

A STUDY OF THE COMPUTERIZED
ACCOUNTING SYSTEM DEVELOPMENT
AT MYANMA AGRICULTURAL AND RURAL
DEVELOPMENT BANK

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A Study of the
Computerized
Accounting
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**A STUDY OF THE COMPUTERIZED ACCOUNTING
SYSTEM DEVELOPMENT
AT MYANMA AGRICULTURAL AND RURAL
DEVELOPMENT BANK**

by

HTAY HTAY THAN

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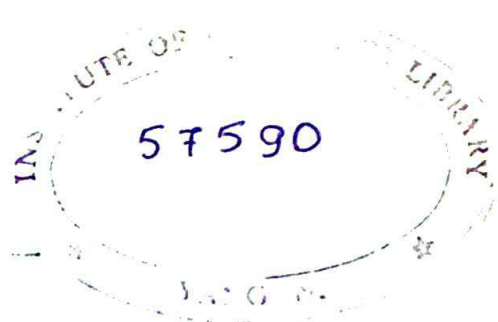
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ABSTRACT

(The study is an empirical study of Myanma Agricultural and Rural Development Bank (MARDB)'s computerized system development) - a case of introducing new technology in a Myanma Government Organization.

The stages of development, the problems and difficulties, the costs and benefits of computerization at MARDB were examined by associating with the Systems Analysis Team, interviewing the managers and related personnel, and by studying the reports, records and working papers at MARDB.

A study of the project papers revealed that computerization was not originally included in the project that was launched with foreign assistance, to strengthen and upgrade MARDB's institutional capabilities. Introduction of new methods of record-keeping and provision of better management information using a mechanized system were recommended under the project. However the electronic accounting machines ordered from NCR company under the project, were not available and the company's offer of NCR Tower computers as an alternative was accepted without much further considerations partly because of lack of experience and know-how; after that MARDB had to concentrate their thinking towards the NCR Tower computers.

Some of the difficulties and problems of MARDB's computerization were similar to other computerization developments experiences in other countries, although other problems and difficulties are specific to Myanma's environment. Inadequacy of the communication system and electrical power supply system in Myanmar are particular problems of Myanmar and perhaps also of other developing countries.

Having had the experience and leadership of the foreign expert from the project, MARDB's computerization had Management Information System Orientation with long-term perspectives. Computers were introduced in the head office not only in the main accounting system but also in other related subsystems i.e Loans Management Subsystem, Personnel Management Subsystem, and Budgeting and Budgetary Control Subsystem.

MARDB's main job of loans disbursement to farmers are in the branches and village banks. There are no attempts yet to computerize this main function of MARDB. However computerization at the Head Office can provide regular and ad hoc information needed for management and operational control activities of MARDB.

Computerized systems development at MARDB is systematic because of its stage by stage development using proper systems study and design methodology. Training of personnel were carried out both by local and foreign experts, thus even after the foreign expert left at the end of the

project, MARDB is left with a working and viable system - though with some constraints - in sustained growth and continuity due to limited availability of foreign exchange; and thus a stage of down-turn or slow down rather than a stage of growth follows initiation stage as in most foreign-aid computerization projects.

Sustained growth of MARDB's computerization is not very easy without the top-level management's commitment which is often lacking because of their unfamiliarity with the new technology and their limited financial resources.

A change to a new technology means new ways of doing things, often discarding old ideas and disrupting old relationships. Some resistance was expected and meetings, presentations and workshops were carried out at the management level to lower the human resistance factor. Yet some resistance was felt during the implementation phase. Perhaps resistance to change, more so in a technological change can only be lowered but not completely eliminated.

Taking all factors into account, MARDB's computerization can be judged successful to a degree. It has an operational system and the organization and staff have gathered necessary force and energy from their development experiences to launch to a new stage of growth and maturity with a computerized system.

CHAPTER ONE

INTRODUCTION

1.1 THE DEVELOPMENT OF COMPUTERIZATION IN MYANMAR

In the 1960s, there has been wide spread attempts to develop computer-based information systems mostly in the developed countries. Now in the 1980s & 1990s computers have become an essential part of organizational information processing.

Computer technology was introduced into Myanmar in 1973 and applications of computer in business organizations was initiated around 1980 with the aid of the United Nations (UN) agencies. Computers are now used in health, education, communication, banks and some businesses, and more recently they are increasingly being used in private enterprises.

Development of computer applications in Myanmar can be divided into three stages - first stage, from 1972 to round about 1985, second stage, from 1986 to round about 1990 and third stage, after 1990.

The first stage can be described as very specific application and training stage. The first computer centre is the Universities' Computer Centre (UCC) in Myanmar. It was set up in 1971, with United Nations Development Programme (UNDP) assistance, mainly for education and training purposes. It provided for the installation of one ICL 1902s batch type computer. The UCC was intended for providing a central computer services and to train personnel in all aspects of computer applications. But, the UCC could produce only computer professionals as a "breeder-

generator of future manpower", providing training courses for M.Sc (Computer Science) degree and for Diploma in Automatic Computing and other short term programming courses. Now UCC has been transformed into the Institute of Computer Science & Technology (ICST) providing the first degree of B.Sc (Computer Science) in addition to the post-graduate courses originally provided by the UCC. The UCC was conceived as a general purpose training centre in the use of computer technology both in public and private administration. As the only available service bureau in the country at that time, many government agencies were dependent upon the UCC facilities.

This first stage may be described as a period of "ad hoc computer applications;" usually some government departments such as Myanma Railways, Myanma Post & Telecommunications using the UCC computer facilities for single applications which were previously done on accounting machines. Thus many of them merely changed their data processing to computers without proper system study and design. Some thirty-one departments used forty-seven total applications in such fields as designing, statistics, payroll, billing, finance, production, sales, inventory control, personnel management and analysis of results.

Although IBM micro-computers were introduced and marketed in 1974, this new development did not reach Myanmar during this first stage. However mini-computers were introduced in some government organizations, Social Security Board in 1979, Myanma Post & Telecommunications in 1981, for organizational

applications. Social Security Board used computers for Retirement and Pension Planning; Myanma Post & Telecommunications, for producing Statistical statement for telephone & telex billing; Myanma Oil & Gas Enterprise (MOGE), for the applications of finance, production, sales and management; Forest department, for forest inventory, field data compilation and Irrigation Department, for analysis of stream flow data.

The second stage (1986-1990) can be regarded as the real beginning of computer applications with proper system study and design. Most of government organizations which entered the second stage are Myanmar government banks mostly through UN Financed Computing Development Project. Around 1985, it was assumed that there were enough manpower for computerization, and systems analysis and design was initiated in Myanmar government banks under Planning & Finance Ministry. In this phase, computer application in various organizations are more systematically developed. By the aid of UN agencies, the MARDB also introduced computer technology with systematic study and design at this stage. The Government of Myanmar formed the Computer steering Committee in 1987 with the aim to support government organizations in their computerization jobs. The IBM 4381 main frame computer was installed in the Central Statistics Organization (CSO). Computer education programmes were conducted for Managing Director (MD) and other top level management of government organizations. The idea of the need for proper systems analysis and design for effective use of computers in organizations was

promoted. It was felt that UN international Systems Development Expert will still be needed for guidance of management information system development in government organizations. The CSO gave training courses for the staff of other government organizations. These training courses are Computer Programming Courses, Systems Analysis and Design Courses. Central Bank of Myanmar (CBM), Myanma Foreign Trade Bank (MFTB) and Myanma Agricultural and Rural Development Bank (MARDB) tried to computerize their systems with the aid of foreign experts. But at that stage computerization in Myanmar is mostly the automation of clerical works and daily routines, at the transaction processing level such as - Payroll calculation, stock control, and personnel record keeping. Computers were rarely used in operational control, management control and strategic planning level.

In 1980s or the third stage of computerization in Myanmar, micro-computers came to be widely used in private businesses mostly because computer hardware costs came down drastically and computer technologies advanced rapidly. Government organizations also came to feel the need for and the importance of information system more acutely because they are trying to survive and develop within the context of competitive environment. They realized that computers are essential for good information system and for daily operations. Now most of government organizations and practically all foreign companies use computer as an essential part of office equipments. Even some of Myanmar private companies use computers for their offices.

The growth of computer professionals may be regarded as slow in Myanmar. The average numbers of annual output are 10 M.Sc (Computer Science), 30 Diploma in Automatic Computing level, 100 programmers among the government staff. There are now some private organizations giving training in programming and uses of software packages. But these courses by the private training organizations still do not provide Systems Analysis & Design Professionals. .

So far Myanmar has relied mostly on foreign experts for their computerization programmes mainly through foreign aid projects. The developments of computer skills or technology for the already experienced staff in the respective fields has been slow and restricted. At this time, the experience of using computers in MARDB is approaching four years.

1.2 STRENGTHENING OF THE MYANMA AGRICULTURAL AND RURAL DEVELOPMENT BANK

Government sponsored credit to the agriculture sector in Myanmar has been provided through government agencies and co-operatives over the past thirty years. MARDB was formed through the reorganization of the Agricultural Finance Division of the Union of Burma Bank (Central Bank of Myanmar) in 1973. MARDB has the responsibility for providing seasonal credit and term credit to the agriculture sector. The organization has been effectively lending money for agriculture purposes and achieving a very high rate of loan recovery.

The amount of loan for seasonal credit for each crop is fixed by the Government of Myanmar on a per acre-basis and is uniform throughout the country. Over 80% of seasonal loans are for paddy. Repayments of paddy loans are deducted from sales proceeds when paddy quotas are delivered by farmers to the government buying centres. Other loans are collected in cash.

The term loans are intended for purchase of draught animals, pumps for irrigations, agricultural machinery such as paddy transplanters, pedal threshers and seeders. Seasonal loans are winter loans, monsoon loans, pre-monsoon loans and harvesting loans. All loans to farmers are made through village banks that act as a channel between MARDB branches and the farmers. MARDB charges eight percent per annum on all loans to village banks and

co-operatives. The village bank charges twelve percent per annum retaining a four percent margin for their farmer-members.

In the late 1970's the Government of Myanmar identified the need to provide further assistance to farmers by expanding the capacity of the MARDB and to provide the credit needed for increased agricultural production.

Annual loans disbursements from MARDB increased from about kyats 111 million in 1977/78 to 1.9 million farmers to kyats 853 million in 1984/85 to 2.6 million farmers. Annual loans disbursements and number of farmers members increased rapidly. Consequently, record keeping and reporting system became more important. Accurate and timely reports need to be produced for providing information to management.

As a result of the need identified by the Government of Myanmar, a comprehensive review of the operation of the MARDB was carried out during 1979/80 by a firm of United Kingdom (UK) based consultants. It was financed by a grant from the British Government. A further study of MARDB needs was carried out by FAO Investment Centre during 1981/82. At the request of the Government of Myanmar, a mission from the Asia Development Bank (ADB) carried out pre-appraisal investigations in relation to the proposed MARDB and others concerned. Based on discussions with representatives of MARDB and other government departments and corporations, it was agreed that there is a need to strengthen the institutional capabilities of MARDB and to expand its lending

operation. Following the various missions, ADB confirmed that technical assistance was required by MARDB to strengthen its ability to deliver credit to farmers by a program of institution building. This project is called "Strengthening of MARDB Project." The mission was informed that the United Nations Development Program (UNDP) has expressed interest in cofinancing a portion of the project.

Assistance was formally requested by the Government of Myanmar in 1984 and the project document was signed by ADB (September 14, 1984), Government of Myanmar (January 31, 1985) and United Nation Development Program (February 1, 1985).

Total contribution by UNDP was \$1,500,000 and by Government of Myanmar Ks.7,536,000 to be utilized during the period 1984 to 1986. ADB was to provide \$350,000 by way of funds to purchase equipment.

Objectives of this project¹ are to strengthen and upgrade the institutional realignment, streamlining of systems and procedures, training, staff development and modernization of equipment and facilities, so as to prepare MARDB to cope with the increasing short-term and long-term agricultural credit.

According to the Inception Report of the preliminary study, loans overall recovery was reasonable. But detail investigation showed that with a growing amount of funds disbursed and the larger number of farmers involved, the amount of unpaid loans

and the number of borrowers in arrears was growing. If effective control measures were not taken, there would be a disturbing effect on the financial stability of MARDB. It was felt that MARDB needs a more effective control system.

MARDB has a large network of 207 branches and agencies spread all over the country showing the scattered nature of MARDB operations. The rapid increase in the volume of credit to farmers has been straining its staff, their managerial and administrative capabilities and physical facilities. According to the "Experts Reports Findings," the organization of MARDB and the Head Office in Yangon were facing administrative difficulties.

There had been considerable pressure on the Head Office staff with requests for assistance from township banks. There was communication delay and work overload delay in the response from the Head Office personnel since their priority is the day-to-day administration of the bank. The scattered nature of the bank's business and the inherent communication difficulties suggest that efficiency can be increased, if as many loan applications as possible are processed at the point of enquiry. There is a need to delegate the disbursements operations.

MARDB has a high level of centralization with limited delegated authority. There was a danger that as the business expands there would be a less than optimal use of available resources. Top management finds itself increasingly encumbered with the day-to-day decisions of the business, leaving it little time to consider the important issues relating to policy, manage-

ment control and future strategies.

As the MARDB extends the number of branches and increases its annual loan disbursements, the need for strict management control would become even more important if the business was to be run efficiently. It is considered that a degree of decentralization forms a necessary part of this expansion as it would allow the delegation of certain authority thus enabling the Head Office to focus its attentions on the important policy making, planning and control functions. To become a development bank, MARDB should have more advanced Management Information reporting system. To do this MARDB would have to become efficient in several directions. They are providing services to meet the farmers' needs for loans for seasonal crops as well as for term loans at reasonable rates and speedy approval of loans was essential.

The existing system was inefficient in the use of manpower, ineffective in terms of useful managerial quality information produced. The accounting system and its procedures were considered not relevant and needed modification to suit MARDB's role in development banking. The operations of the bank and reports on them are supplied to the government. There were numerous reports which dealt with the control of loan operations. These reports were of little use for control, since there were some misleading ratios and most important information are delivered too late for any effective control action to be taken. So the systems of record keeping and provision of management infor-

mation needed to be modernized. To avoid the human errors and to get correct and timely information, it was necessary to introduce machine-based recording and reporting system in the place of manual existing system. Introduction of new methods, and procedures that can provide management information was deemed necessary to provide correct and up-to-date information for taking proper control action. Top management could then have time to consider more important strategies, management control, and decision making. And for this a more advanced management information reporting system is necessary.

Recommendations for Changing the System

The policies, system and procedures of MARDB needed to be streamlined. Such streamlining should include appropriate delegation of authority and responsibilities, improvement in reporting procedures, simplification of accounting forms, records and procedures, decentralization of loan appraisal, approval and disbursement functions, and improvements in monitoring procedures.

Modernization of equipment and facilities would require

- <a> basic office equipment at Head Office and all Branch Offices of MARDB
- accounting and data compilation supplies at Head Office
- <c> training aids at Head Office.

The manual system used much manpower and great effort to produce the final statements and reports which are usually

late. Information produced at such a late date after the event is relatively useless, from the point of view of effective management, and their ability to take action, based on information. The proposed new system would enable the final accounts to be produced in less than one month after the end of an accounting month. Realistic management information could be produced in short order. This was an achievable target, using a new system. To avoid the human errors, the use of much manpower, the production of information at a late date, the new system need to be a mechanized system.

The major problem of the MARDB's accounting system is identified as duplication of records and the unnecessary transferring of records from one subsidiary book to another. It was felt that if MARDB was to move ahead in achieving an effective, rapid control over its business, the system must be changed. If the mechanized system was attempted without the system change, then the bulk of the machine capacity would be utilized on the repetitious recording.

1.3 COMPUTERIZATION PROJECT

AT MYANMA AGRICULTURAL AND RURAL DEVELOPMENT BANK

Under the proposed system, three NCR Electronic Accounting Machine were ordered. On being informed of the non availability of the originally specified NCR Machines and by accepting the offer of the updated "Tower" model with computer system, MARDB became hooked into NCR machine with computer system. Hence MARDB concentrated their thinking towards the potentials of the NCR Tower machine in substitution for electronic accounting machine. In this way, Computerization at MARDB came as part of "Strengthening of MARDB Project."

MARDB requested assistance from both the Government of Myanmar and outside source, to further strengthen the Training Department and Training Programme, to install a computer and associated system and to assist in the initial implementation, revisions and adoption of the proposed revised system and procedures.. The project was implemented by foreign assistance without which MARDB could not have availed itself of the computing facilities.

The project was scheduled for two years from March 1985 to March 1987. But this project was really implemented from 1987 because of the non-completion of import license and computer installation. MARDB has acquired three NCR computers, a few software programs and some supplies. Three NCR Tower have two

high performance Tower XP(3400-2119) and one mini Tower (3450-0402). Two high performance Tower XP came with 2 MB main memory, 45 MB fixed disk drive, 45 MB streaming tape drive and 1 MB flex disk drive, six CRT terminal (7901-0101) which consist of 2000 character display detached keyboard, two 125 LPM (Line Per Minute) system printer, two 85 MB second fixed disk drive. One mini tower has 1 MB main memory, 45 MB fixed disk drive, 45 MB streaming tape drive, battery back-up, two CRT terminal and one 120 CPS (Character Per Second) matrix printer. These computers and associated systems were installed in MARDB Head Office by NCR Engineers from Thailand. It was possible to use some prepared Packages for some of the banks' operations. Operating System of NCR is UNIX system and some of the packages are Multiplan for preparing worksheet, Wordmarc for word processing and Ingres for file handling.

In order to select persons for the NCR computer training, MARDB staff were tested with the NCR standard test. Systems Analysis Team was formed with three members. They have training in Basic Computer Science Concept, Systems Analysis and Design and COBOL (Common Business Oriented Language) programming course from the Central Statistics Organization (CSO) as a part of the UNDP Computing Development Project. Some courses were given in MARDB Head Office with the guidance of CSO staff. Some are trained by experts from Philippines. These are Electronic Data Processing (EDP) concepts, structured COBOL, UNIX operating

system, UNIX system administrator, basic system analysis skills and programming in BASIC.

The Systems Analysis Team developed the new computerized system following the steps below:

- (i) Detailed Investigation of old manual System.
- (ii) Logical Design of the new system.
- (iii) Physical Design of the new system.
- (iv) Implementation and Operation of the new system.

The manual system was investigated from October 1986 to February 1987 and problems and weaknesses identified. The new computerized system was logically designed from March, 1987 to June, 1987 and physically designed from July, 1987 to March, 1988. Implementation of the new computerized system started from April, 1988. The computerized system at MARDB was on a parallel run with manual system for six months. Since then it is being implemented step by step and is now an on-going system.

The detail list of three NCR Tower computers is shown in table 1.3.1 and List of events and dates leading to computerization at MARDB, in figure 1.3.1.

Description	Model	Quantity
High Performance Tower XP 2 MB Main Memory 45 MB Fixed Disk Drive 45 MB Streaming Tape Drive 1 MB Flex Disk Drive	3400-2119	2
CRT Terminal 2000 Char Display Detached Key-board	7901-0101	6
125 LPM System Printer 80 CPS Near Letter Quality Bit-Image Printing	6442-0102	2
85 MB Second Fixed Disk Drive Fits within Tower XP Cabinet 2nd Fixed Disk Support	3450-F865	2

Table 1.3.1 The Detail List of Three NCR Tower Computers

Description	Model	Quantity
Mini Tower with 1 MB Main Memory 45 MB Fixed Disk Drive 45 MB Streaming Tape Drive Battery Back-up	3450-0402	1
CRT Terminal 2000 Chat Display Detached Keyboard	7901-0101	2
120 CPS Matrix Printer 132 Column Printing Serial Interface 2 KB Buffers Paper Guide	6411-1561	1
Cables for the 3 NCR Tower Systems		11 PCS

Table 1.3.1 The Detail List of Three NCR Tower Computers
(Continued)

Figure 1.3.1 List of events and dates leading to computerization at MARDB

Project Activities	Date
Project Document Signed	■ September 14, 1984 with ADB, ■ January 31, 1985 with Government of Myanmar, ■ February 1, 1986 with UNDP
Project Duration	■ Two years - 1985 to 1987
Feasibility Study by four Foreign Consultants	■ March 1985
<u>Equipment Acquisition</u>	
Order of Accounting Machines from NCR company	■ May 1985
Advice on non availability of Accounting Machines	■ July 1985
Order of substitute NCR Tower Computers	■ August 1985
Forming of Systems Analysis Team	■ October 1985
Receiving of NCR Tower Computers	■ January 1986
Installation & Training by Consultants	■ May 1986

Figure 1.3.1 List of events and dates leading to computerization
at MARDB (Continued)

Project Activities	Date
<u>Detail Study & Design</u>	
Investigation of Old Manual System	■October 1986
Designing of New Logical System	■March 1987
Designing of new physical system	■July 1987
Presentation to management	■March 1988
Implementation (Parallel Running)	■April 1988
Actual Running with Computers	■January 1989

CHAPTER TWO

OBJECTIVES AND DESIGN OF THE STUDY

In this chapter, objectives of the study, statement of the hypotheses and the design of the study will be described.

2.1 OBJECTIVES OF THE STUDY

As stated in chapter 1, business applications using computer with proper system study and design started only around 1980, with Myanma Government Banks and a few other organizations among them. If a systematic study can be carried out on the experiences of the development effort in these organizations some beneficial lessons can be learned. The case of Myanma Agricultural and Rural Development Bank's computerized Accounting System Development was chosen for this purpose.

