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**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
SCHOOL OF INFORMATION STUDIES FOR AFRICA**

**A COMPUTER-BASED LOAN MANAGEMENT AND MONITORING
SYSTEM FOR THE DEVELOPMENT BANK OF ETHIOPIA**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN
INFORMATION SCIENCE**

**BY
SEID ALI
MAY, 1998**

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By
Seid Ali Nurye

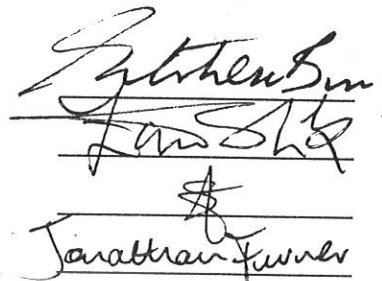
Name and Signature of Members of the Examining Board

Ato Getachew Birru, Chairman, Examining Board

Dr. Zewde Shibre, Advisor

Ato Sisay Fissaha, Advisor

Dr. J. Furner, External Examiner



The image shows three handwritten signatures, each on a horizontal line. The first signature is 'Getachew Birru', the second is 'Zewde Shibre', and the third is 'Jonathan Furner'.

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I am very grateful to **Allah**, most gracious, most merciful without whose help this work could never be possible.

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ABSTRACT

Globally, the banking industry has been showing a dramatic change in accomplishing its day-to-day operations in order to serve its customers efficiently and come out competitive. Though at an infant stage, the change applies to Ethiopian banks, too. A number of private universal banks are emerging which adopt computer technology of the time with better customer service. Even the existing government banks are updating their operations by automating their systems. These moves affect the Development Bank of Ethiopia - the case of emphasis of this study - which is basically oriented to provide loans of mainly medium- and long-term. It needs to improve its activities and provide better customer services.

In this thesis, problems of the loan management and monitoring system of the Development Bank of Ethiopia are identified; the current system is described using tools of systems analysis and design; and users requirements are defined. Moreover, output, input, process and security requirements for the proposed system are drawn. Alternative solution is proposed to attain users' needs.

Logical database design using entity-relationship modeling is also exemplified. Physical design of the new system that discusses output and input design is part of the study. Finally, prototype of the new system using Microsoft Access is used to demonstrate how the loan management and monitoring system could be handled with computers.

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CHAPTER 1

INTRODUCTION

1.0. Back ground

i) General:

Development banks are banks that are in most of the cases designed to assist development. Their forms vary from country to country. They could be fully or partially owned by a government or individuals and provide either a universal or specialised banking service as determined by a country's policy.

Their area of investment concentration is also affected by their ownership. Government owned development banks emphasize mainly on large projects, while private development banks more on relatively small private industrial sectors. Unlike government banks, private development banks are oriented to higher profitability.

The uses of development banks are many folds. To mention some, they are important to minimise unemployment, poverty, inequitable living standard, low standard of infrastructure facilities, unskilled manpower, etc. They intend to speed up economic development by making capital and technical advise available.

Advancement of computer technology has created an ever-changing environment nowadays. The level has reached where financial institutions cannot survive without incorporation of computer into their system. They need to use technology so as to obtain a competitive edge and hence stay in the marketplace. Development banks, as is the case to other financial

institutions, need to take the advantages of computerizing their operation in order to increase productivity by enforcing standard development methodology.

The technology again changes from time to time, better ones replacing obsolete ones. The banks, therefore, may need converting existing system to new system. Conversion of operations to new system involves not simply a change of the system but also a change in procedure, policy, communication, images, etc. They probably incur huge cost of installation and related items. As observed in today's world, many banks heavily rely on computers. They use personal computers, teller machines, different software, etc. [Belasco, 1994]. These entail huge investment on hardware, software, and skilled human labor. Weighing the cost-benefit analysis, these banks should try to cope up with their competitors via a computerized system.

Environmental factors also influence the way banks operate. According to a report on banking and finance by Dormer [1996], the African banking sector is rapidly changing. The trend shows that many sub-Saharan African countries are updating their banking system. As a result, the banks are becoming more sophisticated and competitive. As Roy Anderson, president of Johannesburg Stock Exchange, said Africa is the last continent to find true value. It has good investment opportunities. The motive being profitability, changes are evident to Africa in the banking sector. (For detail information on the trend of African banks, reference could be made to a journal entitled *Opportunity Africa: Nov., 1996, pp. 7-12.*) Thus, operation of banking in the continent will have an influence on the Ethiopian banks.

