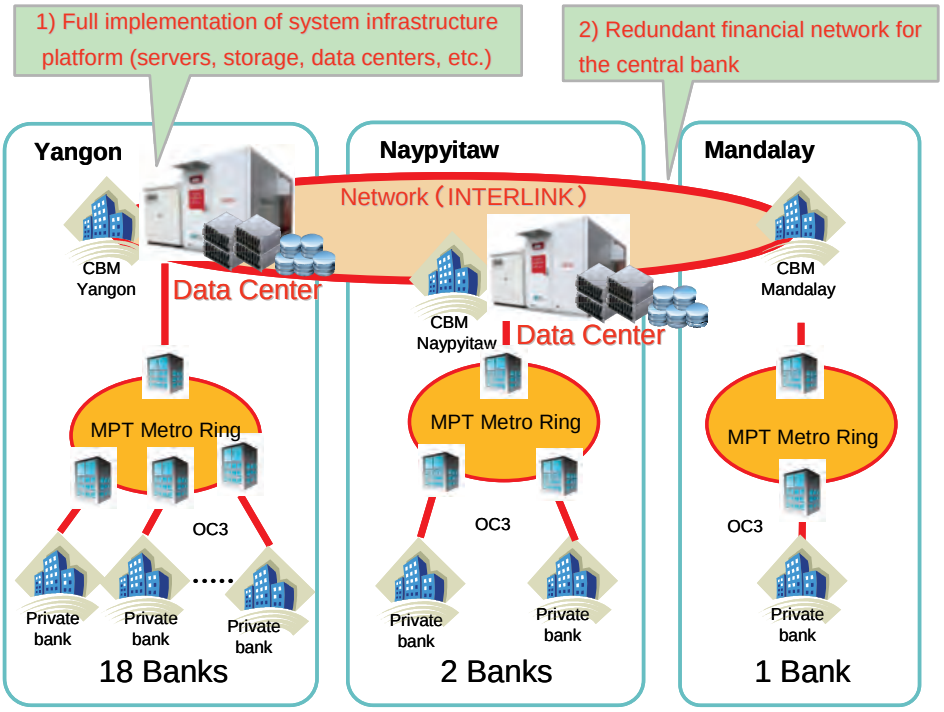
Figure 6-6-1. An overview of a common system infrastructure platform (cloud-based)

Step 1



OC3: A North American digital hierarchy standardized by ANSI (North American Standards Institute)

Step 2



OC3: A North American digital hierarchy standardized by ANSI (North American Standards Institute)

6.7. Development of Central Bank OA System (Project 2)

Project	Development of central bank OA system (Project 2)
Background and Necessity	Most daily banking businesses are done manually as there is not enough OA equipment. It is necessary to introduce OA equipment and to use them properly with appropriate ICT governance in order to avoid data losses, data leaks and to facilitate more effective work processes.
Purpose	Development of OA environment for CBM, and contribution to the improvement of ICT literacy for those responsible for ICT within CBM.
Overview	This project will provide OA environment using Thin Client, which is superior from a data security and business continuity perspective. 1. Provision of a Thin Client OA environment for bank employees (terminal, office software, file servers, mail servers, LAN, etc.) 2. Technical training on managing the OA environment for ICT-related employees of CBM and local ICT firms that work with CBM. *N.B. Part of the OA environment will be implemented prior to this project.*
Objectives	1. System - Implementation of an OA environment in CBM (Naypyitaw, Yangon, and Mandalay) 2. Capacity development - System administrators (from CBM and local ICT firms) will acquire OA environment management technical skills that take into account data security, and they will be able to respond to questions from end users. - System operators (local ICT firms) will acquire OA environment management and maintenance skills.
Required resource	1. Equipment: equipment for OA and Thin Client; related software 2. Dispatching of experts: for work related to OA and Thin Client technology
Project Site(s)	Naypyitaw, Yangon, and Mandalay
Example Schedule	April 2013 to September 2014 ; about 18 months October 2015 to March 2017 : about 18 months