In studying and closely examining the computerization project through its various phases, the main objectives of the study have been :

- (1) To study the strategy if any, and plan of computerization for Myanma Agricultural and Rural Development Bank.
- (2) To identify and analyze the problems and difficulties of implementing the new computerized accounting system at Myanma Agricultural and Rural Development Bank including human resistance to change if any.

- (3) To determine the costs and the benefits of computerization at Myanma Agricultural and Rural Development Bank.
- (4) To examine whether the problems and difficulties found in computerizing at Myanma Agricultural and Rural Development Bank are of the types generally expected or whether they are specific to the situation.

For Myanma Agricultural and Rural Development Bank computerized system development was a very new experience. Its method of acquisition of new hardware, and decision making on probable areas for the introduction of computer-based processing are studied. An examination is made not only of the short-term plan but also of the long-term plan to determine whether the plan provides for later development of a Management Information System (MIS) in a fuller sense.

In the implementing of any new system, many problems and difficulties will be encountered. There will be human resistance to change in introducing any new technology. Human factor is found to be very important in the success of information system development. The practical problems and difficulties of implementing the new system at MARDB including human resistance to change is studied and described, in the light of experiences of other organizations in their systems development process.

Programmes to change existing system and procedures like computerization at MARDB are undertaken because of expected

benefits such as more efficient and less costly operations. Costs will also be involved to bring about the needed changes. A programme must be evaluated in terms of the benefits and costs related to it. One of the difficulties of cost and benefit analysis is that although some costs and benefits are tangible and quantifiable, there are others that are not tangible and not quantifiable. Consideration will be given to tangible factors with figures wherever possible and also to non-tangible factors which will be described as fully as possible.

The practical aspects of computerized system development for a particular organization may not be exactly the same as text book descriptions of problems in development. The experiences of computerization especially in business in the developed countries have come up with certain problems and difficulties that can generally be expected in the process of transition from manual to computerized systems. There can be many factors of differences due to special local conditions. Whether the general problems and difficulties are applicable to Myanmar experience or whether there are problems more specific to the MARDB in particular or Myanmar in general will be studied and discussed. The differences between the local, practical situation and theoretically expected situation can be many.

2.2 STATEMENT OF HYPOTHESES

In studying the MARDB's computerization experience, certain assumptions or statements may be made on the basis of theoretical propositions drawn from the similar experiences in the development of computer application.

- (i) Computerization in organization usually begins with data processing applications which are more cost-effective because of its high volume and repetitive procedures.
- (ii) Management Information System concepts and experiences of other computerized developments are duly considered and applied, for the benefit of Myanma Agricultural and Rural Development Bank's computerized system development.
- (iii) The present computerization is developed as part of a master Management Information System, which in its entirety must also fulfil the information of managerial control and strategic planning.

2.3 DESIGN OF THE STUDY

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The facts necessary to study the development strategy used in Myanma Agricultural and Rural Development Bank will be collected through examination of reports, records and working papers at this organization.

Interviews with systems analysis team, managers, operating personnel and users are conducted to study the problems encountered in implementing the new computerized systems and to acquire other necessary data.

Some difficulty is expected in connection with the cost/benefit analysis of computerization at MARDB. The costs and benefits although not completely quantifiable will be described as far as possible as tangible and intangible costs and benefits, one-time costs and on-going costs, and immediate benefits and long-term benefits.

The computerized system development stages are studied by following through and associating with MARDB systems analysis team. Based on the experiences and theoretical concepts, the differences between the theoretical and practical development situations will be examined.

In order to achieve the objective of studying the strategy and plan of computerization for Myanma Agricultural and Rural Development Bank, examination of reports, records and

working papers will be made. This will also provide the necessary information and data, for verifying assumptions regarding the existence of a master plan for Management Information System development.

Associating and following through with the systems analysis team and through interviews with managers and personnel involved in the operations we plan to obtain data and information to enable us to conclude as to whether the MARDB employ Management Information System concepts and experiences of other computerized development for its own benefit.

By examining working papers, interviewing persons in operation level as well as management level, and by evaluating MARDB's current functions, an examination of the costs and benefits of computerization can be made. Thus a conclusion can be drawn as to whether the application is in fact beneficial and is therefore deserving to be developed further.

CHAPTER THREE

CONCEPTUAL CONSIDERATIONS

3.1 THEORETICAL AND PRACTICAL CONSIDERATIONS IN SYSTEM DEVELOPMENT PROCESS

The first business application of the computer was developed in 1954 and the early computer mostly replaced existing clerical tasks and manual records¹. When applications begin to straddle organizational boundaries, the approach is to involve members of the user department in the systems teams which develop the applications². Once computing has become widely accepted in an organization the data processing function separated the responsibility of accounting and controllership³. In large organizations, the data centre is more or less a production operation and systems development is a more specialized activity. In large computer assisted systems, it becomes necessary to identify the responsibility for data administration⁴. They are the task of setting and maintaining standards and procedures in the use of the data base, creating and retrieving data and ensuring the integrity of data.

A further stage saw "user friendly" systems. The

¹ R.I Tricker & Richard Boland, "Management Information & Control Systems", (London, A Wiley-InterScience Publication, 1976), P. 244

² Ibid

³ Ibid, P. 245

⁴ Ibid, P.246

information system function is to provide service to the users. Further separation of the function is growing in some organizations with the development of highly complex and intensive communication networks throughout the organizations. The information system function is presently considered responsible for data administration, facilitating the provision of information and developing the information systems strategy¹.

Different ideas, concepts and systems of development have come in vogue and the more important of these are examined in this chapter, more or less in a chronological order.

Total System Concept

In the beginning days, information system for the organization was conceptually conceived as a total system; the computer-based centralized handling of the entire data and information processing of business. In this concept, the task was immense, difficult to implement completely, and also very rigid and inflexible, without the ability to adapt to rapid changes². Although some advocates of total system have argued for complete integration of all formal information processing, it was eventually considered that the total system computerization was not compatible with business objectives. The experiences suggest that the total system is impractical. There are too many factors to consider all at once, and maintenance is difficult.

¹ Op. cit. P.246

² Op.cit. P.209

Distributed and Integrated System

Declining hardware costs, improving communications and data base capabilities, developing technologies, and the growing data processing experience of users have provided compelling reasons in the minds of many managers to bring distributed data processing into their organization¹. Distributed data processing means the spread of computer hardware and data to multiple sites around an organization. When information systems are designed, a whole network of computers often becomes involved in carrying out an operation. Such systems represent prototypes for the distributed data processing of the future. It permits the decentralization of many data processing activities. Distributed data processing increases direct access to the system by the end user. The data processing manager participates with end users. Where computer operations are decentralized, the manager must establish charge-out methods that are understandable to the user and that measures service to the organization. Data processing is an organizational resource consisting of many areas of activity, each of which may be controlled by various individuals.

These activities can be spread across an organization in a variety of ways, and a manager should carefully consider the appropriate degree of decentralization for each of them. To take advantage of the distributed data processing, a manager needs a clear conception of the complexities of using and managing the

1 "Information Systems Development Principles of Computer-aided Software Engineering", P.150-152

computer resource. Very often the linkage of information systems to strategy and structure is found neglected. When managers working in different industries, places or times tried to apply these principles, they did not prove successful; they find themselves in difficulty and they see themselves as a collection of machines and technical issues. The individual applications may be inconsistent and incompatible. For these reasons, information systems must plan towards an integrated system.

The integration of information system application is an overall information system plan. When application systems are implemented one at a time, their design can be guided by the overall plan. Information system integration is achieved through standards, guidelines, and procedures set by the management information system function. These permit separated applications to share data, meet audit and control requirements, and be shared by multiple users.

The integrated system with a common database is practicable. Equipment and know-how is available to maintain key files, holding the common records independently of the application programs and providing access to the common data base for application programs and enquiry¹. Integrated processing is achieved by designing several related applications as a single system in order to simplify the interconnections and reduce the duplication of input.

¹ R.I. Tricker & Richard Boland, "Management Information & Control Systems", (London, A Wiley-InterScience Publication, 1976), P.209

Modularity Concept

This can be described as a concept that is useful and essential to practical system development. It is based on the concept that systems can be divided into subsystems and these subsystems again have their own subsystems. Based on this concept, modularity is the design strategy of an information system whereby small sets of processing instructions called modules, are the building blocks of the whole system. Some modules are used in various applications and some are used in a single application. Each module has its own purpose. The use of modules improve system development and modification. Each module can be implemented separately, allowing more efficient maintenance. After implementing each module, all are integrated and linked as a whole system to meet the organizational objectives. The use of module is an application of system principles. Inconsistencies among subsystems are reduced by the use of standards and the common database.

After three decades of experiences in computer applications in businesses and the conceptualizations of management information systems and their development, the results of investigations and research studies are now available for reevaluation and reexamination.

The application systems are large and highly structured. User task comprehension and developer task proficiency are high. The most common method for this large class of organization is a system development life cycle method or descriptive model of

system development. Each stage of development is well defined and has straight forward requirements for deliverables, feedback and sign-off in this method. The basic idea of the system development life cycle is that there is a well-defined process by which an application is conceived, developed and implemented. This system development life cycle method will be described here.

System Development Life Cycle

✓ The basic idea of the system development life cycle is that there is a well-defined phases by which an application is conceived, developed and implemented.

There is a general agreement on the flow of development steps and the necessity for control procedures at each stage. The information system development life cycle for an application consists of three major stages: Definition, Development and , Installation and Operation.

The definition stage is the process which defines the information requirements for a feasible cost-effective system. The requirements are then translated into a physical system of forms, procedures, programs, etc., by system design, computer programming and procedure development. The resulting system is tested and put into operation. There should be a post audit of the system to evaluate how well it performs and how well it meets cost and performance specifications.

The three stages of definition, development and installation and operation can be divided into smaller steps.

The Definition Stage

The definition stage can be divided into four phases. They are proposal definition, feasibility assessment, information requirement analysis and conceptual design.

Proposals may come from users and data processing personnel. They may be for entirely new applications or for enhancements to existing applications. The proposal should include the identification of the project, the organizational need, organizational support, time and user personnel schedules. The proposal is reviewed by the management for allocating resources such as user management or a steering committee.

When a new application is proposed, it needs a feasibility study. Technical feasibility, economic feasibility, motivational feasibility, schedule feasibility and operational feasibility form components of the feasibility study may be made. The feasibility report should include general description of the application, expected development schedule, required budget and resources schedule, expected costs and benefits schedule, summary of evaluation with respect to technical, motivational, schedule and operational feasibility. If the feasibility study includes several alternatives, the choice of alternative is based on the feasibility of each alternatives. When the feasibility study has been accepted and an alternative is approved, information requirement analysis can begin.

The analysts work with users to define the information requirements in detail and to define the information flow. The

requirements consist of items such as report format, regular and ad hoc enquiries, conceptual database schema, functional requirements and user interface requirements.

The conceptual design is called user-oriented external or general design. This phase establishes general description of each of the inputs, general description of each of the outputs produced by the application, functions to be performed, general flow of processing, outlines of operating manuals, user manuals and training materials needed for the application, and, audit and control processes and procedures for ensuring appropriate quality in the use and operation of the application.

The Development Stage

The development stage of system life cycle can be divided into four activity such as physical system design, physical database design, program development and procedure development.

The physical system design phase can be called internal or detail design. It prepare the detail technical design of the user-oriented requirements of the conceptual design. The results of the physical system design are system design showing flow of work, programs and user functions, control design showing controls to be implemented at various points in the processing, hardware specifications if new hardware is required, data communications requirements, the overall structure of programs, security and backup provisions, and, quality assurance plan for

the remainder of the development.

The physical system design work is performed by the systems analysts and other technical personnel. Generally, physical system design is achieved by subdividing the application system into small modules. These modules are relatively self-contained and are programs and procedures which are subsections of programs. Each module can be developed, coded and tested independently. In this way, system complexity is reduced.

The physical database design depends on the existing database requirements determination. It needs to create a new physical database if no database is used or a database is dedicated to the application. When an evolutionary strategy for database development is followed, an existing database can be used and modified. There can be access to an existing database by means of a user schema when a complete conceptual model of the enterprise, anticipating new application needs was used as the basis for physical database design.

The objectives of the program development is to code and test programs. Programmers will be assigned for programming. The program plan is prepared which breaks the programs into modules and specifies interfaces among the modules. A test plan is prepared for each module and for the system when all modules are combined. Modules are combined, tested and debugged as a program system. The result of the programming phase is a set of tested programs that are fully documented.

Program development and procedure development can be

performed concurrently. Procedures should be written for all personnel who have contact with the system. This includes primary users, secondary users, computer operating personnel and training procedures. The procedures are written, tested and reproduced for distribution.

The Installation and Operation Stage

The third stage of information system development life cycle begins with conversion to the new system. After the new system is in operation, changes and enhancements are made during the operation and maintenance phase. A post audit is conducted; based on this activity, the system may be modified.

Conversion is the process of changing from the old system to the new system. Three major activities prepare for actual conversion: acceptance testing, file building and user training. Acceptance testing is testing of the completed application and comparing it to specifications. Differences between what user expected and what the system delivers are identified and resolved. File building refers to the collection and conversion to machine-readable form of all data. Proper user training is an important factor in overcoming user resistance to new systems. Conversion can be accomplished in several ways. The most common method is to run the old and new system in parallel. In a parallel conversion, both the old system and the new system are processed concurrently until the new system stabilizes. This ensures the reliability of the new system prior to abandoning the

old one.

When the system appears to be operating without difficulty it is turned over to the information processing production function. Any subsequent changes are handled as maintenance. Maintenance can be classified as repairs or enhancements. When incomplete or incorrect coding renders the application defective, repairs are required. Enhancement are additions or improvements.

An audit team with representatives from users, development, maintenance, operations, and perhaps internal audit review the operation, use, costs and benefits of the application. Recommendations from a post audit include specific recommendations for dropping, repairing, or enhancing an application and suggestions for improving the development process.

In developing the system life cycle, at completion of each phase, formal approval are required from the users as well as the manager of project development. The information system development life cycle can follow an iterative assurance strategy. The review after a phase may result in cancellation or continuation. It may also result in going back to a new phase¹.

¹ Gordon B.Davis, "Management Information Systems Conceptual Foundations, Structure, And Development", (New York, McGraw-Hill, Inc., 1985), P.571-591

This is shown in Figure 3.1.1.

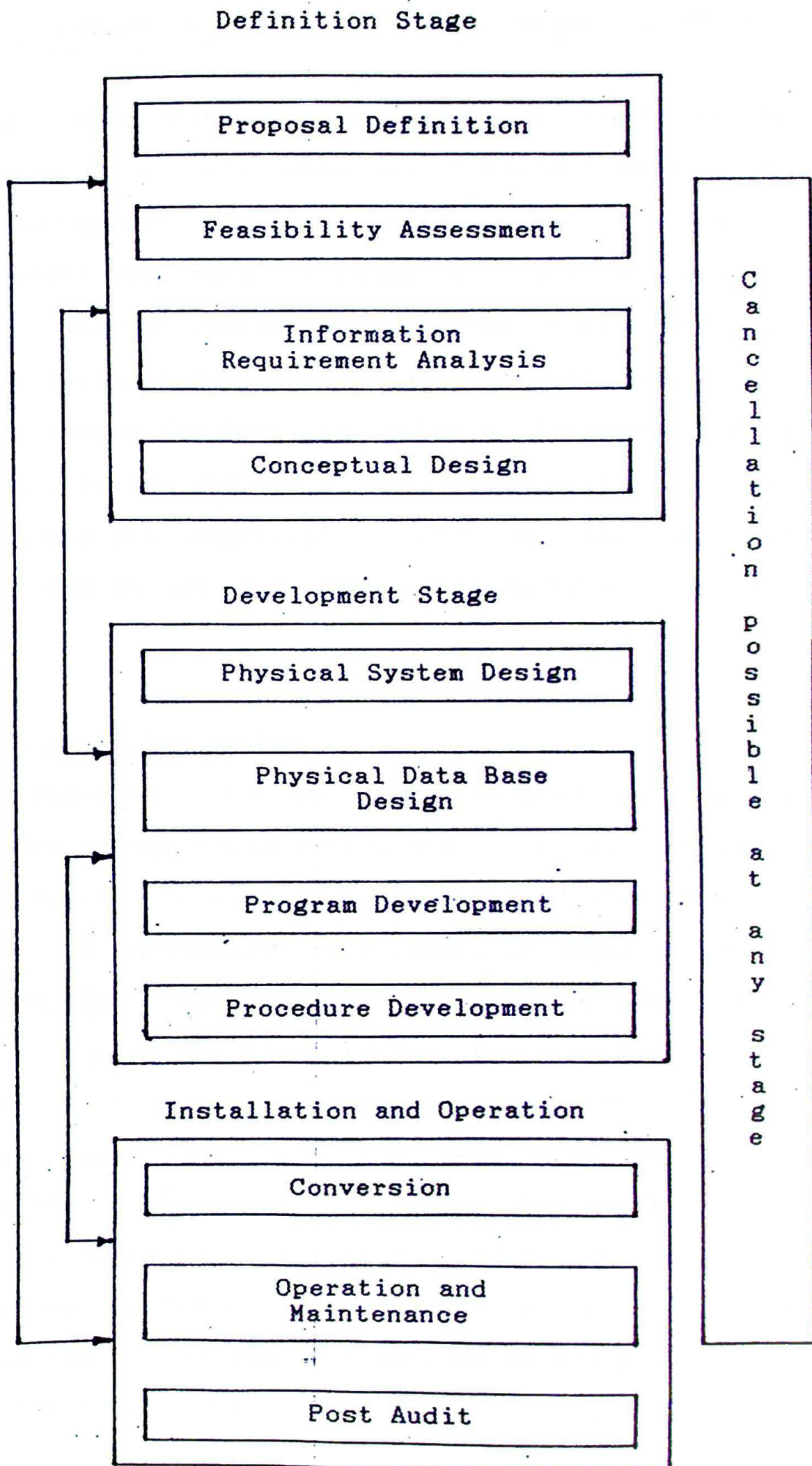


Figure 3.1.1 The application system development life cycle

After mentioning the ideas and concepts of system development briefly, we, now, draw out different approaches used for system development. There will be different approaches to system development. We, have, classified them into three appropriate groups - earlier approaches, rejected approaches and more recent and practical approaches. "Earlier approaches" comprises two approaches namely Top-Down and Bottom-Up Approaches. Rejected approaches includes the Individual Application Approach, the Data Base Approach and the Organization Chart Approach. More recent and practical approaches also has Prototyping and Contingency Approaches.

Top-Down & Bottom-Up Approaches

The Top-Down approach seeks to develop a model of information flow in the organization and to design the implementation of the system to suit this information flow. Modules are defined using the information flow model. In order to define the overall system plan, the top-down analysis approach begins by defining objectives of the organization, the kind of business it is in, and the constraints under which it operates. The activities are then identified. From the activities or functional analysis and the decisions to be made, the major information requirements are specified in fairly broad terms. The next step is to define the subsystems within the overall system. Major modules within the subsystems are defined as the basic unit for development. Priorities are then assigned to the modules, taking

into account the necessity to develop modules in order to take advantage of integration, for the data to be available to support each module, and for similar purposes.

An advantage of the top-down method is its very logical approach to the development of an overall plan. It focuses on the necessity for integration, careful coordination and planning.

The disadvantage of the approach is the fact that it is difficult to make such large-scale plans by factoring from the objectives and activities of an organization down to the information processing development modules. This method does not produce the order of module development that has the most organizational support. It is more difficult to assign cost and value to the system elements.

The bottom-up approach states that the way to develop an overall plan is to start with the operations modules for processing transactions and updating files and to add to it the planning, control, decision-making and other modules. The master development plan reflects the orderly implementation and integration of the modules. Generally, the evolution might consist of five stages.

The first stage is the separation of applications which are in support of operations. The next step is the integration of related files into data bases and the use of a data base processing and requests for reports. The next development might be the addition of decision models and planning models for the support of planning activities involved in management control.

The addition of various models might be followed by an integration of the modules into a model base having a wide variety of analysis, decision, and planning models. The last stage is that strategic planning data and strategic planning models are added to the information system. The data base becomes support modules for inquiry processing, ad hoc requests, management control, planning, decision activities and strategic planning. This method builds on the transaction processing and file updating capabilities that must be available for operations support.

An advantage of this method of approach is the lessening of the risk of having a very large-scale system which cannot operate properly. The disadvantages are that, this is difficult to integrate as closely as might be desirable. Delay in installing very desirable system will occur because the management in a particular area does not initiate the system request. There will be a need to redesign many modules as the system grows because the early system was not designed well enough to handle changes.

Of course, the system development process can be prepared using either method. Both these approaches have their place and each is a necessary consideration in any design effort. A distinction exists between an analysis of the decision making versus the productive process. It is possible to employ a combination of the two. The top-down approach may be used to define an overall structure and the bottom-up approach may be

employed in setting priorities and in developing and implementing the system slowly.

There are less well-known approaches to master plan development that are rejected as being inappropriate in most organizations. They are the individual application approach, the data base approach and the organization chart approach and a brief description of each will be given here.

The Individual Application Approach

The Individual Application development without regard to the integration approach might be used in situations where there is rapid organizational changes. This approach is ad hoc application and is not consistent with the idea of a management information system.

The Data Base Approach

The data base approach emphasized the data base and retrieval, manipulation of data from the database. The reasonable force for this method is impossible to anticipate the decision requirements and strategic planning requirements of management.

The Organization Chart Approach

In the organization chart method, the subsystems and boundaries are defined as the organization chart boxes. The difficulty is that organizations are transitory. The responsibilities held by one authorized person might be altered and

shifted to another authorized person, making this kind of information system easily obsolete.

Now, more recent and practical approaches to system development will be described. They are Prototyping and Contingency approach.

Prototyping and Contingency Approaches

Prototyping

Prototyping approach is used when requirements are difficult to specify in advance and when requirements may change during development. The strategy of experimental assurance in information system development may be succeeded by an evolutionary design method commonly called prototyping.

Prototyping is a very flexible system and is used when general nature of system is known, but system requirements may change during development. Prototyping allows modifications easily and quickly.

It is a difficult task for a manager to define the information requirements exactly. Few information systems provide what is really needed the first time. Indeed, people often have to develop two or three times before the ideal system is built. The fact that users often ask for changes once a system is in place suggests that defining the requirements needs to be a heuristic or learning process. This process allows for an iterative or evolutionary development process. Managers should work with the output of a system before massive development effort

goes into the final system. Using this learning process, the approach would provide for developing a model system¹. The manager should be allowed to change their requirements and temporarily use the system. Based on what they like or disliked, a new version of the system would be generated.

In the prototyping approach, the system designer identify the user's basic information requirements in terms of the system output and determine the availability of data. The basic needs can be computerized and the first version prototype system can be developed to build a functional interactive system. By using very high level languages, the prototype can be modified very easily and quickly. The prototype is delivered to the user as well as management. The user can use the prototype system and identify the problems. When changes are necessary, the system can be revised and enhanced to meet user's requirements by using learning process. At a later stage, the user can test the prototype system to refine the requirements again. When the user determines that the system is not useful, the working prototype is discarded. If the user is satisfied with the system, it becomes an operational prototype. It may be modified and distributed to other users. This process would be repeated until the users were completely satisfied.

In this approach, the user can get the experiences to understand the information needs and what the system works and

¹ JAMES C. WETHERBE, "EXECUTIVE'S GUIDE TO COMPUTER-BASED INFORMATION SYSTEMS", P.122

does not work to fulfil those needs.

Information system technology is now flexible. Online technology makes user interaction with the system more practical than it is with batch processing. The languages have improved and is continuing to improve. Database management systems allow improvement in data manipulation. Advanced system development techniques called prototyping exploit advanced technology to improve information system development. Most people like to solve the problems using the prototype approach. They like to have a rough solution, and iteratively shape the rough solution into a refined solution.

By using advanced technology, prototypes of information systems can reveal what a completed system will be like. Such a prototype can be easily and quickly created. Managements can test the prototype and determine what they like and do not like about the system. The prototype can be changed in response to management's suggestions. Users need the opportunity to discover their information needs by interacting with the system. Users can be satisfied if given the chance to test enough versions of the system¹.

Prototyping approach to system development is very successful, having developed several systems that way. It had only a few minor changes. The advantages of this approach are shorter development time, more accurate determination of user requirements, greater user participation and support, less

¹ Op. cit. P.123

threatening process to users, lower overall development costs when requirements changes frequently, the ability to get a functioning system into the hands of the user quickly, effective division of labour between the user and MIS professional, and, effective utilization of human resources.

The disadvantage is the management of the development process because of frequent changes.

Contingency Approach

Now the latest and modern approach to system development process will be described. This is contingency approach. The contingency approach assumes that the selection of the appropriate technique for management information system development depends on the situational factors. System development should surround a process to accommodate requirements changes. That application should provide accurate and complete reflection of user requirements. Application development strategies differ in their power to meet requirements. Once a strategy is selected, methods appropriate to it can be selected.

In the selection of an appropriate development strategy to assure correct and complete application development, there is uncertainty of requirements. There can have many uncertainties. Appropriate development strategy must be selected with considering all situations including uncertainty to become the most reasonable system development approach. There are no universal approach.

These are computer application approaches to system development process.

During the nearly four decades of experience with computer applications in businesses, we have seen the development of many and varied approaches to applications development. Maturity and successive technological advancements are responsible for the many changes in the concepts and ideas.

If a label has to be given to the computerization approach at MARDB, it could be called the Contingency Approach - where situational factors took precedence over the conceptual and other considerations user's requirements and situational factors more or less dictated the approach and the implementation at MARDB.

As in many of the developing countries, computer application in business organizations with proper system study started in Myanmar only around 1980. Because of later use of computer application system, studying and selecting the appropriate system development approach can be made for more effective system development.

3.2 PROBLEMS IN COMPUTERIZATION

A great deal of development activities in management information systems occurred around 1960s. However, a significant percentage of systems development was unsuccessful because of the failure to construct a system that met users' requirements. Those systems that were successful, were extremely late in completion time and were far over their budgets; in other words they were expensive in terms of resource utilization, and poorly suited for the intended users of the system.

Many different reasons were given for the failure of the systems, including the following:

- The analysts could not understand the problem completely or could not convey the problems to the implementors.
- The developers didn't orient the system to the end users who then rejected the system as being difficult to learn or difficult to use.
- The analysts didn't take the organizational environment into account in specifying the system, thereby leading to an unusable system.
- Analysts and developers were overly optimistic about the development time, development cost, and operational cost of the system.
- There were no intermediate steps during the project at which project management and customer would review progress

and determine the system status.

-The applications demanded the use of highly advanced technology which was often not generally available.

-There was little or no effective communication between the users and the development organization¹.

There is general agreement that a major cause of the failure of the system development is the lack of a systematic approach to information system design and development. Consequently, there is an outcry for a systematic approach to the specification, design and development of information systems.

Despite the systematic approach used by analyst in designing new systems, there are frequently major problems encountered in new systems. Problems and difficulties of computerized systems development experiences will now be considered and described.

(a) Human Resistance to Change

In one organization a well-defined system fail; a similar but poorly designed system in another organization succeeds. The reason can usually be traced to human factors. Employees who dislike and distrust a system can make a well-designed system fail; employees who want a system to succeed can usually make it work, even if the design is somewhat poor. Resistance may arise because of dislike of change, or it may be due to design features

¹ Peter Freeman and A.I Wasserman, "Tutorial on Software Design Techniques", (New York, The Institute of Electrical and Electronics Engineers, Inc., 1980), P. 25

which make the system an irritation to the operators or users.

Resistance to change is a common phenomenon. In some cases, the resistance is very small and the affected persons adjust quickly to the new system. But in extreme cases, the reaction can be subversion or destruction of the new system. The reason for this resistance is generally that change is threatening.

The following are examples of changes that can be threatening.

(1) Fear of loss of employment

Although the effect of introducing a new technology is generally to reduce effort and work rather than resulting in termination, some employees worried about losing their present positions.

(2) Fear of disruptive change in work groups

Work groups have been altered to suit the requirements of the new system, affecting employees' ability to work effectively and the existing social groups. Employees who have had coffee breaks together have received incompatible schedules. Individual interaction with adjacent work stations had been altered.

(3) Fear of inability to do the new job

Feelings of competence have been challenged. Employees

who have learned the routines and rules of a job found new procedures difficult to learn. Changes in computer technology are rapid and employees suffer fear of inability to catch the rapid rate of change in computer technology.

(4) Fear of not being needed

Employee status are often altered. Many employees derive status from the fact that they know how to do their jobs very well and have a wealth of information they have tucked away in their memories. Other employees at all levels including management come to them for information. Computer systems have changed this status; the long time employee has become the same as employees of less tenure and understanding. A manager may feel his or her status has been reduced and his judgment less valuable when decisions are programmed.

These fears are generally based on real or perceived effects that other new systems have had on friends or are reported in the literature. The reasons for resistance represent fear of what may happen. The actual event is usually less traumatic than thinking about it. In other words, uncertainty is a cause of increased resistance¹.

Another practical problem of computerization is System and Data Security.

¹ GORDON B.DAVIS, "Management Information Systems Conceptual Foundations, Structures, and Development", (New York, McGraw-Hill Company, 1974), P.425-426

(b) System and Data Security

It is a practical problem because the consequences of inadequate security can be serious. In computer-based information systems the concentration of processing and files in a limited area using a small number of operations personnel increases the risk from fraud, destruction, theft, etc. A continuing problem in information system management is therefore to provide adequate system and data security by such measures as:

- Computer centre access protection
- Terminal access security
- Data access security
- Special fire and theft provisions
- Off-premises backup for files and programs
- Provision for backup processing
- Internal and external audits¹

The failure of computer-based systems to perform the particular functions, may be regarded as a loss of security and may often lead to problems.

It is difficult to maintain complete security of any computerized system. The problem of security is, however, compounded when a single, comprehensive data base is made available to a wide variety of user departments.

Data security requires the protection of all information maintained in the data base. This security requires the data to be free from errors resulting from unconscious as well as

¹ Op. cit P.463

conscious or deliberate changes or mistakes. But the need for security is, in part, related to issues of privacy. A bank's data base, for example, must be secure enough to guarantee each depositor's right of privacy. Regardless of whether a system's security can be violated as a result of a criminal act or a simple accident, it is imperative that management information system include appropriate hardware and software to prevent such an occurrence¹.

The large number of possible cause of loss of security can be divided into accidental threats and deliberate threats.

Accidental threats may have their origins in shortcomings of system design, manufacture, or maintenance, or in errors and omissions in operation due to the lack of adequate training and supervision of operating staff.

Deliberate threats involve human intent, either by employees, authorized visitors or unauthorized intruders. The selection of appropriate countermeasures very much depends on what sort of person poses the deliberate threat.

As a further aid to systematic consideration of threats, the basic categories may be conveniently sub-divided by describing the primary effect of their occurrence as follows:

- interruption of data preparation, data communication etc;
- corruption of stored data etc;
- destruction of programs, storage media etc;

¹ Robert A.Stern & Nancy A.Stern, "An Introduction to Computers and Information Processing", (New York, John Wiley & Sans Company, 1982), P.481

- disclosure of personal or proprietary information;
- injury to personnel;
- removal of equipment and information.

Most of these classifications (accidental interruption, deliberate destruction etc) can be considered in relationship to the various elements that make up the computing system from hardware, program and data, to the environment, support facilities and even the organization itself. Of course, the occurrence of one threat, as classified above, may often lead to the occurrence of another, or it may be the first in a chain of events which presents a risk to security.

There are three possible consequences of a failure of computer security; the loss of:

- availability - the system will not be operational when required
- integrity - the system will not perform as intended and the data it holds and produces will not be accurate;
- confidentiality - control of access to the system will not be maintained. (e.g. unauthorised access to data is possible)¹.

(c) Lack of Integration

An early concept in organizational information system design was the total system in which the entire information

¹ Brain G. West, "Systems Controls-(NCC Systems training;6)-", (Manchester, The National Computing Centre Limited, 1984), P.17-19

system was designed as a single unified system. This concept has largely been abandoned, primarily because integrating the entire system was found to be too difficult and also unnecessary. Instead the idea of a federation of systems has gained currency. A current issue is still, however, the amount of integration that should be applied to the organizational information system¹.

There is frequent duplication of effort and a lack of integration among systems because each system is designed independently when using a traditional systems approach. As a result, top-level management is sometimes unable to obtain a total view of organization-wide operations. Management information systems minimize this problem, but they, too, have inherent disadvantages such as cost and excessive time required for design.

Since each system functions independently there are no organization-wide standards regarding computer applications. This problem, too, can be minimized by an integrated approach to systems design².

(d) Hardware Problem

Hardware problems can be classified into compatibility problem and upgrading problem.

One of the main problem not taken into consideration is

¹ GORDON B.DAVIS, "Management Information Systems Conceptual Foundations, Structures, and Development", (New York, McGraw-Hill, Inc., 1974), P.461-462

² Robert A.stern & Nancy A.Stern, "An Introduction to Computers and Information Processing", (New York, John Wiley & Sans Company, 1982), P.454-456

the hardware compatibility within an organizations and creating problems of integration. The high rate of advancement in computer hardware often creates problems.

When a considerable amount is invested in a hardware system, upgrading of the system become restricted to acquiring the new version from the previous manufacturer. If the appropriate replacements and modernization are not made to keep up with the advances in technology, the system may become isolated without hardware suppliers and replacement parts.

(e) Ineffective Communication

The most frequent cause for the failure of computerized systems to meet their objectives is inadequate communication between analyst and user.

There is often a lack of communication among the persons involved in the development of an information system and it therefore frequently led to difficulties in interfacing various steps, thereby complicating the testing and maintenance stages.

Efficient systems design requires effective communication between the analyst and the users. Users consist of both managers and operating staff. If the communication is poor, the system will not be followed, and the users will not follow the established structure.

The task of planning, designing, and implementing an information system to be used by management is often left to the

computer specialist, a person sometimes not skilled in the area of management and thus poorly equipped to understand the requirements of such a system. In addition, users, including top-level management, are frequently unfamiliar with information system concepts and thus unable to specify their needs¹.

¹ Robert A. Stern & Nancy A. Stern, "An Introduction to Computers and Information Processing", (New York, John Wiley & Sons Company, 1982), P. 481

CHAPTER FOUR

COMPUTERIZED ACCOUNTING SYSTEM DEVELOPMENT AT MARDB

4.1 DEVELOPMENT STRATEGY AT MARDB

As the agriculture sector in Myanmar accounts for about 40 percent of the Gross Domestic Product (GDP) and provides the main means of livelihood to over two-thirds of the population, the agriculture sector is comparatively the most important in Myanmar. In the agriculture sector crops occupy an important position contributing about 77 percent of the agricultural GDP¹. The strategy adopted for achieving further growth of this sector, therefore, is through crop diversification and extension of intensive production programmes. This would require increased supply of critical inputs such as fertilizers, agro-chemicals, seeds, draught animals and small agricultural machinery, as well as strengthening of agricultural support services. Expanded seasonal credit would facilitate increased supply of inputs, while more term credit would enable farmers to purchase draught animals and small agricultural machinery to carry out farm operations on a timely basis and increased cropping intensity. The integrated and sustained growth of the agriculture sector would require substantial expansion in the supply of credit to the sector and the adaptation and large-scale adoption of small agricultural machinery. This is the government's policy for the development of the agriculture sector in Myanmar.

The MARDB is responsible for implementing the policy at the township and village bank levels, for providing seasonal

¹ UNDP PROJECT OF THE SOCIALIST REPUBLIC OF THE UNION OF BURMA PROJECT, "Strengthening of Myanma Agricultural Bank"

credit and term loans to the agriculture sector. The major financing is for paddy. As mentioned in chapter 1.2, the government of Myanmar also had a desire to expand the capacity of MARDB to fulfill the needs of farmers for increased production. Based on the desire, the government invited the missions or consultants from UK, FAO Investment Centre and ADB. After making wide reviews on agriculture sector, ADB confirmed that technical assistance was actually required for MARDB to get effective and efficient performance mainly on delivery of credit to farmers. Accordingly the whole system of MARDB needs to be modified. Then, foreign experts - a MIS expert, a training expert, credit planner and an advisor on agriculture credit - were hired in 1985, and they conducted a preliminary survey. Expert's report on the findings said that "the organization of MARDB is centralized. The accounting systems and procedures are relatively old and need to be modified to suit MARDB's role in development banking. The credit requirements of the agriculture sector were growing rapidly. In order to meet the expanding credit servicing needs effectively, it is necessary to strengthen and upgrade MARDB's institutional capabilities." For that objective, the project to strengthen and further develop the institutional capabilities of the MARDB was started so that it could better cope with the increasing credit services required for sustaining and promoting growth of the agriculture sector.

One of the project's objectives is to strengthen and upgrade the institutional capabilities of MARDB through organiza-

tional re-alignment, streamlining of systems and procedures, training, staff development and modernization of equipment and facilities. To achieve this objective, it was felt that the MARDB must increase loan operations in seasonal, medium and long-term loans, and also increase the volume and number of clients, and maintain an efficient loan administration. The MARDB also needs a good management information system. Systems of records-keeping and provision of management information need to be changed and modernized. That would involve introducing new methods, management information systems and procedures, and better training capabilities for the staff. It must produce correct and timely information for taking proper control action. In order to overcome the existing problems, it was felt that the new system should be a mechanized system. The project therefore included the purchasing of electronic accounting machines for the head office. Three NCR Electronic Accounting Machines were ordered. However, on being informed of the non-availability of the originally specified NCR machines, MARDB decided to accept the offer of the updated NCR "Tower" computers. In reality, the introduction of computer systems was not originally considered at all. Computerization came as substitution for electronic accounting machines for the "Strengthening of MARDB Project."

After the decision to substitute computer in place of accounting machines the MARDB requested assistance from both the government and outside sources. A local Systems Analysis Team was formed for MARDB. Since all project's element cannot be developed

and implemented at the same time, priority was set. The MARDB planned computerization by two phases. The first phase is initial installation of computers in the head office and the second phase is to develop a computer-based management information system for the whole MARDB organization including the branches.

To develop the initial computerization in the head office, the foreign expert investigated MARDB's functions and defined the four areas for initial computerization. The MARDB's main accounting system was supported by other operational systems and these are interconnected. For supporting the long-term MIS of MARDB, the following priority areas were identified.

- (1) Accounting System
- (2) Loans Management System
- (3) Personnel Management System and
- (4) Budgeting and Budgetary Control System.

The MARDB's old accounting system was a manual system. Returns from branches are often late, with no reports to assist planning and control. There was duplication of work for accounting control and the unnecessary transferring of records from one subsidiary book to another. No timely information was available. It was therefore decided that a change from the present system to a computerized system would be very beneficial.

Secondly, the computer can be applied to loans management. In the manual system, there were numerous reports which dealt with the control of loan operations. These reports were of little value for control. According to the Expert's reports, they

gave misleading ratios in general and were delivered too late for any effective control action to be taken. A new computerized system could improve recovery of old seasonal loans and term loans in arrears. It can streamline term lending operations so that the MARDB can increase this type of lending without increasing the risks of high arrears. It can simplify operational monitoring and reporting systems to become performance oriented and timely. Management at all levels can quickly evaluate performance and take corrective actions to counteract any adverse trends. For the above reasons, the MARDB tried to computerize the loans management system.

Thirdly, computer could be applied in the budgeting and budgetary control system. Preparation of budget estimates, comparison of actual performance and budgeted amounts would be very simple by computers.

Next, the computer could also be used in the MARDB's personnel management system for updating the staff information which is important for promotion, retirements and transfers. Reports on existing staff strength and other additional required reports can be easily processed from the staff data base.

In the manual system, return-forms returned from branches and agencies are not uniform. The same data in different return-forms were sent to different departments. For example, monthly loans, monthly recovery returned from branches and agencies, were sent to both accounts and loans department in different return-forms. The MARDB attempted to overcome these

weaknesses. In the new computerized system, different department can get their required information from the computer database. Return-form from branches and agencies can be standardized and detail data entered into the computer database. The computer can then print out statements when required. The new standard return-form may be called integrated return-form. These return must contain common data used in accounts, loans and budget departments. This integrated system for database development is the first phase of the computerization master plan.

When the volume of loans get higher, the MARDB's credit management system will become more important and complex. Those data concerning loans, loans recovery and arrears must be updated at all times so as to make the decision-making as well as information reporting system more effective.

Plans are also being made for the direct connection between the head office and branches using the computer links. Detail data entries can then be made from terminals at the branches. Head office must have a main frame computer with terminals at the branches. The daily operations at the branches can be transmitted to the head office for updating the respective files. If this plan is successful, MARDB's management information system can be considered very modern and up-to-date. Loans information can be updated and processed to produce the required statements in time so that management can evaluate and take necessary action.

This second phase of the computerization is as visual-

ized by the foreign expert in the master plan. However, this phase may or may not be possible because of the realities of the situation at MARDB. Although the expert visualized this phase, there is some doubt that the management of the MARDB took this phase seriously.

4.2 THE COMPUTERIZATION OF ACCOUNTING PROCEDURES AT MYANMA AGRICULTURAL AND RURAL DEVELOPMENT BANK

The MARDB is different from other banks which deal with individual customer daily services - receiving deposits and disbursing cash. The MARDB is mainly responsible for the management of loan operations such as loan disbursement to and recovery collection from farmers through branch offices. Rather than being concerned with the operations of customer services daily, the MARDB has operations to carry out the general policy of the state regarding agricultural credit.

The MARDB's functions can be generally classified as Loans Management function, Finance and Accounting function, and Administration including Personnel Management function.

For each function there are transactions usually carried out by clerks at the lowest level. The management of each function is conceived to have three broad levels, the operations control of transactions at the bottom, managerial control in the middle and strategic planning at the top. The volume of work at the lowest level is large and its nature repetitive, whereas the contrast is true as we move up the management levels.

Loans management is the major function of MARDB and is concerned with the disbursement of seasonal and term loans to farmers through the branch offices. Loans are also collected through the branch offices. The transactions take place at the

various branch offices which report to the head office in Yangon regularly on the status of disbursements, collections, outstanding loans. Transfer of cash to the branch offices and from the branches take place regularly. The branch data are processed and analyzed for control information. Reports generated monthly for managerial control are statements of total loans disbursed, recovered and outstanding by type, state and division. In addition, reports showing loans, interest, penal interest for the whole MARDB, monthly status reports of interest, penal interest by state and division, and for the whole MARDB are prepared for management control activities. Reports showing loan amount, recovery amount and recovery percentage by state and division and by township are sent to the Ministry of Planning & Finance for strategic planning purposes. These reports are shown in appendix (page 130). Some of the managerial control information with data on external environment provide input for strategic planning of MARDB's activities for short-term and long-term.