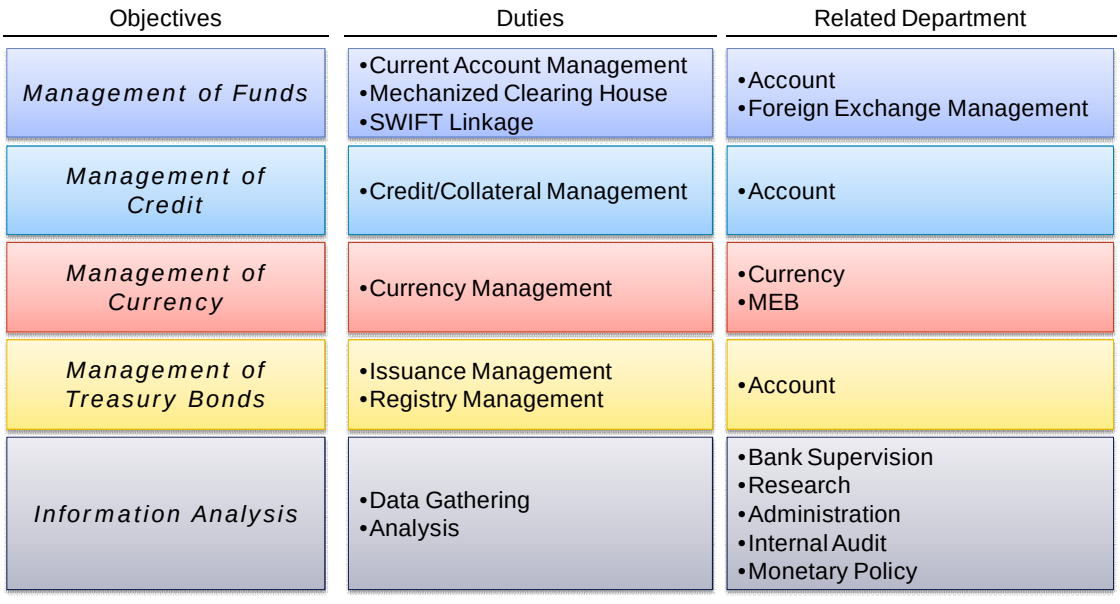
Implementing organization and counterparts	CBM administration department Local ICT firms in Myanmar
Benefits	1. Greater office work efficiency - Promotion of information sharing via file servers and e-mail 2. Improved information security - Separate accounts for each user (no more shared IDs) - Prevention of unauthorized data removal 3. Realization of work continuity - Prevention of lost data due to power outages - Rapid recovery from desktop equipment malfunctions
Maintenance and management structure	1. Ensuring Sustainability: Implementation experts from Japan will provide system maintenance and management training for CBM and local ICT enterprise employees. After completion of on-the-job training, these employees will develop a structure for independent systems maintenance. 2. Ensuring Expansion: Key OA environment development personnel will be developed in the course of this project to establish an independent staff training system for ICT infrastructure.

6.8. Development of Central Bank Core System (Project 3)

Project	Development of central bank core system (Project 3)
Background and necessity	Most businesses are done manually so far. It is necessary to build ICT application software to support the businesses essential to the function of the central bank as the efficient operation at the central bank will facilitate the financial and economic activities.
Overview	Creation of a system for the following operations in CBM ・ Funds management (capital transfer and settlement, forex, etc.) ・ Credit collateral management ・ Currency management ・ Government bonds (tender and issuance, registration, settlement, interest payment, redemption, etc.) ・ Information gathering and analysis (supervision, statistics, etc.) ・ Systems operation (accounting, master data management, etc.)
Objectives	1. System - Implementation of applications to aid various CBM operations - Implementation of CBM system usage terminals within related financial institutions - Implementation of check sorting machines in all clearing houses (Naypyitaw, Yangon, and Mandalay) and MICR printers capable of automatic sorting 2. Software - Greater efficiency and stability of CBM operations - Transparency of operation by transaction records - Greater efficiency through faster information gathering and analysis, and increased supervisory capability, accompanied by stability in Myanmar's financial sector - Contribution to development of Myanmar's economy by enabling high-volume processing
Required resources	1. Equipment: equipment for actual use in project as well as development testing equipment 2. Dispatching of experts: to transfer necessary business know-how on