The Finance and Accounting function is responsible for cash paying and receiving, accounting for it in accordance with Budgeting procedures, and determining its income and financial position. The activities are grouped into two subsystems: the Budgeting and Budgetary Control Subsystem and the main Accounting Subsystem.

The Budgeting and Budgetary Control Subsystem maintains accounts from vouchers and returns by budget heads to facilitate operational control to ensure that the payments are within the

budget allotted for each account head. Comparisons of budget and actual performance and their variances, preparation and submission of budget estimates and monthly cash flows to top management are management control activities. Information from the operations, future plans and guidelines from the ministry are used by the managing director's office to issue instructions and guidelines for preparing the budget and getting it approved.

The Accounting Subsystem covers paying and receiving of cash from business transactions, calculating paying, wages and salary at the transaction and preparation of Income and Expenditure Statement and the final accounts for MARDB at the management level and financial and Cost analysis at the top level.

The Administration Department of the bank, with the Managing Director at the top performs the personnel functions of planning, recruiting, assigning, training and control of employees. Maintaining and updating of employee records are the activities at the transaction level. The operations control must see to it that they are updated and error free. Assigning work, granting of casual leave are personnel management control activities: staff planning, recruiting, transfer and promotions are carried out by the top management.

The computerization at MARDB is generally planned firstly to transform the manual processing and operations control of transactions in the functional areas described previously and secondly to build an information system for managerial control and strategic planning. Thus it was designed as a federation of

subsystems of applications, serving different levels of management in the functional areas of Loans Management, Finance and Accounting and Personnel Management. Due to the nature of MARDB's operations with branch offices, and computer installation at Head Office, loans disbursements and collection transactions are manually entered and summarized at the branches and are then consolidated and processed further by computers at the Head Office for analysis and control.

The pyramid structure of management activities and the proposed computer application at each level are shown in figure 4.2.1.

The computerization plan as a federation of activities subsystems in the functional areas are also shown in figure 4.2.2.

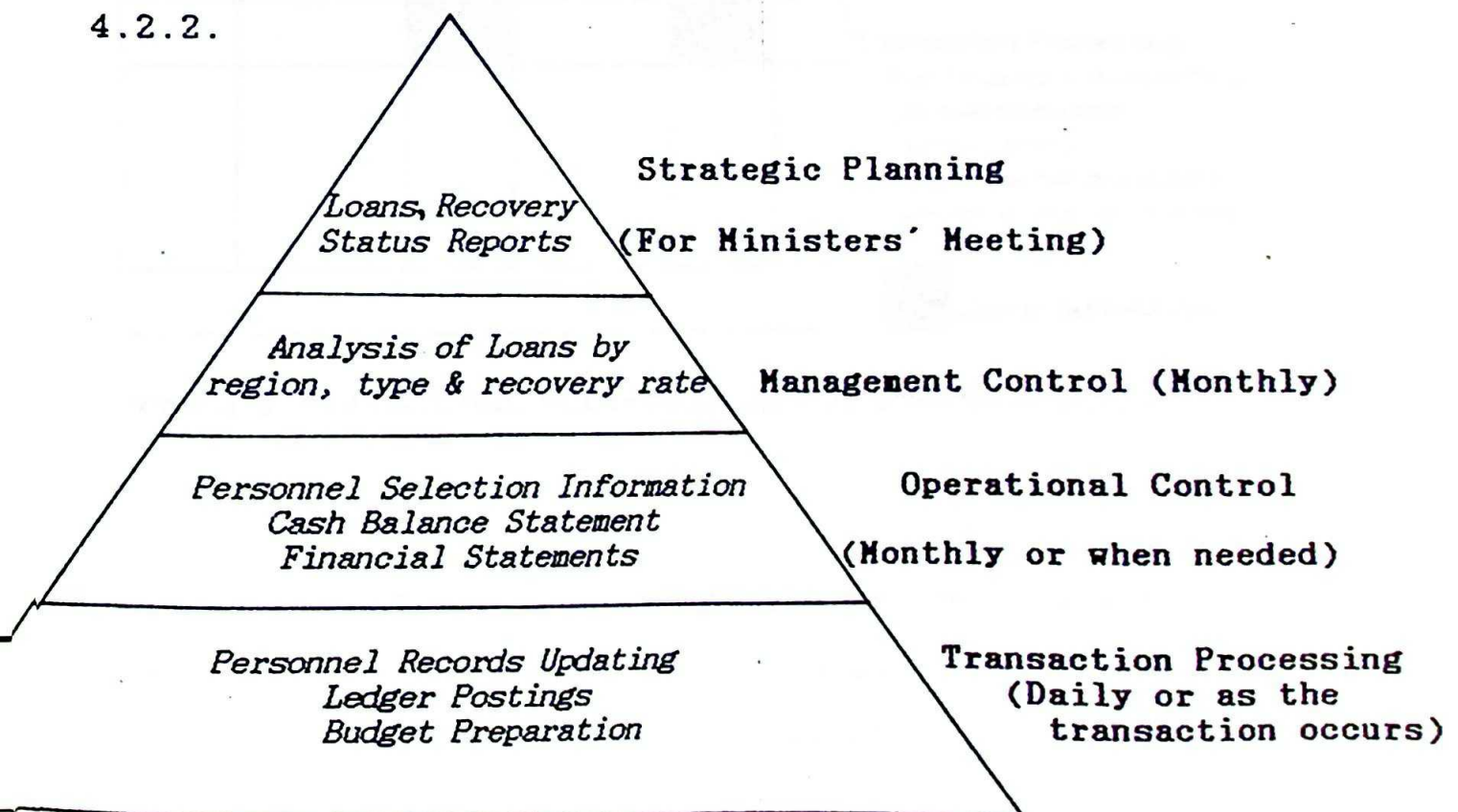


Figure 4.2.1 Pyramid Structure of Management Activities

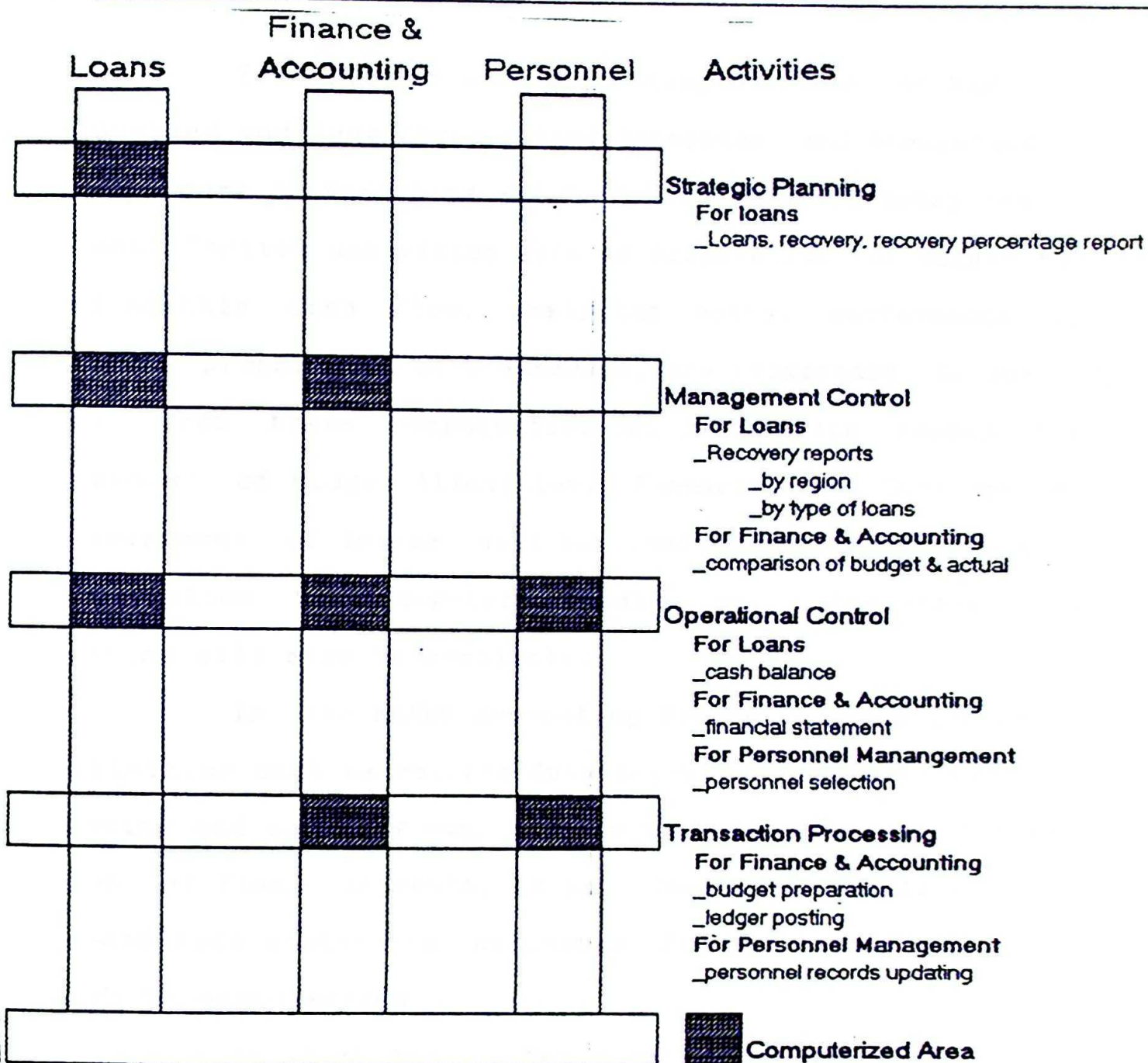


Figure 4.2.2 The Activities Subsystems and Functional Subsystems of MARDB

After computerization of the Loans Management, operational control information can be consolidated into totals of loans disbursed and loans recovered; analysis by region, by type, by crop and by customer can be made for management control of the loans function.

The Finance and Accounting function of MARDB covers Budgeting and Budgetary Control Subsystem and Accounting Subsystem proper. In Budgeting and Budgetary Control Subsystem, Operational Control activities such as preparation of budget estimate and monthly cash flow, analyzing actual performance against budget, preparation of statements, are programmed to use computers. From these computerization, information needed for the Approval of Budget Allocation, Financial and Cost Analysis and Measurement of income will be readily available. In addition, information for long-term, medium and short-term financial planning will also be available.

In the MARDB Accounting System, transaction processing activities such as returns data entry, voucher data entry, ledger posting and updating can be done by computers, and the preparation of final accounts, balance sheet statements and income & expenditure statements necessary for operational control will also be computerized.

In the Personnel Management Subsystem of MARDB, recording and updating of personnel data, reporting on staff strength and staff shortage, staff recruitment, promotions, transfers and retirements are planned for computerization. Reports produced by computers can be used for MARDB's management control activities such as workload per person, comparison of required and existing staff strength, analysis by region, and by department. Information on staff requirements of MARDB that will be helpful for strategic planning can be obtained also.

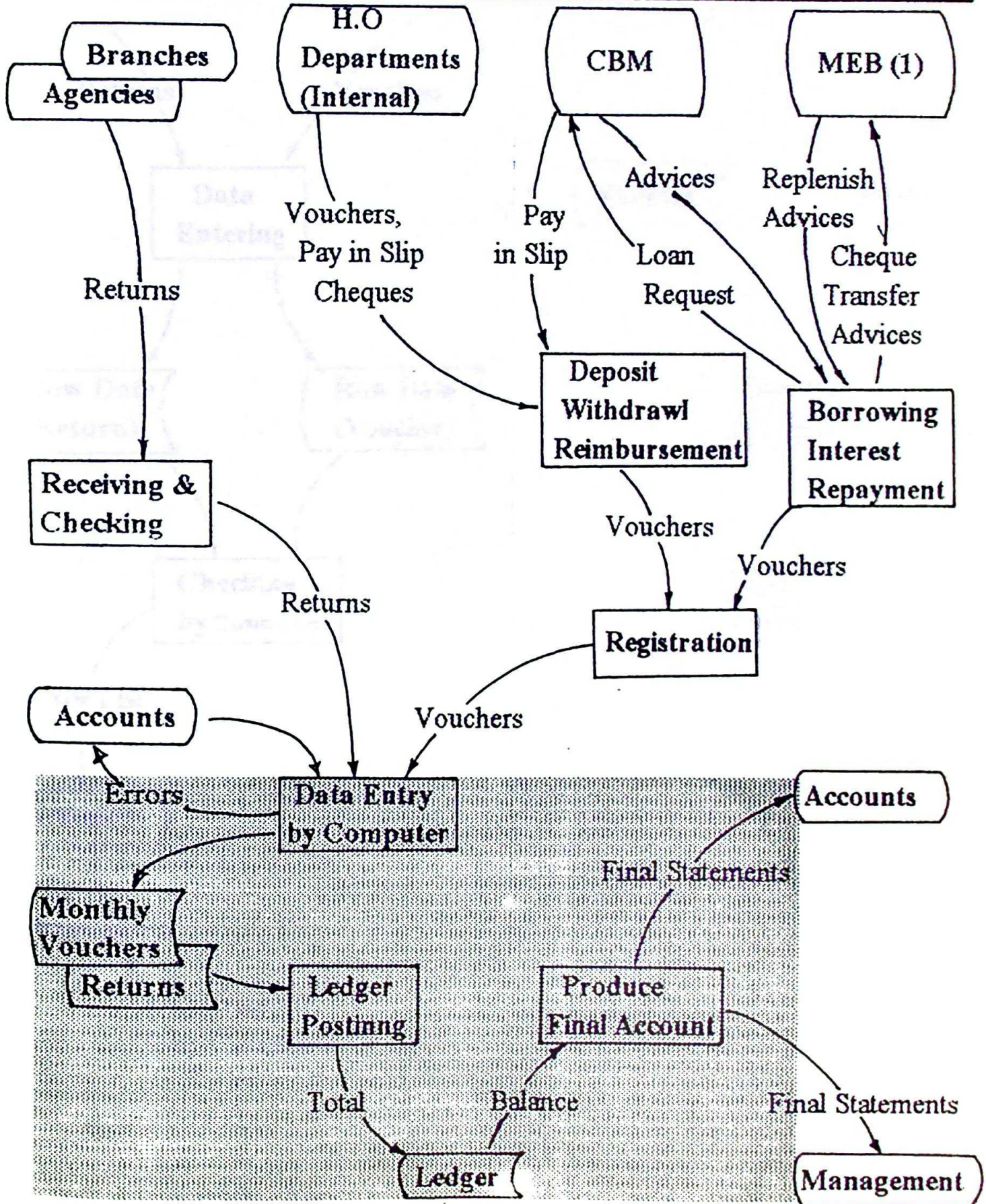
The MARDB's General Accounting Procedure and the Proposed Computerized Accounting Procedure will consist of three sub-processings. They are branch account processing, head office account processing and compilation. Branch account processing consists of entering return data sent from branches and agencies, editing, ledger posting, generating trial balance and day books, and producing income and expenditure statement. These transaction processings will be done with computer. Head office account processing consists of entering voucher data from head office (departments), updating, ledger posting, generating trial balance and day books and producing income and expenditure statement. These processes are to be computerized. Compilation consists of consolidating head office ledgers and branch ledgers, generating trial balance and day books, and producing income and expenditure statement and balance sheet. Final statements are sent to management to provide information for management planning and control.

In the MARDB's Computerized Accounting System, returns and vouchers are source documents. These documents sent monthly in large volume, will be processed by a series of programs. the MARDB's Computerized Accounting System is planned for batch processing. Data will be captured in hand written documents such as returns and vouchers sent by mail or telegram. Data transcription is from source to tape or disk for computer processing and preparing reports for management. The most common tasks will be entering data, editing, updating and report generating.

A view of the general procedure of the MARDB Accounting

System and the relationship to proposed Computerization, Procedures for data entry, ledger posting and final account preparation are shown in figure 4.2.3, 4.2.4, 4.2.5, 4.2.6.

Figure 4.2.3 General Procedure and Proposed MARDB Accounting System



Computerized Area

CBM - Central Bank of Myanmar

Figure 4.2.4 Data Entry

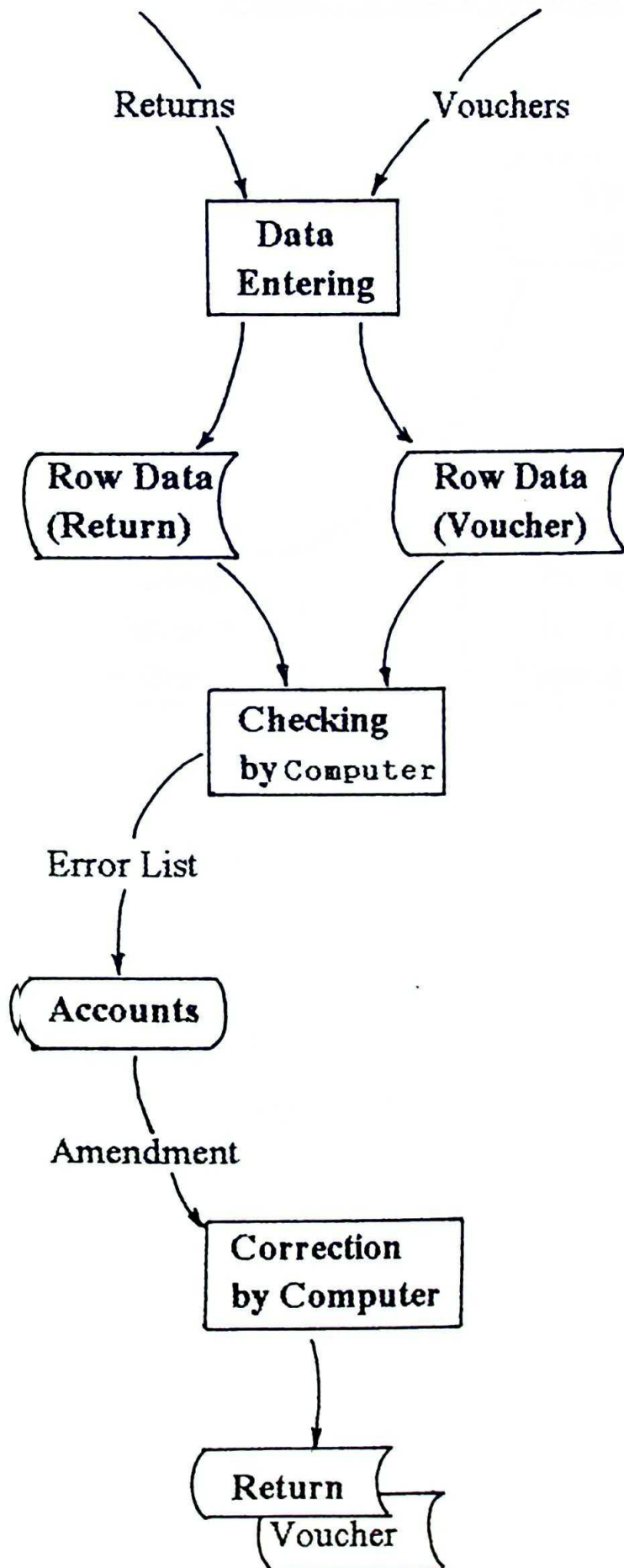


Figure 4.2.5 Ledger Posting

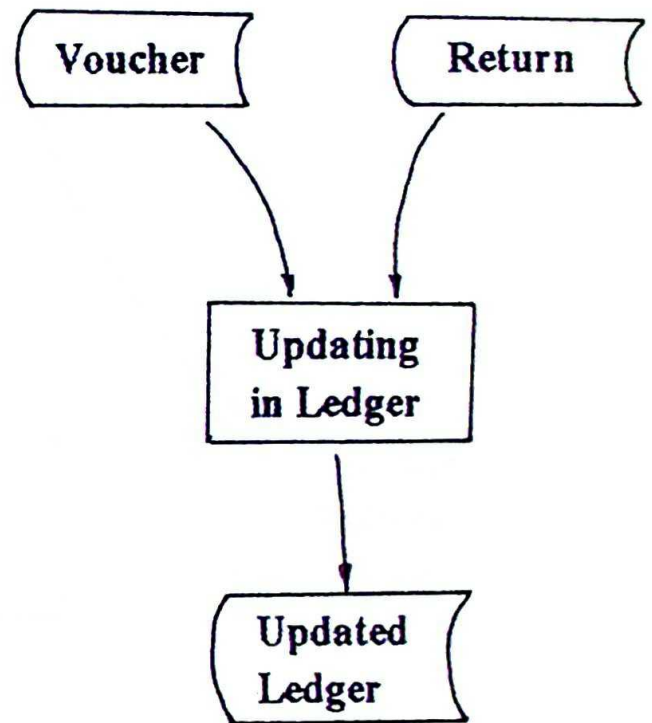
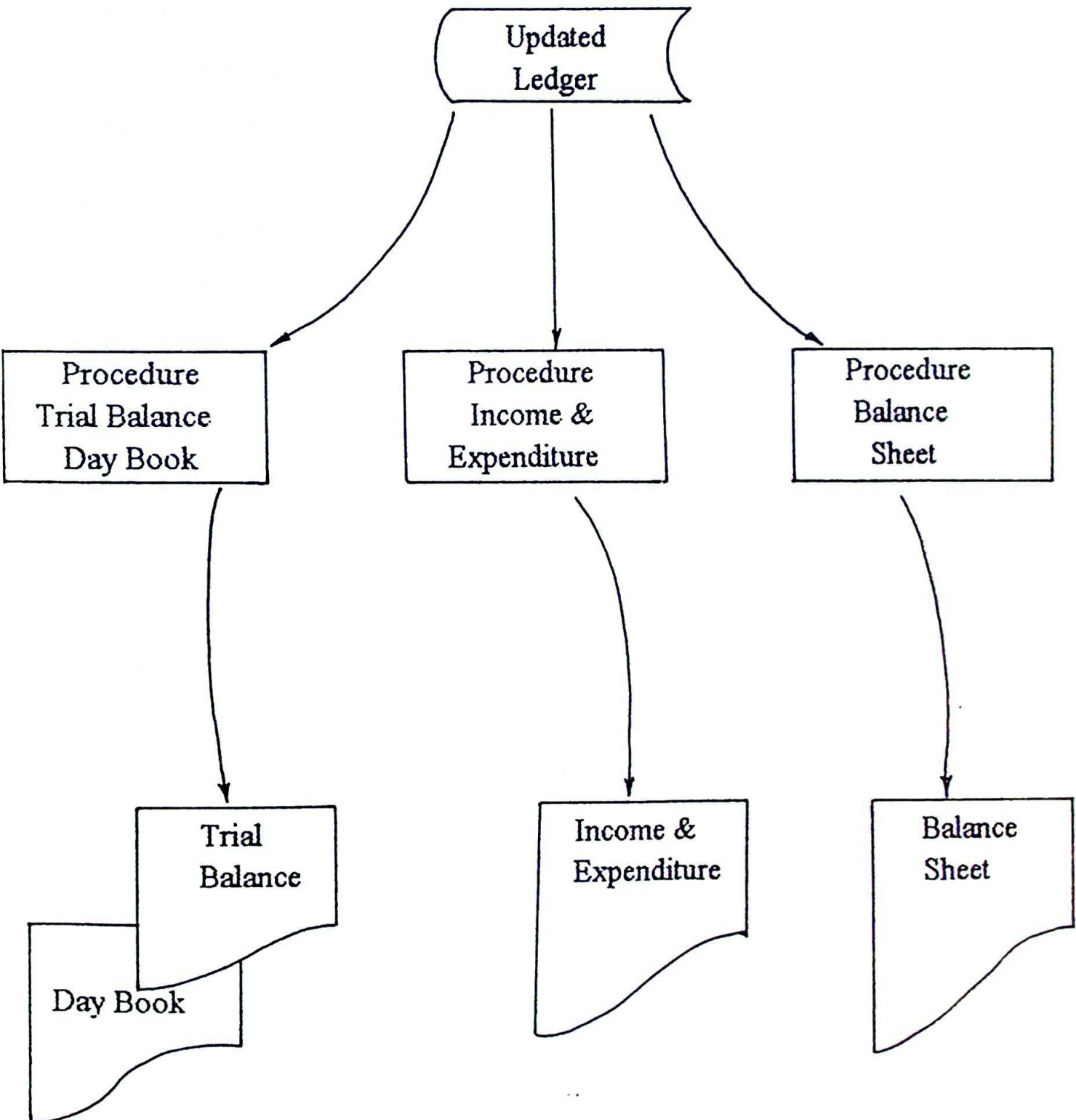