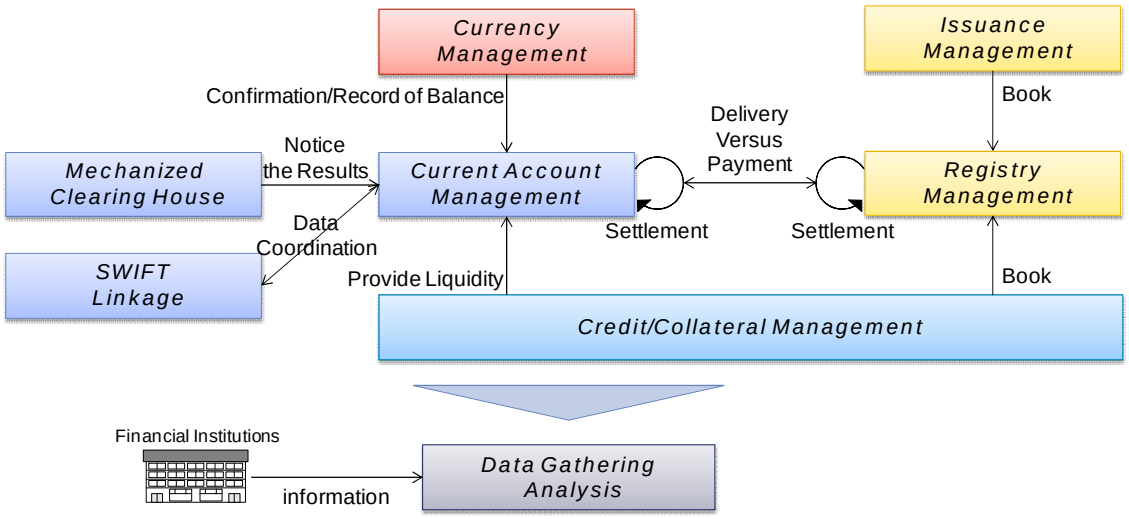
	the execution of operations, 3. Application development
Project Site(s)	Naypyitaw, Yangon, and Mandalay
Example Schedule	April 2013 to March 2016: about 36 months
Implementing organization and counterparts	Various administrations at CBM
Benefits	1. CBM operational efficiency through new system 2. Stabilization of economic activities, etc.
Maintenance and management structure	Currently considering discussions with local vendors

Figure 6-8-1. Image of computerization of CBM (1)



Source: Study team

Figure 6-8-2. Image of computerization of CBM (2)



Source: Study team

6.9. Development of Securities System (Project 4)

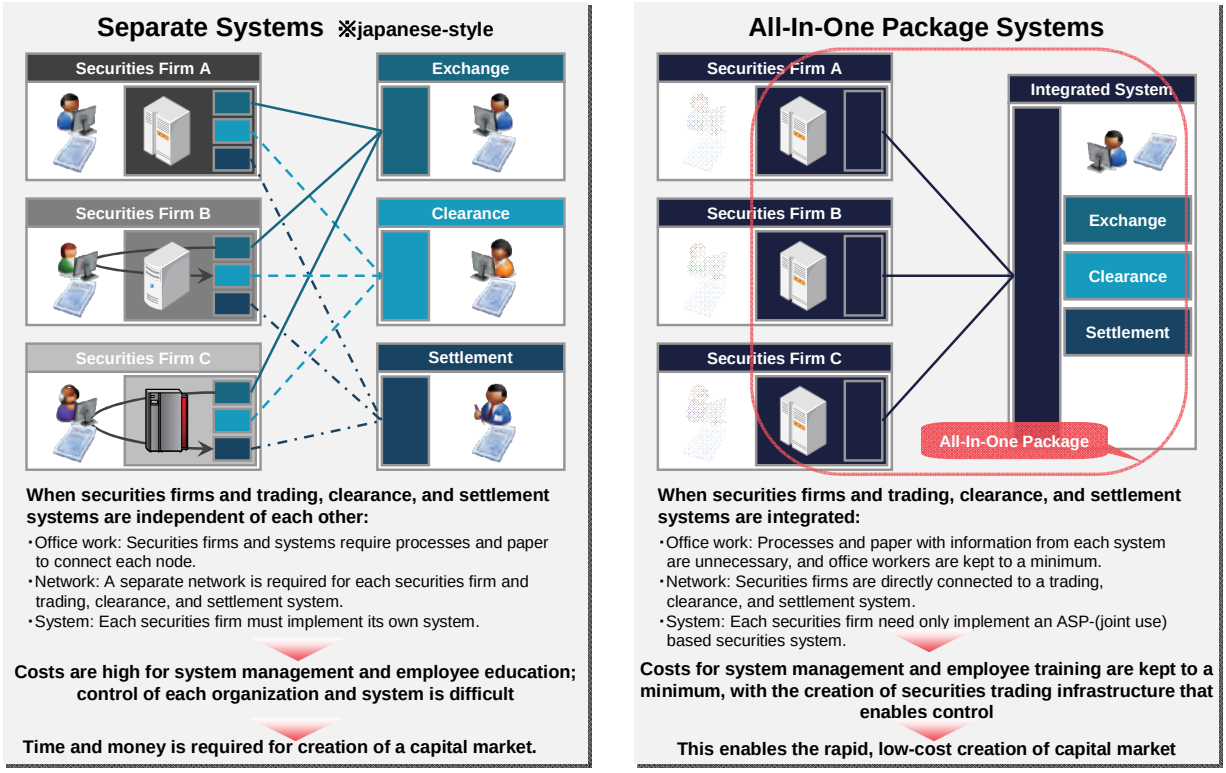
Project	Development of securities system (Project 4)
Background and necessity	The government is looking to establish the securities exchange system by 2015 in order to develop the capital market. While MSEC functions as the-over-the-counter trading center currently, it is necessary to build an exchange with the comprehensive functions to support the securities trading and the related business processes.
Overview	To build a securities trading system for government bonds, stocks, and other securities, which will have a central role in the capital market in order to establish and develop the financial capital market within Myanmar.
Objectives	Systems implementation for securities trading - Implementation of an integrated securities trading system with an exchange, securities firms, and securities clearing and settlement functions in Yangon - Training on use of the securities trading system
Required resources	Equipment: equipment for the cloud platform and inter-location network Dispatching of experts: engineers for system infrastructure platform, inter-location network, and maintenance of securities trading system applications
Project site(s)	Yangon
Example schedule	April 2013 to December 2015 (Step1); System development April 2016 to December 2017 (Step2); System modification(if needed) and education and training for system maintenance and development : about 57 months in total
Implementing organization and counterparts	CBM, MSEC Myanmar ICT enterprises
Benefits	1. By implementing a cloud-based, integrated system, minimize amount of the processes for exchanges and securities firm, securities clearing, and settlements. 2. This will enable more efficient office work, less time and cost required for training, and the rapid creation of a capital market.