Figure 4.2.6 Procedure for Final Account



4.3 IMPLEMENTING THE COMPUTERIZED ACCOUNTING SYSTEM AT MARDB

In the implementation stage, the proposed system moves from a theoretical system into a living-working system. It begins with a preliminary study in March, 1985 and ends with a work computerization in September, 1985.

The preliminary survey was carried out with the assistance of a foreign expert. It was felt that a management information reporting system would need to relate the information needs of the organization, to the operational necessities (i.e. the loan processes) and that persons responsible for carrying out activities should also be part of the information network. In the old system, management reports could reveal very little useful control information to management and were not timely enough for effective actions. The three NCR Tower computers ordered in place of NCR accounting machines formed the initial step in the MARDB computerization. Thus the management of MARDB had to start with the potentials of the NCR Tower computer for its computer applications.

Three NCR Tower computers - two high performance Tower XP and one Mini Tower - arrived in 1986. Their operating systems are "UNIX system," and the available ready-made packages are Multiplan for preparing worksheets, Wordmarc for word processing and Ingres for file handling. Some software were also developed by the MARDB in-house programmers. Hardware installation and

testing was done by NCR (Thailand) and operating systems installation was done by NCR (Philippines).

The subsequent detail study of the four areas identified for computerization was carried out by the MARDB in-house Systems Analysis Team under the supervision of a local consultant. A contract was signed with Universities' Computer Centre (UCC) now the Institute of Computer Science and Technology (ICST) and it was given the responsibility of conducting the detail study and training of the staff. The local consultant from UCC became a supervisor for the detail study. A computer section was created with a section head who was a manager of budget department and two systems analysts. They had been trained in Systems Analysis and Design (SAD), COBOL programming, at the Central Statistics organization (CSO) under one of the UNDP computing development projects.

Trainees for computerization development was selected using NCR Tower Standard test. Anybody with 2 years universities' mathematics training was qualified to take the test. Thirty-five selected candidates were given the training in Electronic Data Processing (EDP) concepts. Twenty-one were selected for further training in Programming Languages and Software Applications. Programming Languages are Structured COBOL and BASIC, and software packages are Wordmarc for wordprocessing and Multiplan for preparing worksheets. Then, twelve were again selected and trained by the expert from the Philippines, in UNIX operating system and UNIX system administration. From these trainees,

finally, two programmers and two system administrators were selected for the implementation work in association with Systems Analysis Team.

Under the supervision of the local consultant, the Systems Analysis Team carried out the investigation of old manual system, the design of the new logical system and the new physical system and the implementation of the new computerized system.

Firstly, from the predetermined four areas, the team first took on the investigation of the accounting system. Weaknesses and difficulties were determined and a new logical accounting system was designed. The Systems Analysis Team and the consultant visited some of MARDB branches and investigated the data collection process. The complexity of data collection was observed in some selected branches. They decided to standardize the three return-formats in use to a single form. The new general accounting procedures and the detail procedures were designed, and presented to the management in April 1987 and was approved after a few alterations.

Subsequently, an implementation schedule was drawn up by the consultant and approved by the management. The tasks of implementation was done by Systems Analysis Team. The structured chart for computerized accounting system was also prepared by Systems Analysis Team. Specifications for each file were also drawn up. A Chart of Accounts, and a coding system was determined. The accounts-heads used at MARDB had to conform to the Budget department, of Planning and Finance Ministry specifica-

tions and therefore the Chart of Accounts was also the same.

Throughout the various stages of implementation, discussions were held between Systems Analysis Team and management at appropriate times to present problems and find solutions. Approved physical system design specifications were later submitted to the management.

In the mean time, computer hardware and the necessary communication links were installed and tested to ensure that they were functional and ready for operation. Training of programmers and operators was also completed. At this stage, it could be said that things were ready for program development.

A computerized accounting system needs inputs which are processed to produce outputs. In the MARDB, system inputs are monthly returns and voucher forms. The validation of input data is made manually and by computer. Validated data is stored in three input-files namely voucher files, return files and ledger files. Input data editing is made manually on screen and an error-list for checking is produced. Program list and functions are described in Fig 4.3.1. The programs are Data Entry Programs, Data Correction Programs, Ledger Posting Programs, Monthly Status Report Generation Programs, written in COBOL programming language. All these programs are developed by the MARDB in-house programmers and tested individually. After being tested individually, and approved by the consultant, they were combined into an integrated one. Linkages between programs as outlined in the system specifications were developed, tried, and corrected for

the smooth running of the system. All programs are tested in groups as part of the complete system. Having completed the system testing, the conversion from the old manual system to the new computerized system was completed.

The new computerized system at first ran parallel with the old manual system. The parallel running means that the processing is performed manually as well as by computers. As both old and new systems use the same data to produce outputs, results or outputs must be the same. If the outputs are not identical, corrections are made. The last stage is the cancellation of the old system, and finally only the new computerized system is in operation, and the implementation of computerization is considered at an end.

For the actual running of the new system, training is also provided for computer operators most of whom are from the accounting department, who do most of the data entry work.

Computer data entry is done by about fifteen personnel at the head office - six from accounts department, eight from loans department and one from budget department. About twenty people including three management person had been trained in computer programming. The General Manager, the Assistant General Manager and Department Managers, at the head office, regularly use statements and reports produced by computer for management and operational control. Although the second phase has not started, the staff of MARDB head office as users of the systems and some as operators, programmers and analysts have functional

knowledge of computer system.

Figure 4.3.1.List of Programs

Name	Function / Purpose	Input	Output	Frequency
1.Data Entry				
1.1	Enter voucher Data	Vouchers	Voucher file	Monthly
1.2	Enter return Data	Returns	Return file	"
1.3	Enter opening data for ledger		ledger file	Yearly
2.Data correction				
2.1 Voucher Data				
2.1.1	Create Indexed voucher file	Sequential Voucher	Indexed Voucher	Monthly
2.1.2	Data correction	Indexed Voucher	Indexed Voucher	"
2.1.3	Create Sequential	Indexed Voucher	Sequential	"
2.1.4	Create the Day book	Sequential Voucher	Daybook(Each A/c head day by day)	"
2.2 Return Data	Return data correction	Seq. return file	Seq. return file (monthly return format)	"

Figure 4.3.1 (Continued)

Name	Function/Purpose	Input	Output	Frequency
3. Ledger posting				
3.1	Create Indexed ledger File	Seq: led: file	Ind: led: file	Monthly
3.2	Ledger Updating	Ind: led: file Ret: (or) Vou: file	Ind: led: file	"
3.3	Create seq: led: file	Ind: led: File	Seq: led: file	"
3.4	Create Trial Balance	Seq: led: file	Trial Balance	"
3.5	Create Day Book	Seq: led: file	Day Book (Each Group by A/c head)	"
3.6	Combine the group led:	led: files	Combined led: file	"
3.7	Create the Balance sheet	Combined led:	Balance Sheet	"
4. Generate Income/Expenditure report				
4.1	Create Ind: led: file	Inc/Exp ledger	Indexed	"
4.2	Updating	Ind: led: Ret (or) Vou.	Ind: led	"
4.3	Create Seq: led:	Ind: led:	Seq: led	"
4.4	Generate Inc/Exp Report	Seq: Led:	Inc/Exp Report (required)	Monthly
5. Generate Status of Monthly Report				
5.1	Generate report by A/c code	Return File	Report (DB Format)	
5.2	Generate report by summary			
5.3	Generate monthly return by each township	Ret: File	Monthly Ret: (for audit checking)	"

CHAPTER FIVE

ASSESSMENT

5.1 SPECIAL PROBLEMS AND DIFFICULTIES OF IMPLEMENTING THE COMPUTERIZED SYSTEM AT MARDB

In developing any new system, problems and difficulties are generally found in every organization. Problems and difficulties found in implementing the new computerized systems at MARDB may be classified into three groups. They are computer system factors, internal or organizational factors and external or infrastructure factors.

COMPUTER SYSTEM FACTORS

Difficulties of computer system factors which are encountered in implementing the computerized system at MARDB will be described first.

(a) Hardware-first Approach

MARDB as one of the government organizations, was computerized as part of the "Strengthening of MARDB," a UNDP project. As mentioned in Chapter 4.3, the MARDB received the NCR Tower computers in substitution of NCR Accounting Machines which were originally ordered as part of the "Strengthening of MARDB" project. As such MARDB did not have the full opportunity of choosing computers more appropriate and suitable for the nature

of MARDB's operations. As a result MARDB had to make the best use of the computers it received.

(b) Installation Problems

This problem is the result of the Hardware-first approach. The NCR Tower computers are very special and to install these computers, services of foreign experts were needed. Although hardware facilities were ready for installation, because of the time waiting for the foreign expert, the installation took longer than necessary. If the computers were those widely used in Myanmar, the installation could have been accomplished easily and quickly with local expertise.

(c) Incompatibility

Tower computers are not compatible with computers used widely in Myanmar viz. IBM Micro computers and IBM main frame computers. IBM 4381 main frame, installed at the CSO under the Planning and Finance Ministry, supports other government organizations for all their computerized jobs. However MARDB (and also MFTB) though under the same Planning and Finance Ministry, cannot use this service because NCR Tower Mini computers were installed in these two organizations.

Computer compatibility can be at three levels. First is data compatibility i.e. data stored in a computer storage media

can be accessed by other computers directly or through telecommunication. NCR Tower and IBM computers have different disk or tape formatting facilities and are therefore not compatible. NCR Tower Operating System is "UNIX" system and IBM is Disk Operating System (DOS). The data stored in NCR Tower can be accessed by IBM computers only through interface programs. This task is not an easy one and the MARDB in-house programmers do not have the necessary skill. So, data stored in NCR Tower computers can neither be read nor written on IBM computers.

The second is software compatibility. Software compatibility means, the software which can be run on one computer can also be run on another computer. Software which are used on NCR Tower computers cannot be used on IBM computers. IBM has many types of ready-made software; wordprocessing, spreadsheet preparation and database, and there are many packages for each type. They are very powerful, user-friendly, and very widely preferred and more available in Myanmar. But they can be run only under Disk operating system (DOS). Therefore the MARDB was limited to those software which can be run under "UNIX" operating system.

The third is Hardware compatibility. If hardware devices such as input devices, output devices, storage devices etc. can be used in other computers, it is said to have hardware compatibility. NCR Tower hardware devices are not compatible at all with IBM. Hence MARDB cannot use hardware spare parts that may be available at other organizations using IBM computers connected to IBM main frame.

(d) Maintenance Problems

The MARDB do not have hardware maintenance yet. Engineers in Myanmar are trained to repair and maintain IBM computers. They are not familiar with NCR Tower computers. MARDB do not have in-house engineers who are specially trained for NCR either. The contract signed with foreign experts do not cover maintenance of NCR computers.

INTERNAL OR ORGANIZATIONAL FACTORS

(a) Initial Data Preparation

Initial data preparation is very important for the success of a computerized system. In developing the MARDB's personnel management system, programs were already written, tested and approved by the consultant. The MARDB's tailor-made personnel management system was installed into NCR Tower computer. However this system cannot be successfully used because of initial data preparation difficulties. Staff records in the old manual system are found to be not updated at this organization. So, personnel data had to be collected again. They were verified before coding. These steps involved a lot of time, taking up the longest duration in the computerization work.

Data stored in computers must be updated regularly. Even after the programs were ready for producing reports for

management, it was found that the computer-based personnel management system was not used. Managers are used to preparing required reports personally and manually. The reason may be the protection of their role, in matters of transfers and promotions, usually a powerful one in most government organizations.

(b) Frequent Changes of management

Management changeover occurred frequently at MARDB. Matters of importance like computerization were decided by the very top man (only one MD) in most government organizations in Myanmar. And because that top management changed quite often at MARDB, frequent changes (Five times between 1985 and 1992) were made in the system. In computerization, software upgrading, hardware upgrading and staff skill development must be planned to modernize and keep the system compatible with the technical advancements. The frequent changeover of top management created a lack of continuity and sometimes interest in the computerization programme. Management changeover is one of the difficulties in the implementation of the computerized system at MARDB.

(c) Human Resistance to Change

The success of information system design, implementation and operation are directly related to human factors such as resistance to change and man/machine interfaces. People with no

technical knowledge often wanted to continue with the old manual system. They are not familiar with computers and have a distrust of computers. This is the generally found human resistance to a new technology. At MARDB, top level management's support was very good although at the middle-level management there was some resistance. Those people who have learned the routine and rules of a job found new procedures difficult to learn. Also some may feel their status reduced when decisions are programmed and less dependent on individual judgement. Reluctance to change the manual system to new computerized system may also be due to the general attitude of government employees who avoid risks and changes. There were some indications of fear of unemployment.

During the preliminary survey at MARDB by foreign expert, this human resistance factor was not apparent because the middle management level officer attached to assist the foreign expert was personally very willingly to change the system. During the project formulation phase the foreign expert interviewed some of the staff who seemed very willing and responsive.

During the detail study interviews by the SAT and the consultant in the planned areas they found no reason to expect resistance.

In the actual designing of the new system however there was found to be much resistance to the change. In the manual system, payroll format was slip report format. In the computerized system, the slip report was changed to columnar report format. Monthly returns from branches and agencies were

many and for various departments. It was decided to change to the integrated uniform return format. Also accounting procedures were redesigned to fit the new computerized system. Some middle-level management did not seem convinced of the benefits of these changes.

EXTERNAL OR INFRASTRUCTURE FACTORS

Other problems or difficulties which cannot be controlled by MARDB will be mentioned now. They are Power failure problem and Inadequacy of Myanma communication system.

(a) Power Failure Problem

Computers are electrical data processing machines and electricity is essential to run the computers. Without electricity computers can do nothing. Electricity must also be stable for computer use. In MARDB, as elsewhere in Myanmar, electrical power failures occur frequently and consequently target dates cannot be met. Computer outputs, reports, statements and enquiry responses, are often too late for management decision-making. Hence, management cannot evaluate the performance or make important policy-decisions, and take control measures in time.

At MARDB Uninterruptible Power Supply (UPS) is used to protect the data loss within a certain duration of power failure. This duration depends on UPS's capacity. UPS can automatically

control current running operations of computers during the electrical power shut-down for a certain short period of time. To solve this power failure problem the MARDB can buy generators. If no provision can be made for such power failures, there would be many problems for a computerized system. Back-up manual procedures are still needed to produce the required reports and this can be very costly.

(b) Communication Problem

Myanma communication system as it exists today is not adequate. Communication must be effective for the success of a computerized system. In the MARDB computerized system, source data is received from regional offices for processing to produce required outputs for users. These outputs must then be sent to the information user. Now, as Myanma communication system is not good, source data are received late and processed outputs are also out of date. Only processing of input to output is done by computers very quickly and accurately. The collection of data and the distribution of information depend on the communication system. In the present MARDB system, computer output are used at the head office only. If output is to be distributed to other regional office, communication system will be very vital. The communication system of Myanmar is of course not under the control of MARDB, but it has grave effects on its computerization effectiveness.

(c) Experts' Unfamiliarity with Real Situation of Myanmar

The Management Information System expert from UK was not familiar with Myanmar and was not able to provide for the real conditions such as the failures in the communication system and power supply system in Myanmar. So in implementing the new system, his predetermined target dates could not be met. It may be said that choice of equipment (computers) was the basic fault.

In planning for computer hardware, present and future operational plans, data flows and information requirements of the organization must be investigated. Proper system capabilities such as hardware, software, printer, disk and etc. must be planned to meet the organization's present and future requirements. And then only the optimum configuration should be decided. However, the original assignment was only to upgrade the MARDB's operations and did not include computerization. But as NCR Tower computers became available in place of the NCR Accounting Machines, computerization was adopted without real planning.

The problems and difficulties discussed above are from personal observations during close association with the staff of MARDB, and from personal interviews with some of middle-level management and conversations with MARDB in-house Systems Analysis Team.

5.2 THE COSTS AND BENEFITS OF COMPUTERIZATION

The main objective of developing a computerized system is to produce an alternative system which is more efficient and effective for the organization. For any computerization project, it is a generally accepted procedure to determine the costs and benefits of computerization and to decide whether it is actually beneficial for the organization or not and whether it actually contributes towards the objectives of organizations or not.

To be able to evaluate the acquisition, installation or development of computer equipment and software, and to measure the extent of improvement in the organization's information system, one needs a clear picture of the costs involved. To further judge the efficiency of computer hardware and software, and to determine whether a change in the system is indeed an improvement, and to justify a proposed system as being worth the considerable expenditures envisaged, one needs to define and measure the resulting benefits¹.

It is not easy to make a cost/benefit analysis of computerization at MARDB, because all computerization projects in Myanmar more or less introduced a completely new technology into the country. In most developing countries' experiences, computerizations initiation steps or boot strap effort in introducing a

¹ C. Warren Axelrod, "COMPUTER PRODUCTIVITY: A Planning Guide for Cost Effective Management," (New York, Wiley-InterScience Publication, 1982), P.61

new technology, costs of computerization are high and obvious and resulting benefits are not so obvious and often not realized. Benefits are sometimes mostly intangible.

To utilize the cost and benefit method for analysis and evaluation, it is neither sufficient nor adequate merely to list costs and benefits and so numerical values should be given to each item. However some factors may not be quantifiable. It is useful however to characterize costs and benefits according to their most significant features. Some useful ways of classifying the costs and benefits for computerization are to classify them as to whether they are Tangible or Intangible, Direct or Indirect and One-time or ongoing.

The most important segregation of costs and benefits is the separation into tangible and intangible components. Tangible costs and benefits are those which can be readily identified and measured. Tangible benefits are measurable reductions in costs. Intangible or less tangible costs and benefits are those which are not so readily identifiable or measurable¹.

Costs and benefits can be classified differently depending on whether they are deemed direct or indirect. For a particular activity, direct costs and benefits are those that can be attributed directly to that activity. Indirect costs are costs that are incurred external to a particular activity. However, since the activity utilizes some part or aspect of those resources, the cost of those indirect resources can be partially

¹ Op.cit P.63

attributed to computing activities. Similarly, indirect benefits accrue to some activities and are charged for such indirect services on an allocation basis¹.

Whether a cost or benefit occurs once or recurs is an important factor in the evaluation of different activities. The cost of developing a system is essentially a one-time outlay whereas the cost of running the system in production mode and maintaining that system is ongoing and involves costs that continue well beyond the point at which the system is implemented. Generally, one-time costs and benefits occur in the near term, except for longer-term future, one-time costs may result from anticipated conversion from one mode of operation to another. Ongoing costs and benefits, on the other hand, are usually incurred year after year or month after month².

Now, an attempt will be made to describe the costs and benefits of computerization at MARDB. Intangible factors, as it is not easy to measure and calculate, will be mentioned for broad considerations and discussion. The costs of computerization at MARDB will be divided into one-time costs and ongoing costs. The costs of developing the computerized system at MARDB, from the point of starting the project to actual operation, can be called one-time costs and the costs for maintaining the computerized system from the actual operation can be called ongoing costs. The one-time costs at MARDB can further be divided into tangible or

¹ Op. cit P.68

² Ibid P.82

intangible and direct or indirect costs. Most of one-time cost are direct and tangible costs, that are usually incurred in the computer unit or department. They are

- (i) Hardware cost,
- (ii) Software cost,
- (iii) Manpower cost (Personnel cost)
- (iv) Environmental cost and
- (v) Other costs.

Computer hardware description for MARDB and their costs is shown in Table 5.2.1. Total hardware costs amounted to US\$ 92,498.

Computerization costs at MARDB, separated into hardware costs and software costs, together with descriptions is shown in Tables. The costs incurred are either in dollars or kyats and they will be shown separately in each case without attempting to convert the dollars to kyats for arriving at total costs.

Sr.No	Model	Description	Qty	Unit Cost (US\$)	Total Cost (US\$)
1	3400-2119	High Performance Tower XP 2 MB Main Memory 45 MB Fixed Disk Drive 45 MB Streaming Disk Drive 1 MB Flex Disk Drive	2	22- ,767	45,534
2	7901-0101	CRT Terminal 2000 Char Display Detached keyboard	6	950	5,700
3	6442-0102	125 LPM System Printer 80 CPS Near Letter Quality Bit-Image Printing UPGRADE	2	3,950	7,900
4	3450-F865	85 MB 2nd Fixed Disk Drive Fits within Tower XP Cabinet 2nd Fixed Disk Support	2	6,380	12,760
		Total CIF, Yangon			71,894

Table 5.2.1. Hardware Description and Costs

Sr.No	Model	Description	Qty	Unit Cost (US\$)	Total Cost (US\$)
1	3450-0402	Mini Tower with 1 MB Main Memory 45 MB Fixed Disk Drive 45 MB Fixed Disk Drive 45 MB Streaming Tape Drive Battery Back-up	1	16,200	16,200
2	7901-0101	CRT Terminal 2000 Char-Display Detached Keyboard	2	950	1,900
3	6411-1561	120 CPS Matrix Printer 132 Column Printing Serial Interface 2 KB Buffer Paper Guide	1	1,426	1,426
		Cables for the 3 NCR Tower Systems	11 PCS	98	1,078
		Total CIF, Yangon			92,498

Table 5.2.1. (Continued)

Software can be divided into Ready-made and Tailor-made software. The ready-made software used in NCR Tower computers at MARDB together with costs are shown in Table 5.2.2.

Title	Description	Value(US\$)
UNIX	Operating System Software	5,039
Wordmarc	Word processing Software	3,763
Multiplan	Spreadsheet Software	924
Ingres	Database Software	2,601
COBOL	Programming Software (Common Business Oriented Language)	2,072
BASIC	Programming Software (Beginner's All Purpose Symbolic Instruction Code)	1,689
	Total Ready-made Software Cost	16,088

Table 5.2.2 Software Description and Costs

Tailor-made software planned for development at MARDB are for applications in the Accounting System, loans management system, Budgeting & budgetary control system and personnel management system. All systems except Budgeting & budgetary control system have been developed. They were written by MARDB

in-house programmers. Two System Analysts work with two computer System Specialist, and took charge of computer systems administration and supervision of programmers. These costs are included in the manpower cost for development of the ready-made software.

Direct manpower costs will be also mentioned. One MIS expert was hired for preliminary survey and feasibility study. One local consultant and MARDB in-house Systems Analysis Team were organized for doing systems detail study. Two programmers and two systems analysts did programming work. Two computer system operators were used for smooth-running of operations. Training for the use of NCR Tower computers and operating system was given by one expert from the Philippines. Those who were hired together with payments for them are shown in Table 5.2.3(a) and 5.2.3(b).

Title	Number	Months	Man/Month	Costs
MIS Expert	1	6	6	\$110,000
Training Expert	1	0.5	0.5	\$ 14,000
Total US \$	2		6.5	\$124,000

Table 5.2.3(a) Manpower Costs (US Dollars)

Title	Number	Months	Man/Month	Costs
Section Head	1	8	8	Ks 6,850
Local Consultant	1	8	8	ks 18,000
Systems Analysts	2	8	16	Ks 2,400
Programmers	2	6	12	Ks 2,520
Operators	2	6	12	Ks 2,520
Total Kyats	8		56	Ks 32,290

Table 5.2.3(b) Manpower Costs (including Tailor-made software)

The duration of the preliminary survey carried out by MIS Expert was six months. Local consultant who was responsible for giving local training in programming and software use and for supervision of Systems Analysis Team for Systems Detail Study was hired for eight months. Training Expert from the Philippines was hired for only two weeks. The time of systems detail study carried out by Systems Analysis Team in association with the local consultant was eight months; Systems Operators worked six months until the system testing. Manager of Budget Department served as the head of Computer Section in addition to his regular duties.

Expenses for direct resources needed to provide appropriate environment for the computers are the environmental component of computerization costs and should be charged as such.

These one-time environmental costs can be classified as tangible, direct cost. They are shown in Table 5.2.4.

Title	Quantity	Unit Cost	Total Cost
Uninterruptable Power Supply	3	\$ 6,450	\$ 19,350
Dehumidifier	1	\$ 2,000	\$ 2,000
Total US \$			\$ 21,350
Computer Room (375 sq-ft)			Ks1,00,000
Air Condition	3	Ks 9,055	27,165
Automatic Voltage Regulator	2	3,000	6,000
Generator	1	21,113	21,113
Furniture			
Tables	12	326	3,912
Chairs	12	195	2,340
Steel Cabinets	2	1,154	2,308
Fluorescent Lamps	11	341	3,751
Total Kyats			Ks1,66,589

Table 5.2.4. Environmental Components Costs

In addition to the one-time tangible and direct costs, there are some indirect costs such as the cost of time and an altering will be included to describe the indirect such as top level, middle-level management for giving suggestions and approval on computerization at MARDB. However, no attempt is made

to cost their time and is therefore not included in the total costs.

The total of one-time cost for computerization at MARDB in separate dollar and kyat component is shown in Table 5.2.5.

Description	Costs (US\$)	Costs (Ks)
Hardware	92,498	-
Ready-made Software	16,088	-
Manpower (including Tailor-made software)	124,000	19,990
Environment	21,350	166,589
Total	213,936	186,579

Table 5.2.5 One-time Total Costs at MARDB

The development of the whole computerization project began in January, 1987 and was completed in March, 1989, and 62 man/month were also utilized altogether.

The MARDB also has to incur long-term costs for smooth-running of the computer system. Ongoing costs involve costs of hardware maintenance, software maintenance, staff upgrading, stationery, electricity and environment maintenance. These costs are usually incurred yearly or monthly and the estimated cost per month is shown in Table 5.2.6.

Description	Monthly Cost(Ks)
Hardware Maintenance	250
Air Condition Maintenance	400
Two Systems Analysts Salary	2500
Two Programmers Salary	2500
Two Operators Salary	3150
Other Environmental Maintenance Cleaning	80
Stationary	103
Electricity	182
Total Maintenance Cost	9,165

Table 5.2.6 Maintenance Costs of Computerization at MARDB

Having considered the costs, we can now consider MARDB's computerization benefits. The benefits of computerization at MARDB may not be so obvious; most of them will be intangible and not readily quantifiable. They will however be mentioned and discussed. The benefits may be divided into immediate and long-term benefits.

The immediate benefits of using a computer are savings in time; reduction of manual labour and human error, reduction of

paper use and handling costs, better quality and timely information.

Savings in Time

The most immediate and obvious benefit of using a computerized system at MARDB is time-saving in transaction processing. With the new computerized system only a single return is sent from the branches to the head-office instead of three in the old manual system. By using that single form, the branch staff is required to prepare a single return-form instead of the three forms, thus requiring less time. The old three return-form and new integrated return-form are attached in Appendix A.

Data from return-forms are entered into the computers, and after validation check the required statements and reports are printed automatically. Previously, many manual transcriptions were necessary. Computerized accounting drastically reduced working-time. Required statements and reports can be printed out from updated data in computers within a short time which is a decided benefit of the system.

The data entry from the three sets of return-forms from the branches took approximately 24 minutes in the manual system, whereas it now took only about 12 minutes.

Time needed for the head office to generate reports have also been reduced considerably; report-generating in the manual system took about 116 hours for the process of data entry, data transferring, posting and report-generating but in the

computerized system it took only about 65 hours, approximately half the time it took in the manual system.

Reduction of Manual Effort and Human errors

Because of the use of uniform return-form, there is a reduction in work-load at the branches. In the processing, data from the branches is entered manually into the computers. After entering the source data, subsequent processing are done by computers automatically, and required reports and statements are printed. In the manual system, source data were entered into various books and many transcriptions were needed before producing the final reports. These transcriptions entries number seven (i.e. Data to Voucher preparation, Voucher to Transfer, Voucher to Day Book), and the required time was about ten minutes for one return-form. In the computerized accounting system, it has only one manual data entry. This takes about fifteen minutes for one return form including corrections. Hence much time and labour were required in the manual system. It can, therefore, be said that the computerized system reduced time and labour.

The nature of accounting work, is repetitive and voluminous. To produce required final reports and statements, data are entered, and processed following the same routine and this is done without error. In the manual system, human error often occurred when following a repetitive working procedure to process a large volume of data. In the computerized system, this human error dose not exist. In the manual system, the repetitive

clerical processes are often monotonous for the staff. Computerization reduces this monotony for the staff and gives them a chance to do more interesting and satisfying tasks. Repeated transcriptions, also meant many checking and verifications. In the computerized accounting system, data entry is made from the keyboard directly and entered into the ledger file and checked. Once checked, no additional checking of data is necessary.

Reduction of paper use and handling costs

In the manual system, many return-forms were prepared and sent to the head office requiring many ledger books and returns, working papers both at the head office and the branches. In the head office, there were seven files for one return-form per month. So many storage devices such as book shelves were used for the working papers and various files and books. In the computerized system, data are stored in computer files; disks and tapes. Required reports and statements are printed on paper when required. Statements such as the Trial Balance, Income & Expenditure statements and Balance Sheets prepared by townships and township groups and consolidated statements require 448 sheets of paper. The final reports were stored in files for the manual system. In the computerized system, they are stored in computer files which can also be deleted when not required. Whenever necessary, programs can produce required reports and statements from the computer files. Therefore computerized system reduces the need for paper files and the costs of storing them.

If some of weaknesses described in chapter 5.1 can be overcome computerization at MARDB can be even more effective than now. Therefore we can expect more benefits from the system in the long-term.

As Myanma electrical power support is often inadequate, computerized final statements and reports are often produced later than target date. Therefore, when Myanma communication system and electrical support system is better and more integrated, reports and statements can be more timely and accurate for management decision-making. Computers can also be used to respond to ad-hoc enquiries of users with updated data.

The MARDB has been using the computerized system for about four years now. It is difficult to picture the benefits of computerization at MARDB because they are more implicit than explicit, more possibility than actually realized. However, the MARDB has been able to cope with the rapid growth in technology. It is indeed a great benefit that an advanced technology had been successfully installed and is operating in MARDB.

5.3 THEORETICAL MODEL AND PRACTICAL DEVELOPMENT

The approach of computerized system development used at MARDB can be regarded as System Life Cycle approach which has already been described in Chapter 3.2. As there are three stages in the System Development Life Cycle in general, MARDB's development also has Definition stage, Development stage and Installation and Operation stage.

An attempt will be made here to assess the practical development processes at MARDB with what is outlined and recommended in the Systems Development Life Cycle for applications development.

In theory, a proposal for new applications or for enhancement to existing system should come from users and data processing personnel. The project should include identification of Project, organizational need, organizational support, time schedule and personnel schedules. In MARDB's computerized system development, there was no written proposal. Computerization of the accounting system was simply the conversion of the existing old manual system to a computerized system. Because accounting procedures at all government organizations are standardized, drastic changes cannot be permitted to enhance or change the system. However MARDB's loans management system can be redesigned because this system is internal to MARDB. As part of the "Strengthening of MARDB" project aimed to upgrade the bank operations

for becoming a development bank, management information reporting system of MARDB should be better and more effective; clerical work should be mechanized, systems and procedures should be changed and modernized, and staff should be trained. As mentioned in Chapter 4.3 because NCR Tower computers were accepted in place of NCR Accounting Machines, the feasibility study was made for the main project, and there was no well-defined written-proposal and systematic feasibility study for computerization. The feasibility report included general descriptions of the new system, expected development schedule, required budget and resources schedule. But it did not include evaluation with respect to technical, motivational and operational feasibility as it should.

The analysts should have worked with users to define the information requirements and the information flows in detail. In MARDB, a preliminary survey was made by a foreign MIS expert for the entire main project. Subsequent reports consist of items such as report format for regular and ad hoc enquiries. Detail study was made by MARDB in-house SAT under the supervision of a local consultant. They investigated the old manual systems and its weaknesses and designed new forms and documents. However the remaining systems were not covered.

At the stage of logical or conceptual system design phase, general description of new system, functions to be performed, general flow of processing, general descriptions of inputs and outputs were established. This phase was carried out

by Systems Analysis Team for the accounting system only. They presented these conceptual design to the management. In this phase, general descriptions consist of general relationship among inputs, outputs and functions.

The development stage is usually divided into four activities: physical system design, physical database design, program development and procedure development. The physical system design was undertaken by Systems Analysis Team and it covered flow of work, overall structure of programs, detail design of each input and output and back-up provisions. In a theoretical model for development, hardware specifications, data communications requirements should be included in this phase in specifying new and additional hardware requirements. However, hardware has been already received for MARDB computerized system development. Therefore, hardware specifications and data communication requirements were not included in this physical system design.

A new Database design for this computer system has to be specified from the paper data files in the old manual system. In MARDB's computerized system, physical database design has file design and code design. Although the file design is the traditional file design, data are normalized and coded for use with database software.

In the next program development step - coding and testing programs - MARDB has two programmers in addition to the SAT who are also responsible for programming. Programs were

separated into modules. Each module was coded, tested and debugged individually. When all modules were combined, a set of tested programs was obtained. In this development phase the practical development at MARDB more or less followed the theoretical model of development.

In procedure development, of the Systems Development Life Cycle approach, procedures manuals should be written for all personnel who are in contact with the system. In MARDB, so far there are no written procedure manual for users.

The third stage of information system development life cycle is the installation and operation stage. This stage has three activities: conversion, operation and maintenance and post audit.

Parallel running method, the most common method, was used in MARDB's conversion of the old manual to new computerized system. The old manual and the new computerized system were run concurrently for a period of six months. Differences between manual and computerized results were identified and resolved.

After six months, the MARDB's computerized accounting system was considered ready for operation. Subsequent changes were handled as maintenance, repairs or enhancement. MARDB in-house SAT and programmers are still attached to the computerization project, being responsible for repairs or maintenance to the new system and programming.

The last step of the System Life Cycle is post audit. An audit team should review the use and operations and costs and

benefits of the new system. However, at MARDB proper audit team has not been organized yet and hence there are no post audit functions carried out about computerization.

The computerized system development in MARDB was carried out stage by stage similar to the steps in the system life cycle plan of application development. However, there was no well-defined written-proposal for computerization, no specific hardware specifications, since NCR Tower computers were obtained in place of NCR accounting machines. It was also found that though the system is operating and running, there are no written procedure manuals for user so far. The post audit that should follow has not been done either.

CHAPTER SIX

CONCLUSION

In this concluding chapter, the thoughts and ideas throughout the previous chapters will be brought together and discussed for establishing relationships, and drawing conclusions. Perhaps some valuable lessons are also learned and offered as recommendations for future computerizations in Myanmar.

The study is empirical study of a single business organization through its computerization process. However, the stage of computer technology development and the place where the transfer of this technology took place and how provided reasons for much interest and close observation. Generations of computer have bypassed Myanmar for several decades and when MARDB computerized its data processing in 1985, it was among a few Myanmar business organizations that did. By that time, the western developed world has had enough experience with computer systems and design for business and organizations. Scholars and practitioners have conceptualized and theorized on the design and development of computer systems - that it must have a management information orientation; modularity rather than the totally integrated system; that it should follow the steps and the stages of systems life cycle; computerization will have initiation, proliferation, formalization and maturity stages.

It was against this background and in this setting that MARDB's computerization was studied. So, although situation and problems found in MARDB's computerized system devel-

opment cannot be generalized, an opportunity was obtained to determine whether these problems are because of Myanma's specific condition or because of MARDB's specific situation. More than this opportunity, we obtained chances to study whether MARDB's computerization experiences, problems and issues are as suggested in management information system literature, and whether MARDB benefited from the lessons and avoided certain weaknesses and pitfalls. Although this study may not be able to provide a solution for the problems in MARDB, some considered opinions, suggestions and comments will be given, and some questions (and doubts) will be raised.

One of the areas in which computers are initially introduced is in accounting where it is most cost-effective. Accounting system is concerned with the classifying and structuring of accounting data and in commercial or administrative organizations, it is usually the first to be mechanized even before computerization. So, when computers are used for business data processing, the early applications are in the area of accounting system.

In MARDB's computerization, computers were also first introduced for procedures of accounting system which has the nature of high volume data and repetitive routines. Besides accounting systems it attempted to computerize Loans Management System, Personnel Management System and Budgeting and Budgetary Control Systems. To computerize, modules were developed individually for each subsystem and then integrated and linked as a whole system. It can therefore be said that

MARDB used the modularity concept for computerization. Also, from the initial stage, management information system orientation was adopted with long-term perspective.

The circumstances of MARDB's decision to computerize at the time it did, determines the nature of its problems and constraints. MARDB's original project did not consider computerization. But as mentioned in Chapter 4.3, computerization was a substitution in the absence of accounting machines. Originally specified accounting machines from NCR Tower company were unavailable and MARDB had to more or less accept the hardware offered by the company. This hardware acquisition approach of "hardware-first" without shopping for appropriate vendors is fundamental to the problems at MARDB's computerization.

MARDB had to accept the NCR Tower computers without considering their suitability and it became "hooked" to the NCR Tower computers more or less in isolation from other machines in Myanmar. By that time computer hardware costs had decreased and computer technology had advanced enough for an organization to choose and buy the most suitable machines from among many suppliers. This chance Myanmar did not have. Computer technology has been introduced to Myanmar in 1973 and there are already many Myanmar computer technicians but MARDB management without any computer knowledge and experience and advice on local computer scene, accepted the NCR machines that were not compatible with IBM computer used widely in Myanmar. As MARDB received NCR Tower computers, it could not inter-

change with other computers mostly IBM, used in Myanmar, even within the same ministry of Planning & Finance. This is indeed a great disadvantage for MARDB's computerization not being able to cooperate and grow with others.

The MARDB computerized at the head office. It supports the organization's operational control activities and management control activities as mentioned in Chapter 4.2. If computerization is to include loans transaction processing - the main job of MARDB - the head office and branches must have direct computer links. This is not possible yet and the communication with the branches remained dependent on the public communication system which is still inadequate.

MARDB's computerization is a part of the "Strengthening of MARDB," a UNDP project. Because of Foreign Exchange limitation computerization projects at all government organizations in Myanmar are UNDP aid projects. Without further foreign aid the computerization projects usually go through an involuntary slow-down. MARDB's computerization like others is, "Foreign Aid-dependent".

In the small and close-community of computerized organizations in Myanmar, there is sharing of information on problems and improvised solutions. All computerized organizations face problems external to the computer system and the organization, but are particular to the Myanmar economic situation. The inadequacies in communication and electricity supply system discussed in Chapter 5.1 are an environment not very friendly to the computer.

MARDB do not as yet have a separate computer department. It exists as a computer section under the budget department headed by the manager of that department. Total number of staff in the computer section is only six. The organizational place and its relationship to others can make a great deal of difference in its effectiveness.

Hardware maintenance, repairs and replacements, are needed regularly, if not, after sometime only a certain percent of the machines will be operational, which is the case at MARDB and others. It is unwise to stay "hooked" to NCR Tower machines but the changeover to modern and compatible machines needs not only financial resources mostly foreign exchange in this case but also top management's involvement and push. The computerization project at the Office of Auditor General enjoyed the personal involvement and leadership of the top management with a corresponding degree of success and effectiveness. The frequent changes of MARDB's top management and the newness to the situation each time promoted resistance and reluctance.

In systems design and implementation, predetermined systems area must be planned systematically, its implementation and development controlled and monitored step by step to determine whether the development follow the plan or not and whether it is actually beneficial or not. In MARDB, as in other government organizations, out of predetermined four computerized systems, Budgeting and Budgetary Control System never got developed.

Tailor-made software developed by MARDB in-house programmers are very well maintained and this task is not dependent on external programming expertise. However, MARDB does not have well-prepared documentation about computer systems operations and though currently there is no staff turn-over and so far no problem, documentation must be done with the long-term in mind. So far there has been no proper post-audit - a step suggested in the systems development life cycle and therefore no real evaluation.

The MARDB does not have any long-term plan for staff development, hardware and software acquisitions, using only ad hoc planning for immediate needs. Generally, there should be annual replacement and maintenance plans, and a strategy for going forward from the foreign-aid initial computerization project. MARDB management did not have any long-term plans; it is perhaps because it is their very first experience but also because they are fully aware of the financial constraints and also because of frequent management change-overs.