	3. Additionally, by deploying an integrated system, the Myanmar governmental administration will be simplified, and securities exchanges laws and regulations, etc. can be prepared in stages, in accordance with Myanmar conditions. 4. Training of the work process using these ICT system will be also implemented.
Maintenance and management structure	1. Ensuring Sustainability: Experts will provide on-the-job training to CBM and local ICT firm employees for providing system management and maintenance. After 2015, a support structure will be built to independently support local issues. 2. Ensuring Expansion: Key application support personnel will be developed in the course of this project to develop an autonomous application support human resource system.

The system for the following functions will be developed and implemented:

1) Securities firm Joint use system
   Order processing functionality
   Account management functionality
   Account balance functionality
2) Securities trading system
   Matching functionality:
3) Clearance system
   Clearance functionality:
4) Verification system
   Verification functionality:
5) Repository system
   Securities settlement functionality:

Figure 6-9-1. Image of the integrated system which makes possible the speedy, low-cost development of a capital market



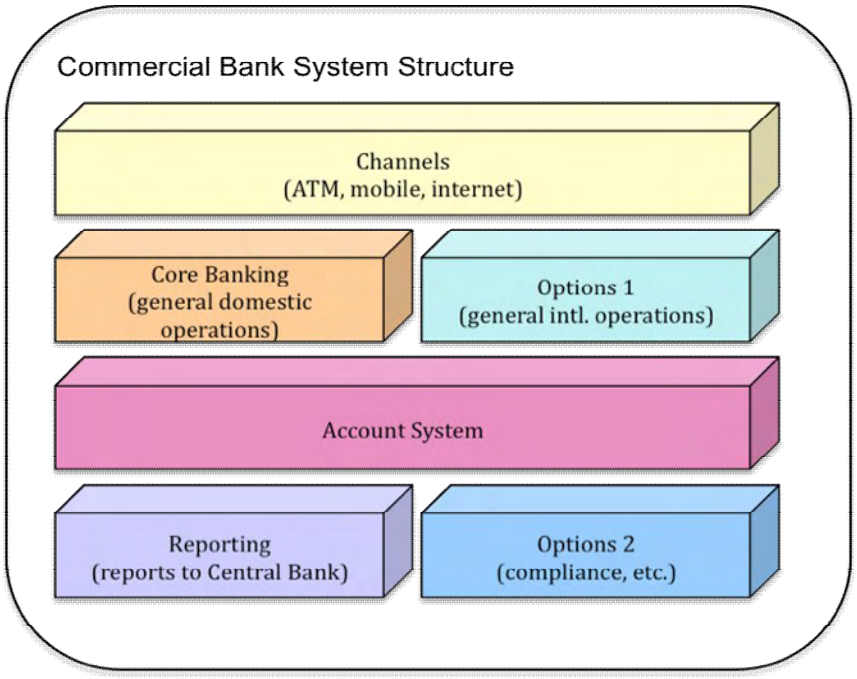
Source: Study team

6.10. Development of Commercial Bank System (Project 5)

Project	Development of commercial bank system (Project 5)
Background and necessity	Currently, there is a large gap of the level of the modernization among the banks. In order to narrow such gap among the banks and to facilitate the inter-bank transaction including CBM and state-owned banks, it is necessary to develop the core banking function together simultaneously.
Overview	The creation of a core banking system for shared use in order to modernize and internationalize Myanmar's entire financial system. Functions and services, implemented on Myanmar National Cloud, can be used by any commercial bank with common operational functionality, depending on their business strategy.
Objectives	1. Functions and services offered by commercial banks in a system encompassing two elements. The first element is a flexible system that can respond to the Myanmar government's deregulations. Second, in response to future economic and financial internationalization, the system will be capable of handling international standards for various regulations, such as Basel III. With these elements, commercial banks can introduce not only the latest international standard systems but its business operations knowledge in a short time frame by subject matter expertise. 2. Another development objective will be the training of local Myanmar ICT engineers (particularly application engineers), sufficient skills transfer assuming joint development with local ICT partners (i.e. offshoring), and joint system maintenance and sales by the local partners after the system goes live.
Required resources	Equipment for actual operation, development of testing equipment, various license costs, SE costs (team leaders and managers), ICT training lecturer’s costs, etc.
Project site(s)	Yangon and Naypyitaw
Example schedule	Financial operations (core banking functions) 2013: System development for model banks 2014: Rollout to other commercial banks

Implementing organization and counterparts	Commercial banks Initial development: local vendors
Benefits	1. The system will be equipped with Infrastructure to improve reliability and convenience, and to support economic activity development for financial services used by citizens and business alike. 2. By raising the level of systems for both the state-owned and commercial banks, the financial systems nationwide will be modernized, with smoother progress in international economic activities.
Maintenance and management structure	System maintenance will be provided by local ICT partners in Myanmar.

Figure 6-10-1. Image of services offered by commercial banks



Source: Study team

Appendix. Interviewees

Name	Position	Company/Organization
U THEIN OO	Chairman & CEO	ACE Data systems
U ZAW MOE THANT	Director	ACE Data systems
AUNG KYAW TUN	Sr.Manager	Asia Green Development Bank
AUNG KYAW TUN	Sr.Manager	Asia Green Development Bank
SAI AON SAI MEIN	Asst:General Manager	Asia Green Development Bank
THET LWIN SHWE	Dy.Managing Director	Asia Green Development Bank
U Soe Thein	General Manager	Asia Yangon Bank
Oo Minn Wint Oo	Dy.General Manager, IT Department	Ayeyarwady Bank
Phy Aung	General Manager, General Administrarot	Ayeyarwady Bank
U MAUNG MAUNG WIN	Deputy Governor	CBM
U NAY AYE	Deputy Governor	CBM
KHIN SANDER	Deputy Assistant Director	CBM, Accounts Dept.
U MAUNG MAUNG	Director	CBM, Accounts Dept.
BHARAT SINGH	Director	CBM, Administration Dept.
U AUNG AUNG	Director	CBM, Administration Dept.
U THAN LINN AUNG	Staff officer	CBM, Administration Dept.
U THEIN ZAW	Director	CBM, Bank Supervision Dept.
DAW KHIN SAW OO	Director	CBM, Banking Regulation Dept.
U KYAW WIN TIN	Director	CBM, Currency Dept.
DAW NAW EH HPAW	Director	CBM, Forex Dept.
AUNG MYINT	Assistant Manager	Co-OperativeBank
PE MYINT	Managing Director	Co-OperativeBank
PE MYINT	ManagingDirector	Co-OperativeBank
THEINGI NEW	General Manager	Co-OperativeBank
U SEIN MAUNG	Chairman	First Private Bank
THEIN KYAW MIN	Senior Manager	Global Technology
U Aye Lwin	General Manager	Innwa Bank
Yin Sein	Managing Director	Innwa Bank
JEREMY CHEW	General Manager	Kanbawza Bank
JEREMY CHEW	General Manager	Kanbawza Bank
TAKUYA TSUJI	Senior General Manager	Kanbawza Bank
TAKUYA TSUJI	Senior General Manager	Kanbawza Bank
U THAN CHO	Managing Director	Kanbawza Bank
MYO TUN	Senior Manager,	KMD
SAN THIDA MYO LATT	Senior Manager	MIT
U LIN AUNG	Deputy Director General	MOFR, Budget Dept.
HNIN THIDAR KO	Deputy General Manager	Myanma Apex Bank
KYAW SOE MIN	Deputy Managing Director	Myanma Apex Bank
THEIN LWIN OO	Assistant General Manager	Myanma Apex Bank
SAN THEIN	Adviser	Myanma Industrial Development Bank
THAN TUN	Executive Director	Myanma Industrial Development Bank
TIN MAUNG HTAY	General Manager	Myanma Industrial Development Bank
AUNG MYINT	Managing Director	Myanma Livestock and Fisheries Development Bank
MAUNG MAUNG NYUNT	Executive Officer	Myanma Livestock and Fisheries Development Bank
Than Than Nu	Deputy General Manager	Myanma Livestock and Fisheries Development Bank
KYI KYI KHAING	General Manager	Myanmar Information Technology
NI NI TUN	Director	Myanmar Information Technology
TUN THURA THET	CEO	Myanmar Information Technology
Hla Thaung	Deputy Managing Director	Myanmar Oriental Bank
Kyi Kyi Than	Managing Director	Myanmar Oriental Bank
Than Win	Senior General Manager	Myanmar Oriental Bank