In the long-run, MARDB can be more effective with the use of a distributed data processing system. The loans function, MARDB's main function, is spread over the whole country in branches and village banks. Distributed data processing permits the decentralization of many data processing activities and increase direct-access to the system by the users which in this case are the branches. It needs proper delegation of authorities and responsibilities to branches and village banks. With computer hardware costs declining, commun-

ications and database capabilities improving and with data processing experience gained, it will not be difficult to install a distributed data processing system in MARDB with multiple computers, if a concerted effort and plan is made.

MARDB now has had some computer experience and some computer technological knowledge which can only be learned from experiences itself. Management has begun to think about hardware replacement of NCR Towers with IBM PC and hardware maintenance. The necessary budget was accepted by top level management and proposed to the ministry level in 1993-94 budget year. This will be of great benefit to MARDB's process of introducing a computer technology; whatever the problems of acquisition was at first, the decision to get away from the tightspot is strategic.

Initial data preparation is often the most difficult part in computerization as discussed in Chapter 5.1. If initial data is not reliable, the whole system will not be reliable. In MARDB accounting system and loans management system, as accounting and financial information are already validated, the systems work satisfactorily. The staff of the two departments fear the possibility of having to do without the computer. The personnel management system has problems and difficulties in initial data preparation. It took some time to begin from the very beginning. Budgeting and Budgetary Control System has not been developed yet, perhaps because the uniform system of government accounting is not flexible enough for changes necessary for computerization. But this may change in

the near future.

Taking all factors into account it is fair to judge the computerization programme at MARDB successful to a degree. There is a common purpose and commitment especially among the computer people viz. programmers, operators, systems analysts and systems men. However, this could not be said of the management whose reluctance and disinterest especially at the implementation stage is understandable when we remember that computer technology is totally new to the organization. A government organization with its centralized decision-making has more problems with changes and innovations in the process of transfer to a new technology. The work that started in October 1986 was completed in January 1989. It is operational and still is though there are times when only a few terminals are functioning - the rest waiting to be repaired.

A study of the experiences of computerization in Myanmar and other developing countries might shed a new light on Nolan's theory of the four stages of Electronic Data Processing growth viz. initiation stage, expansion stage, formalization and maturity stage. When the computer technology is transferred to a developing country 25-30 years after its full development in the developed world, the growth pattern and the nature of each stage can be different. Because it came many years later after a wealth of experience has been gained and ideas formed, it often comes with a foreign expert to initiate it the right way with the right plan. This happened at MARDB; the initiation is not confined first to Cost-effective accoun-

ting applications - it had a Management Information System's orientation with applications in personnel management, general ledger and financial analysis. The system analysis and design steps were carefully followed. A long-term plan strategy is left for the organization by the foreign expert who left at the end of the project. The computer system and the organization are left to face the problems of the country's technical, social and economic environment. So, computerization, instead of growing into the second stage of "Proliferation" may actually have a down-trend after the UN support came to an end. Another reason why "Proliferation" may not take place as predicted may be particular to situations such as in Myanmar. Computers are precious property, not easily replaceable and are subject to much controls. Access to computers is often limited and controlled and this does not promote growth. Computer literacy takes longer to spread and human resistance to a new technology takes longer to disappear.

The lessons from the experiences of computerization at MARDB, the problems faced due to the particular nature of the situation, may now be brought together which are outlined below to reflect as suggestions and recommendations for future computerization projects in Myanmar:

1. A learning hands-on experience of computerization is a necessity even at costs for which there may not be immediate tangible benefits. These learning costs must however be minimized.
2. In initiating computerization projects especially with

foreign assistance, hardware replacement should be a built-in feature to assure sustained growth of computerization. Without it the diffusion of the computer technology cannot be expected. Computers have a limited life time, technologically as well as its equipment life. Hence replacement plans must be drawn up as part of the initial plan. Hardware replacement and modernization is no longer as difficult as it used to be because of declining hardware costs, improved communications and increasingly more powerful and user-friendly software.

3. The organizational environment as well as the external environment for computer system compatibility should be studied and understood during the various steps of system study. Only then can we expect support and assistance within ministry and from the computer community in Myanmar. There are now computer companies in Myanmar from whom services and support can be expected and even contracted.
4. Proper review audit should be taken before completion of the computerization project and a long-term plan should be proposed to organization and ministerial decision-makers for step by step growth.
5. A separate computer department should be set up, headed by a senior director level so that the department can deal directly with top level management.

There are new trends in the environment that can help computerizations to grow faster. Since the change to open-market system, the ever more affordable and powerful

personal computers are readily available from computer importers some of whom also ran computer training schools and give computer-related services. More manufacturer support can also be expected from regional representatives and agents. In short the environment has become more supportive; computers are resources within the reach of many businesses - especially foreign company branches and individuals and the forces for the technology to take hold and spread are there and growing.

APPENDIX

APPENDIX

Myanma Agricultural Bank Branch
 Monthly Return of Detailed Heads of Income and Charges Account for the month of 199

Heads of Account	Opening Balance		Income during month		Progressive Total	
	Debit	Credit	Debit	Credit	Debit	Credit
Income Account						
Interest on Agriculture Loan						
Interest on Co-operatives Loan						
Penal Interest on Agriculture Loan						
Other Items						
Total						
Charges Account						
Pay and Allowance						
Wages						
Bonus						
Overtime Allowance						
Travelling Expenses						
Meal Allowances						
Postage, Telegraph and Telephone						
Lighting and Power						
Remittance and Bank Charges						
Books, Newspaper and Periodicals						
Uniform Allowance						
Transportation and Handling Charges						
Office Supplies						
Printing and Stationery						
Rent						
Municipal Taxes						
Insurance						
Office Equipment Maintenance						
Furniture and Other Equipment Maintenance						
Depreciation on Office Equipment						
Depreciation on Furniture and Other Equipment						
Total						

Manager,
 Myanma Agricultural Bank
 _____ Branch.

Monthly Return of Clean Cash and General Ledger Main Heads for the month of

Head of Account	Opening Balance		Transaction During the		Closing Balance	
	Debit	Credit	Debit	Credit	Debit	Credit
Liabilities Accounts						
Myanmar Agricultural Bank Head Office A/c						
Sundry Deposit Account (Domestic)						
Accrued Liabilities Account						
Unclaimed Liabilities Account						
Subscription Account (Village Bank)						
Saving Account (Village Bank)						
Profit Account (Village Bank)						
Income Account						
Inter Branch Remittance A/c						
Total						
Assets Accounts						
Office Equipment Account						
Furniture and Other Equipment Account						
Suspense Account (Domestic)						
Accrued Income Account						
Prepaid Account						
Claims Account (Government)						
Claims Account (Private)						
Seasonal Loans to Cultivators Account						
Short Term Loans to Cultivators Account						
Long Term Loans to Cultivators Account						
Loans to Farming Cooperatives						
Loans from Village Bank Deposits Account						
Development Loans Account						
Charges Account						
Account with Myanmar Economic Bank						
Cash in Hand Account						
Inter Branch Remittance A/c						
Total						
GRAND TOTAL						

Manager
Myanmar Agricultural Bank,
Branch.

MYANMA AGRICULTURAL BANK
Subsidiary Heads of General ledger Accounts

Annexure(3) (A)

Branch, _____

Date _____

Serial No	Head of Account	Debit	Credit
1	Suspenses Account (Domestic) Advances for Agricultural Loans Village Bank Forms Petty Cash Misappropriated Case Under Enquiry Miscellaneous		
2	Claims Account (Government) Demonetized Notes Trade Corporation (1) General Administration Dept		
3	Claims Account (Private) Agricultural Loans Misappropriated or Losses incurred by Village Bank		
4	Prepaid Account Prepaid Expenses Prepaid Deposits with Government		
5	Accrued Income Account Accrued Interest Receivable(Domestic) Items Due and Unreceived(Domestic)		
6	Accrued Liabilities Account Items Due and Unpaid (Domestic)		
7	Sundry Deposits Account(Domestic) Miscellaneous		
8	Unclaimed Liabilities Account Undisbursed salaries and fees		

O Manager,
Myanma Agricultural Bank,
_____ Branch

MYANMA AGRICULTURAL BANK

Subsidiary Heads of Seasonal Loans to Cultivators Account

Branch, _____

Date _____

Serial No	Particular	Debit		Credit	
1	Old Loans				
2	64-Winter Loan				
3	65-Monsoon Loan				
4	65-Winter Loan				
5	66-Monsoon Loan				
6	66-Winter Loan				
7	67-Monsoon Loan				
8	67-Harvesting Loan				
9	67-Winter Loan				
10	68-Monsoon Loan				
11	68-Harvesting Loan				
12	68-Winter Loan				
13	69-Monsoon Loan				
14	69-Harvesting Loan				
15	69-Winter Loan				
16	70-Monsoon Loan				
17	70-Harvesting Loan				
18	70-Winter Loan				
19	71-Monsoon Loan				
20	71-Harvesting Loan				
21	71-Winter Loan				
22	72-Monsoon Loan				
23	72-Harvesting Loan				
24	72-Winter Loan				
25	73-Pre-Monsoon Loan				
26	74-Monsoon Loan				
27	74-Harvesting Loan				
28	74-Winter Loan				
29	75-Pre-Monsoon Loan				
30	75-Monsoon Loan				
31	75-Winter Loan				
32	76-Pre-Monsoon Loan				
33	76-Monsoon Loan				
34	76-Harvesting Loan				
35	76-Winter Loan				
Total					

Manager
Myanma Agricultural Bank
..... Branch.

မြန်မာ့စိုက်ပျိုးရေးဘဏ်ခွဲ
မြိတ်မြို့။

စာအမှတ်-၈၅၁၀၁၁-၄

နေ့စွဲ။ ၁၉၈၆ ခု၊ ဇွန်လ (၂၇) ရက်။

သို့

အထွေထွေမန်နေဂျာ

မြန်မာ့စိုက်ပျိုးရေးဘဏ် (ရုံးချုပ်)

ရန်ကုန်မြို့။

အကြောင်းအရာ။ ။ ချေးငွေ၊ ဆပ်ငွေ၊ အပ်ငွေ လချုပ်စာရင်းပေးပို့ခြင်း

အထက်ပါအကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍၊ ၁၉၈၆ ခု၊ မေလအတွက်
ချေးငွေ၊ ဆပ်ငွေ၊ အပ်ငွေ လချုပ်စာရင်းကို ဤစာနှင့်အတူပေးပို့အပ်ပါသည်။

စဉ်၊

ချေးငွေအမျိုးအစား

၁။

၈၅ - ဗို

၂။

အပ်ငွေ

အထက်ပါချေးငွေ၊ ဆပ်ငွေ၊ အပ်ငွေ လချုပ်စာရင်းတွင်ပါရှိသော
ကိန်းဂဏန်းများသည် ဤဘဏ်ရုံး၏ အထွေထွေလယ်ဂျာနှင့်သက်ဆိုင်သည်
စာရင်းခေါင်းစဉ်အသီးသီးရှိ ကိန်းဂဏန်းများနှင့် ကိုက်ညီပြီးဖြစ်ပါသည်။

လေးစားစွာဖြင့်

မန်နေဂျာ

မြန်မာ့စိုက်ပျိုးရေးဘဏ်

မြိတ်မြို့။

မိတ္တူကို။

မန်နေဂျာ၊ မြန်မာ့စိုက်ပျိုးရေးဘဏ် (တိုင်းရုံး) ထားဝယ်မြို့။

သိသာရန်ပေးပို့ပါသည်။

တနင်္သာရီတိုင်း။

တနင်္သာရီမြို့နယ်။

၁၉၈၆ ခု၊ မေလအတွက်။

စဉ်။	ခုနစ်နှစ်ချေးငွေ အမျိုးအစား	စာရင်းဖွင့်ကျန် နှစ်အတွင်းထုတ်	လအတွင်းကောက်ခံရငွေ			ဘဏ္ဍာရေးနှစ်အစမှလက်နံ့ထိဆင်ငွေ			လအတွင်းကျန်ငွေ
			အရင်း	အတိုး	ဒဏ်တိုး	အရင်း	အတိုး	ဒဏ်တိုး	
၁။	ကြေးဟောင်း(ဘဏ်)	၁၄၄၅၁-၂၀							၁၄၄၅၁-၀၀
၂။	ငွေ-ဆောင်း	၈၆၃၅-၀၀							၈၆၃၅-၀၀
၃။	ငွေ-ခိုး	၅၅၄၅၀-၀၀							၅၅၄၅၀-၀၀
၄။	ငွေ-ခိုး	၇၃၁၁၀-၀၀							၇၃၁၁၀-၀၀
၅။	ငွေ-ခိုး	၂၄၇-၀၀							၂၄၇-၀၀
၆။	၇၀-ခိုး	၂၅၇၅-၀၀							၂၅၇၅-၀၀
၇။	၇၁-ခိုး	၃၂၃၂၅-၀၀							၃၂၃၂၅-၀၀
၈။	၇၂-ခိုး	၆၄၃၀၂-၀၀							၆၄၃၀၂-၀၀
၉။	၇၇-ခိုး	၂၆၀၀-၀၀							၂၆၀၀-၀၀
၁၀။	၇၈-ခိုး	၁၁၉၈၈၀-၀၀							၁၁၉၈၈၀-၀၀
၁၁။	၇၉-ခိုး	၉၁၇၀-၀၀							၉၁၇၀-၀၀
၁၂။	၈၀-ခိုး	၂၂၇၇-၀၀							၂၂၇၇-၀၀
၁၃။	၈၃-ခိုး	၆၇၉၀-၀၀							၆၇၉၀-၀၀
၁၄။	၈၄-ခိုး	၂၀၃၀-၀၀							၂၀၃၀-၀၀
၁၅။	၈၅-ခိုး	၁၇၉၂၀၀-၀၀				၂၈၄၂၀-၀၀	၁၈၅၉-၀၀	၁၂၂-၈၅	၁၇၉၂၈၅-၀၀
	ပေါင်း	၅၆၅၂၇၀-၂၀				၂၈၄၂၀-၀၀	၁၈၅၉-၀၀	၁၂၂-၈၅	၅၆၅၃၈၅-၂၀

မန်နေဂျာ
မြန်မာ့စွဲကတ်ပျိုးရေးဘဏ်
။မြို့။

13/06/2024

ကျေးရွာဘဏ်အပ်ငွေလချုပ်စာရင်း

၁၉၈၆ ခု၊ လအတွက်။

.....မြို့နယ်

အကြောင်းအရာ	ပေးသွင်းသည့်			က-ဘ အပ်ငွေ ထုတ်ချေးငွေ	ရုံးခွဲလက်ကျန်		
	အစု	ရွှေတာ	အမြတ်		အစု	ရွှေတာ	အမြတ်
ယခင်လကုန်အထိ	၂၅၀၆၀-၀၀	၁၂၀၂၃-၅၅	၄၂၈၄၉၇-၀၀				၃၄၈၆-၇၀
ယခုလအတွင်း		၇၇၀၄-၀၀	၂၆၄၀၂-၈၀				
ယခုလကုန်အထိ	၂၅၀၆၀-၀၀	၂၀၉၇၇-၅၅	၄၅၄၈၉၁-၈၀				၃၄၈၆-၇၀
ဘဏ္ဍာရေးနှစ်အစ မှလကုန်အထိ		၁၁၃၅၀-၃၅	၃၅၁၉၂-၉၆				

Village Bank or Express

LIBRARY

13 - 07 - 93

SERIAL NO	STATE / DIVISION NAME	LOAN AMOUNT	RECOVERY AMOUNT	RECOVERY %
1	KACHIN STATE	15274690	15275320	100.00
2	KAYAH STATE	5891370	5891370	100.00
3	TANINTHARYI DIVISION	10576715	10576715	100.00
4	BAGO DIVISION	301397715	301397715	100.00
5	MAGWAY DIVISION	157623985	157623985	100.00
6	MANDALAY DIVISION	217769295	217769295	100.00
7	MON STATE	66647470	66647470	100.00
8	RAKHINE STATE	33874745	33874745	100.00
9	YANGON DIVISION	163059930	163059930	100.00
10	SAGAING DIVISION	193660855	193663355	99.94
11	AYEYARWADY DIVISION	310722765	309127227	99.48
12	SHAN STATE	18047125	17939615	99.40
13	KAREN STATE	7916080	7417920	93.70
	NATIONAL TOTAL	1502462740	1500164662	99.84

13 - 07 - 93

BRANCH CODE	BRANCH / AGENCY NAME	DATE	LOAN AMOUNT	RECOVERY AMOUNT	RECOVERY %
1010105	WAINGMAW	31-03-93	1440070	1440700	100.04
2010101	MYITKYINA	26-04-93	327700	327700	100.00
3010103	FUTAO	12-03-93	218800	218800	100.00
4010104	MACHANEAW	22-03-93	130500	130500	100.00
5010201	BHAMO	26-04-93	581670	581670	100.00
6010202	MANSI	11-03-93	260900	260900	100.00
7010301	MOGAUNG	31-03-93	2859910	2859910	100.00
8010400	MOHNYIN	22-03-93	7988110	7988110	100.00
9015100	MOMAU	31-03-93	86400	86400	100.00
1015200	SHWEGU	31-03-93	1380630	1380630	100.00
	KACHIN STATE		15274690	15275320	100.00
1020101	LOIKAW	26-03-93	2288060	2288060	100.00
2020102	DIMAWSHO	26-03-93	1892175	1892175	100.00
3020103	PHRUHSE	07-02-93	120000	120000	100.00
4020107	PEKHON	26-03-93	1591135	1591135	100.00
	KAYAH STATE		5891370	5891370	100.00
1030101	PA-AN	05-03-93	4250540	4250540	100.00
2035300	HLAINGBWE	05-03-93	873190	873190	100.00
3035200	KYA-IN SEIKKYI	05-03-93	494040	480280	97.21
4035101	KAWKAREIK	15-06-93	2148320	1698320	79.05
5030103	THANDAUNG	15-06-93	149990	115590	77.06
	KAREN STATE		7916080	7417920	93.70

STATE/DIVISION NAME = AYEYARWADY

NO	CODE	ACCOUNT NAME	PRINCIPAL	INTEREST	PENAL INTEREST
1	10401	SL OLD LOANS	27316.00	1495.59	.00
2	10402	SL 64-WINTER	3851.00	5.25	75.30
3	10403	SL 65-MONSOON	32903.10	582.07	2292.88
4	10404	SL 65-WINTER	1620.00	9.45	63.90
5	10407	SL 67-MONSOON	9057.80	.00	1352.70
6	10408	SL 67-HARVESTING	881.05	.00	.00
7	10410	SL 68-MONSOON	6111.00	3159.80	398.08
8	10411	SL 68-HARVESTING	1230.00	1723.83	561.62
9	10415	SL 69-WINTER	520.00	.00	.00
10	10416	SL 70-MONSOON	5969.00	2067.81	561.95
11	10417	SL 70-HARVESTING	42.00	.00	2.52
12	10419	SL 71-MONSOON	860.00	289.94	456.15
13	10420	SL 71-HARVESTING	80.00	199.70	131.30
14	10422	SL 72-MONSOON	705.00	907.11	895.00
15	10423	SL 72-HARVESTING	1510.00	.00	42.00
		SUBTOTAL	92655.95	10440.55	6833.40
16	10441	SL 78-MONSOON (P	4726.60	3924.70	5039.14
17	10445	SL 79-MONSOON (P	2940.00	1714.16	2077.90
18	10449	SL 80-MONSOON (P	2455.00	4172.02	4463.60
19	10453	SL 81-MONSOON (P	5998.00	2308.63	2705.65
20	10455	SL 81-WINTER	.00	103.00	138.00
21	10457	SL 82-MONSOON (P	2870.00	4607.87	5617.25
22	10459	SL 82-WINTER	.00	163.00	340.50
23	10461	SL 83-MONSOON (P	1940.00	1021.75	1046.45
24	10465	SL 84-MONSOON (P	19300.00	2652.87	3148.44
25	10469	SL 85-MONSOON (P	.00	.00	12.00
26	10473	SL 86-MONSOON (P	11000.00	5502.87	4373.40
27	10475	SL 86-WINTER	658.00	158.80	198.90
28	10477	SL 87-MONSOON (P	14255.00	5940.74	6785.48
29	10479	SL 87-WINTER	.00	25.20	18.20
30	10489	SL 90-WINTER	.00	14.77	.00
31	10491	SL 91-MONSOON	489785.00	7360.65	.00
32	10494	SL 92-MONSOON	379880.00	149769.33	6872.25
33	10495	SL 92-WINTER	6960255.00	463653.54	12628.53
34	10497	SL 93-MONSOON	7600.00	41.23	.00
		SUBTOTAL	7903662.60	653135.13	55465.69
		TOTAL	7996318.55	663575.68	62299.09