Name	Position	Company/Organization
U Mya Than	Chairman	Myanmar Oriental Bank
U Myint Thein	Director	Myanmar Oriental Bank
Daw Hnin Hnin Aye	Dy:General Manager	MyanmarCitizensBank
DAW KAY THWE SOE	InternationalBanking	MyanmarCitizensBank
DAW SWE SWE MYINT	Chief Account	MyanmarCitizensBank
DAW ZARCHI TIN	ShareHolder	MyanmarCitizensBank
Ken Tun	Chief Executive Officer, CEO consultant of PARAMI ENERGY GROUP OF COMPANIES	MyanmarCitizensBank
U AUNG AUNG	ShareHolder, IT Consultant	MyanmarCitizensBank
U HLA TIN	Chairman	MyanmarCitizensBank
U HLA WIN	Head of IT Department	MyanmarCitizensBank
U Hla Win	Asst.General Manager	MyanmarCitizensBank
U MYINT WIN	Managing Director	MyanmarCitizensBank
U THAN AUNG	General Manager	MyanmarCitizensBank
DAW KHIN AYE MAW	Senior General Manager	Myawaddy Bank
DAW MALAR MYINT	General Manager	Myawaddy Bank
DAW NWE NWE SOE	Senior General Manager	Myawaddy Bank
DAW NWE NWE SOE	Senior General Manager	Myawaddy Bank
MYAT SANDAR KYAW	General Manager	Myawaddy Bank
SAI NYEIN AYE	General Manager	Myawaddy Bank
U MAUNG MAUNG AYE	Technician	Myawaddy Bank
U TIN AUNG	Consultant	Myawaddy Bank
U TUN KYI	Avisor	Myawaddy Bank
Aei Pu	Manager	Sibin Tharyaryay Bank
THEIN TUN	Chairman	TunFoundationBank
Hsu Thet Htoon	Manager Risk Management Department	United Amara Bank
Kyawt kay Khaing	Director	United Amara Bank
Mahesh K Bhandari	Director, Trade Services	United Amara Bank
Kyaw Win	General Manager	Yangon City Bank
Mi Mi Hlaing	Asst:General Manager	Yangon City Bank
AUNG THAN	Managing Director	YOMA BANK
AYE AYE SOE	Director	YOMA BANK
KHIN MAUNG YIN	Vice Chairman Ⅱ	YOMA BANK
KYAW PAING	Chairman	YOMA BANK
KYAW SOE LIN	General Manager（IT Dept）	YOMA BANK
MYO THWIN	General Manager	YOMA BANK
THI THI HTAY	Deputy General Manager	YOMA BANK

Source: Study team