R..	CO- DE	TYPE OF LOANS	INTEREST		PENAL INTEREST	
			DURING THE MONTH	END OF THE MONTH	DURING THE MONTH	END OF THE MONTH
11	101	OLD LOANS	1495.59	9609.41	.00	.00
21	102	64 WINTER LOANS	5.25	5.25	75.30	75.30
31	103	65 MONSOON LOANS	582.07	584.22	2292.88	2342.08
41	104	65 WINTER LOANS	9.45	9.45	63.90	63.90
51	105	66 MONSOON LOANS	.00	39.00	.00	.00
61	107	67 MONSOON LOANS	.00	.00	1352.70	1352.70
71	110	68 MONSOON LOANS	3159.80	3159.80	398.08	398.08
81	111	68 HARVESTING LOAN	1723.83	1723.83	561.62	561.62
91	116	70 MONSOON LOANS	2067.81	2074.56	561.95	658.85
01	117	70 HARVESTING LOAN	.00	.00	2.52	2.52
11	119	71 MONSOON LOANS	289.94	300.34	456.15	630.95
21	120	71 HARVESTING LOAN	199.70	199.70	131.30	210.80
31	122	72 MONSOON LOANS	907.11	907.11	895.00	929.50
41	123	72 HARVESTING LOAN	.00	.00	42.00	42.00
51	125	73 PRE-MONSOON LOA	.00	30.00	.00	.00
		SUBTOTAL	10440.55	18642.67	6833.40	7268.30
61	141	78 MONSOON (PADDY)	3924.70	9973.22	5039.14	11584.39
71	145	79 MONSOON (PADDY)	1714.16	6587.69	2077.90	8432.50
81	147	79 WINTER LOANS	.00	61.33	.00	42.00
91	149	80 MONSOON (PADDY)	4172.02	14232.71	4463.60	16741.35
01	151	80 WINTER LOANS	.00	293.33	.00	411.40
11	153	81 MONSOON (PADDY)	2308.63	4918.22	2705.65	6231.05
21	155	81 WINTER LOANS	103.00	103.00	138.00	138.00
31	157	82 MONSOON (PADDY)	4607.87	7117.32	5617.25	8578.40
41	159	82 WINTER LOANS	163.00	163.00	340.50	340.50
51	161	83 MONSOON (PADDY)	1021.75	6869.13	1046.45	5388.20
61	163	83 WINTER LOANS	.00	81.25	.00	39.00
71	165	84 MONSOON (PADDY)	2652.87	8376.02	3148.44	13512.40
81	167	84 WINTER LOANS	.00	466.10	.00	495.50
91	169	85 MONSOON (PADDY)	.00	603.86	12.00	928.74
01	173	86 MONSOON (PADDY)	5502.87	14189.69	4373.40	10581.01
11	175	86 WINTER LOANS	158.80	169.47	198.90	208.90
21	177	87 MONSOON (PADDY)	5940.74	7066.42	6785.48	11612.97
31	179	87 WINTER LOANS	25.20	25.20	18.20	18.20
41	185	89 MONSOON	.00	302.39	.00	.00
51	188	90 MONSOON	.00	309.75	.00	.00
61	189	90 WINTER LOANS	14.77	14.77	.00	.00
71	191	91 MONSOON	7360.65	10107.75	.00	709.20
81	194	92 MONSOON	149769.33	707382.11	6872.25	21610.20
91	195	92 WINTER LOANS	463653.54	1414283.71	12628.53	12628.53
01	197	93 MONSOON	41.23	49.36	.00	.00
		SUBTOTAL	653135.13	2213746.80	55465.69	130232.44
		TOTAL	663575.68	2232389.47	62299.09	137500.74

MYANMA AGRICULTURAL AND RURAL DEVELOPMENT BANK
 STATUS OF INTEREST & PENAL INTEREST FOR THE MONTH JULY 1973
 STATE / DIVISION UNION

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CO- DE	TYPE OF LOANS	INTEREST		PENAL INTEREST	
		DURING THE MONTH	END OF THE MONTH	DURING THE MONTH	END OF THE MONTH
1101	OLD LOANS	57909.29	76932.73		36.00
1102	64 WINTER LOANS	3148.08	3366.74	.00	513.43
1103	65 MONSOON LOANS	14765.09	14979.89	267.54	6860.45
1104	65 WINTER LOANS	9.45	9.45	6798.65	63.90
1105	66 MONSOON LOANS	237.50	1005.88	63.90	48.00
1107	67 MONSOON LOANS	.00	.00	30.00	1611.72
1110	68 MONSOON LOANS	3159.80	3159.80	1611.72	398.08
1111	68 HARVESTING LOAN	1723.83	1723.83	398.08	561.62
1113	69 MONSOON LOANS	553.86	553.86	561.62	71.59
1116	70 MONSOON LOANS	2138.59	2145.34	561.95	658.85
1117	70 HARVESTING LOAN	.00	.00	2.52	2.52
1119	71 MONSOON LOANS	422.17	432.57	480.75	655.55
1120	71 HARVESTING LOAN	199.70	199.70	131.30	210.80
1122	72 MONSOON LOANS	8503.27	8503.27	1287.31	1321.81
1123	72 HARVESTING LOAN	43.98	43.98	51.30	51.30
1125	73 PRE-MONSOON LOA	.00	30.00	.00	.00
1137	77 MONSOON LOANS	238.75	393.75	15.00	15.00
1139	77 WINTER LOANS	.00	16.70	.00	.00
	SUBTOTAL	93053.36	113497.49	12333.23	13080.62
141	78 MONSOON (PADDY)	11656.84	20883.98	14013.79	22736.34
142	78 MONSOON (MULTI	2000.00	3337.40	.00	1049.60
143	78 WINTER LOANS	.00	.00	1128.00	1128.00
145	79 MONSOON (PADDY)	17479.19	29153.01	7658.95	19080.17
146	79 MONSOON (MULTI	.00	577.84	.00	1825.10
147	79 WINTER LOANS	11842.32	11903.65	9829.58	9902.09
149	80 MONSOON (PADDY)	42049.37	65738.91	18146.88	69175.23
150	80 MONSOON (MULTI	.00	286.18	.00	424.55
151	80 WINTER LOANS	304.00	597.33	.00	411.40
153	81 MONSOON (PADDY)	10902.93	15062.34	9051.70	14733.42
154	81 MONSOON (MULTI	99.15	1492.95	216.75	2786.10
155	81 WINTER LOANS	103.00	103.00	138.00	138.00
157	82 MONSOON (PADDY)	11008.76	19235.50	12349.55	24795.76
158	82 MONSOON (MULTI	8083.85	9128.39	2207.32	4064.54
159	82 WINTER LOANS	250.50	250.50	900.50	900.50
161	83 MONSOON (PADDY)	22620.01	31220.75	12568.68	22164.71
163	83 WINTER LOANS	320.50	401.75	301.50	340.50
165	84 MONSOON (PADDY)	26998.90	39263.31	20400.99	42900.29
166	84 MONSOON (MULTI	.00	1196.98	.00	3374.41
167	84 WINTER LOANS	.00	2308.90	.00	1441.80
169	85 MONSOON (PADDY)	12367.87	22558.43	11292.95	22371.29
170	85 MONSOON (MULTI	248.30	2531.64	337.35	4721.80
171	85 WINTER LOANS	347.60	347.60	.00	.00
172	86 PRE-MONSOON LOA	.00	577.67	.00	552.75
173	86 MONSOON (PADDY)	19022.90	49207.30	16783.35	57832.84
174	86 MONSOON (MULTI	340.57	348.92	209.80	220.75
175	86 WINTER LOANS	251.95	262.62	278.25	288.25
177	87 MONSOON (PADDY)	7462.01	10397.04	10532.68	17848.37
178	87 MONSOON (MULTI	.00	156.80	.00	273.00
179	87 WINTER LOANS	2909.05	5909.05	18.20	243.20
181	88 MONSOON (PADDY)	13007.08	15028.60	16355.05	17151.70
182	88 MONSOON (MULTI	105.53	318.20	111.10	383.35
183	88 WINTER LOANS	1857.95	4752.35	.00	.00
185	89 MONSOON	.00	302.39	.00	.00
186	89 WINTER LOANS	.00	.00	100.00	100.00
188	90 MONSOON	.00	309.75	.00	.00
189	90 WINTER LOANS	14.77	171.47	.00	.00
191	91 MONSOON	7360.65	11245.32	.00	709.20
192	91 WINTER LOANS	.00	103.97	.00	.00
194	92 MONSOON	206650.94	1095383.36	11698.26	37588.91
195	92 WINTER LOANS	2097573.59	12156866.39	81655.72	82129.72
196	93 PRE-MONSOON LOA	39004.28	45092.12	.00	.00
197	93 MONSOON	47.08	65.32	.00	.00
	SUBTOTAL	2574291.44	13674078.98	258284.90	485787.64
	TOTAL	2667344.80	13787576.47	270618.13	498868

MYANMA AGRICULTURAL AND RURAL DEVELOPMENT BANK
 RETURNS DATA FOR THE MONTH JULY -1993
 STATE/DIVISION NAME = UNION

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NO	CODE	ACCOUNT	NAME	PRINCIPAL	INTEREST	PENAL INTEREST
1	10401	SL	OLD LOANS	568614.98	57909.29	.00
2	10402	SL	64-WINTER	19377.16	3148.08	267.54
3	10403	SL	65-MONSOON	220123.10	14763.09	6798.65
4	10404	SL	65-WINTER	16837.00	9.45	63.90
5	10405	SL	66-MONSOON	23420.00	237.50	30.00
6	10406	SL	66-WINTER	10379.00	.00	.00
7	10407	SL	67-MONSOON	18147.80	.00	1611.72
8	10408	SL	67-HARVESTING	2371.05	.00	.00
9	10409	SL	67-WINTER	100.00	.00	.00
10	10410	SL	68-MONSOON	6511.00	.00	.00
11	10411	SL	68-HARVESTING	4105.00	3159.80	398.08
12	10412	SL	68-WINTER	4670.00	1723.83	561.62
13	10413	SL	69-MONSOON	5011.00	.00	.00
14	10414	SL	69-HARVESTING	41.00	553.86	71.59
15	10415	SL	69-WINTER	1076.00	.00	.00
16	10416	SL	70-MONSOON	22851.00	.00	.00
17	10417	SL	70-HARVESTING	7234.00	2138.59	561.95
18	10418	SL	70-WINTER	5791.00	.00	2.52
19	10419	SL	71-MONSOON	27640.00	.00	.00
20	10420	SL	71-HARVESTING	4653.00	422.17	480.75
21	10421	SL	71-WINTER	3113.00	199.70	131.30
22	10422	SL	72-MONSOON	60293.75	.00	.00
23	10423	SL	72-HARVESTING	8439.00	8503.27	1287.31
24	10424	SL	72-WINTER	3109.00	43.98	51.30
25	10426	SL	74-MONSOON	200.00	.00	.00
26	10430	SL	75-MONSOON	200.00	.00	.00
27	10437	SL	77-MONSOON	1776.25	.00	.00
28	10439	SL	77-WINTER	130.00	238.75	15.00
			SUBTOTAL	1046214.09	93053.36	12333.23
29	10441	SL	78-MONSOON (PA)	13612.60	11656.84	14013.79
30	10442	SL	78-MONSOON (MU)	1370.00	2000.00	.00
31	10443	SL	78-WINTER	3080.00	.00	1128.00
32	10445	SL	79-MONSOON (PA)	19476.00	17479.19	7658.95
33	10447	SL	79-WINTER	1722.00	11842.32	9829.58
34	10449	SL	80-MONSOON (PA)	36296.00	42049.37	18146.88
35	10450	SL	80-MONSOON (MU)	1650.00	.00	.00
36	10451	SL	80-WINTER	570.00	304.00	.00
37	10453	SL	81-MONSOON (PA)	17954.00	10902.93	9051.70
38	10454	SL	81-MONSOON (MU)	.00	99.15	216.75
39	10455	SL	81-WINTER	.00	103.00	138.00
40	10457	SL	82-MONSOON (PA)	8825.00	11008.76	12349.55
41	10458	SL	82-MONSOON (MU)	8480.00	8083.85	2207.32
42	10459	SL	82-WINTER	300.00	250.50	900.50
43	10461	SL	83-MONSOON (PA)	9435.00	22620.01	12568.68
44	10462	SL	83-MONSOON (MU)	405.00	.00	.00
45	10463	SL	83-WINTER	860.00	320.50	.00
46	10465	SL	84-MONSOON (PA)	23220.00	26998.90	301.50
47	10466	SL	84-MONSOON (MU)	165.00	.00	20400.99
48	10468	SL	85-PREMONSOON	200.00	.00	.00
49	10469	SL	85-MONSOON (PA)	2670.00	12367.87	11292.95
50	10470	SL	85-MONSOON (MU)	365.00	248.30	337.35
51	10471	SL	85-WINTER	880.00	347.60	.00
52	10473	SL	86-MONSOON (PA)	13320.00	19022.90	16783.35
53	10474	SL	86-MONSOON (MU)	650.00	340.57	209.80
54	10475	SL	86-WINTER	3033.00	251.95	278.25
55	10477	SL	87-MONSOON (PA)	19255.00	7462.01	10532.68
56	10479	SL	87-WINTER	9275.00	2909.05	18.20
57	10481	SL	88-MONSOON (PA)	32560.00	13007.08	16355.05
58	10482	SL	88-MONSOON (MU)	2345.00	105.53	111.10
59	10483	SL	88-WINTER	.00	1857.95	.00
60	10486	SL	89-WINTER	.00	.00	100.00
61	10489	SL	90-WINTER	.00	14.77	.00
62	10491	SL	91-MONSOON	489785.00	7360.65	.00
63	10494	SL	92-MONSOON	655015.00	206650.94	11698.26
64	10495	SL	92-WINTER	30240020.00	2097573.59	81655.72
65	10496	SL	93-PREMONSOON	1001240.00	39004.28	.00
66	10497	SL	93-MONSOON	8680.00	47.08	.00
			SUBTOTAL	32626763.60	2574291.44	258284.90
			TOTAL	33672977.69	2667344.80	270618.1

MYANMA AGRICULTURAL AND RURAL DEVELOPMENT BANK
STATEMENT OF DISBURSED AMOUNT RECOVERED AMOUNT AND OUTSTANDING AMOUNT BY TYPE OF LOANS

STATE/DIVISION NAME =AYEYARWADY

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SR NO		TYPE OF LOAN	DISBURSED AMOUNT	1-4-93 OPENING	UP TO (31-JULY '1993)				
NO					FOR THE MONTH RECOVERED	FOR THE YEAR RECOVERED	TOTAL RECOVERED	OUTSTAND - BALANCE	RECOVERY %
1		SL OLD LOANS	164471446.00						
2		SL 64-WINTER	6727579.50	5972966.32					
3		SL 65-MONSOON	47804055.00	1568987.73	27316.00	34043.00	158532522.68	5938923.32	96.39
4		SL 65-WINTER	3260215.00	2455256.64	3851.00	4081.00	5162672.77	1564906.73	76.74
5		SL 66-MONSOON	19920985.00	343384.00	32903.10	50671.10	45399469.46	2404585.54	94.97
6		SL 66-WINTER	2214631.00	422603.40	1620.00	1620.00	2918451.00	341764.00	89.52
7		SL 67-MONSOON	26082605.00	135618.00		9591.00	19507972.60	413012.40	97.93
8		SL 67-HARVESTING	6081095.00	384096.04			2079013.00	135618.00	93.88
9		SL 67-WINTER	1026535.00	116423.94	9057.80	9057.80	25707566.76	375038.24	98.56
10		SL 68-MONSOON	19695130.00	11955.00	881.05	881.05	5965552.11	115542.89	98.10
11		SL 68-HARVESTING	3560275.00	331435.65			1014580.00	11955.00	98.84
12		SL 68-WINTER	1253960.00	55130.00	6111.00	6111.00	19369805.35	325324.65	98.35
13		SL 69-MONSOON	20524165.00	7515.00	1230.00	1230.00	3506375.00	53900.00	98.47
14		SL 69-HARVESTING	4891700.00	146830.00			1246445.00	7515.00	99.40
15		SL 69-WINTER	1290075.00	11997.00			20377335.00	146830.00	99.28
16		SL 70-MONSOON	25476905.00	24995.00	520.00	970.00	4879703.00	11997.00	99.75
17		SL 70-HARVESTING	6555295.00	231601.20	5969.00	7384.00	1266050.00	24025.00	98.14
18		SL 70-WINTER	1428740.00	20855.00	42.00	797.00	25252687.80	224217.20	99.12
19		SL 71-MONSOON	25974135.00	40955.00			6535237.00	20058.00	99.69
20		SL 71-HARVESTING	6797940.00	629258.25			1387785.00	40955.00	97.13
21		SL 71-WINTER	1345685.00	95565.92	860.00	1888.00	25346764.75	627370.25	97.58
22		SL 72-MONSOON	20767375.00	96409.00	80.00	1320.00	6703694.08	94245.92	98.61
23		SL 72-HARVESTING	3819240.00	719212.10			1249276.00	96409.00	92.84
24		SL 72-WINTER	1629070.00	99846.00	705.00	2135.00	20050297.90	717077.10	96.55
25		SL 73-PREMONSOON	432050.00	112004.00	1510.00	2075.00	3721469.00	97771.00	97.44
26		SL 74-WINTER	497435.00	2375.00			1517066.00	112004.00	93.12
27		SL 75-WINTER	782335.00	3161.00			429675.00	2375.00	99.45
28		SL 76-WINTER	1697660.00	4680.00			494274.00	3161.00	99.36
29		SL 77-WINTER	2751570.00	27855.00			777655.00	4680.00	99.40
				19491.00			1669805.00	27855.00	98.36
							2732079.00	19491.00	99.29
		SUBTOTAL	428759886.50	14092462.19	92655.95	133854.95	414801279.26	13958607.24	96.74
30		SL 78-MONSOON (PADDY)	219974955.00	1314465.85	4726.60	8305.60	218668794.75	1306160.25	99.41
31		SL 78-WINTER	4960595.00	24363.00			4936232.00	24363.00	99.51
32		SL 79-MONSOON (PADDY)	220881130.00	2115267.00	2940.00	7830.00	218773693.00	2107437.00	99.05
33		SL 79-WINTER	6206875.00	128190.00		350.00	6079035.00	127840.00	97.94
34		SL 80-MONSOON (PADDY)	219087425.00	1766576.00	2455.00	8621.00	217329470.00	1757955.00	99.20
35		SL 80-WINTER	6922972.00	220881.00			6702091.00	220881.00	96.81
36		SL 81-MONSOON (PADDY)	326119370.00	2466201.00	5998.00	7938.00	323661107.00	2458263.00	99.25
37		SL 81-WINTER	6879773.00	137674.00			6742099.00	137674.00	98.00
38		SL 82-MONSOON (PADDY)	335940380.00	2913919.00	2870.00	3670.00	333030131.00	2910249.00	99.13
39		SL 82-WINTER	5385475.00	4005.00			5381470.00	4005.00	99.93
40		SL 83-MONSOON (PADDY)	327752260.00	1838446.00	1940.00	5030.00	325918844.00	1833416.00	99.44
41		SL 83-WINTER	6421911.00	46495.00			6375416.00	46495.00	99.28
42		SL 84-MONSOON (PADDY)	329138090.00	2814206.00	19300.00	24735.00	326348619.00	2789471.00	99.15
43		SL 84-WINTER	7003765.00	70360.00		200.00	6933605.00	70160.00	99.00
44		SL 85-MONSOON (PADDY)	323515150.00	789697.00		2540.00	322527993.00	987157.00	99.69
45		SL 85-WINTER	6427580.00				6427580.00		100.00
46		SL 86-MONSOON (PADDY)	343676715.00	2724694.00	11000.00	19977.00	340971998.00	2704717.00	99.21
47		SL 86-WINTER	8169300.00	75155.00	658.00	658.00	8094803.00	74497.00	99.09
48		SL 87-MONSOON (PADDY)	318231200.00	1625651.00	14255.00	15845.00	316621394.00	1609806.00	99.49
49		SL 87-WINTER	11031725.00				11031725.00		100.00
50		SL 88-MONSOON (PADDY)	308683470.00				308683470.00		100.00
51		SL 88-WINTER	9196645.00				9196645.00		100.00
52		SL 89-MONSOON	402231650.00				402231650.00		100.00
53		SL 89-WINTER	10636820.00				10636820.00		100.00
54		SL 90-MONSOON	327063020.00				327063020.00		100.00
55		SL 90-WINTER	10375485.00				10375485.00		100.00
56		SL 91-MONSOON	299310760.00	2245730.00	489785.00	1329180.00	298394210.00	916550.00	99.69
57		SL 91-WINTER	20503615.00				20503615.00		100.00
58		SL 92-MONSOON	310725665.00	5971798.00	379880.00	5956078.00	310709945.00	15720.00	99.99
59		SL 92-WINTER	24342855.00	23513880.00	6960255.00	21647840.00	22476815.00	1866040.00	92.33
		SUBTOTAL	4756796631.00	53007653.05	7896062.60	29038797.60	4732827774.75	23968856.25	99.49
		TOTAL	5185556517.50	67100116.04	7988718.55	29172652.55	5147629054.01	37927463.49	99.26

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1. BURMA, MYANMA AGRICULTURAL BANK,
AGRICULTURAL CREDIT STUDY, VOLUME III
2. MAB FOR A MECHNIZATION PROJECT TA NO.556 BUR
3. (MAB FINANCIAL AND PERFORMANCE)
AGRICULTURAL CREDIT NEEDS AND OPERATIONAL PLAN FOR MAB
4. Strengthening of MAB
"Technical Assistance Project No.556-BUR(BUR/83/001)"
5. STRENGTHENING OF MYANMA AGRICULTURAL BANK
BUR/83/001 TA. NO.556 FINAL REPORT
6. STRENGTHENING OF MAB BUR/83/001
TA. NO.556 BUR INCEPTION REPORT
7. UNDP Project of THE SOCIALIST REPUBLIC OF THE UNION OF
BURMA PROJECT DOCUMENT"