Commercial Bank of Ethiopia and private banks have been automating their system, and provide better service to customers. Following a free market-led economy, they participate in granting long-term loans. Thus, though these banks perform more of retail banking, the

change in the system of the environment sooner or latter affects the way the Development Bank of Ethiopia works.

To maintain sustainability and be competitive, it is high time for the Development Bank of Ethiopia to computerize its operations. For this, of course, the current system needs to be analyzed. Determine the requirements of users, develop specifications it might have that are specifically referring to its operation, and alternative system is to be developed.

ii) Specific:

The Development Bank of Ethiopia provides short, medium, and long-term loans to Agricultural, Industrial and Service sectors of the economy. According to February 1998 consolidated financial statement (unaudited), loans account 96% of the revenue (i.e., Birr 108 million in eight months) and 77% of the total assets of the Bank. Besides, according to the plan for 1997/98, the loan approval, disbursement, and collection plans are Birr 828 million, 757 million, and 585.5 million (both from the principal and interest), respectively.

Despite these huge financial resources, not much attention is given to the loan. Almost all the reports related to loans are produced manually. Due to lack of a complete and up-to-date financial information, decision makers faces obstacles, for example, to whether accept or reject new loan applications on a certain sector/sub-sector of the country and region of the country. Quite a number of clients' loan show erroneous balances.

In all branches and sub-branches, reporting requires looking through the individual hard copy records to collect relevant data needed, organise the data collected, summarise and finally interpret as requested. If, in case, some information is missing, the whole process would be repeated depending on the importance of the sought information. Even the electronic data

processing used by the Finance and Banking Department at the Head Office, on which many of the reports are based, has many deficiencies. For example, it does not provide complete statistical information about a specific loan and provides information only on the financial aspect of the loans. It has limited storage capacity. It cannot accommodate data more than two years transactions. The reports it produces are subject to further manual processing.

Besides playing significant role in the development activities, the Bank is also expected to be profitable as well and guarantee its lending programmes so as to enable it to continue providing the much needed assistance to different sectors of the economy. Since it provides loans up to 15 years, it is faced with high risk of environmental changes, inflation, etc. To this effect, appropriate decision is mandatory. This decision again should be based on adequate information. Decision makers nowadays consider information as a critical factor in determining the success or failure of a business. Key variables like the number of projects financed in a region, defaulters' rate in various types of the financed projects, etc., and continuous comparing of actual performance with planned ones are of great importance. In order to provide accurate information at the right time, automation of loan information handling and monitoring activities is appropriate.

1.1 Historical Background of the Development Bank of Ethiopia

The base for the establishment of the present Development Bank of Ethiopia is a private association called Societe Nationale d' Ethiopie pour le development de l' Agriculture et de Commerce which was established in May 1908 with a capital of 3.2 million Ethiopian Dollars. This was raised from 40,000 shares with 80 Ethiopian Dollars face value each. This bank, however, liquidated in 1928 [Fekade, 1987; Belai, 1987].

Later, the Agricultural Bank of Ethiopia came into being in 1945 by proclamation number 75/1945 with basic objectives of assisting Ethiopians who have lost their cattle during the Italian invasion. It had a capacity of financing loans up to 200 Ethiopian Dollars. In order to participate in commercial activities, this Bank was reorganised and named as the Agricultural and Commercial Bank of Ethiopia, in 1949 [Fekade, 1987; Belai, 1987].

Then in 1951, the Agricultural and Commercial Bank of Ethiopia was changed to the Development Bank of Ethiopia by proclamation number 116/1951. The major objective was to accelerate the development of the agricultural and industrial sectors of the economy.

Along with this Development Bank of Ethiopia, there emerged another development bank, in 1963, called Ethiopian Investment Corporation SC. which was first named as the Investment Bank with an increased paid up capital of Birr 20 million from the previous 10 million Ethiopian Dollar. Due to the similarity of these financial institutions, they merged and formed the Agricultural and Industrial Development Bank in 1970.

Following the revolution of 1974, it was nationalised and legally re-established in 1979 by proclamation No. 158/1979 as a Public Financial Agency. National Bank of Ethiopia was assigned to be its administrator. This Bank had been forced to provide loans that would have expected to result huge bad debts such as state farms. Thus, huge loss became the fate of the Bank every year as a result of high government intervention resulting in a *loss of Birr 198 million* by the end of the Derg regime.

Finally the present development Bank of Ethiopia was established as a public enterprise by the Council of Minister's Regulation No. 200/1994. The state capital, at present, is Birr 250 million. It follows a decentralised system. The number of employees as of 31 January 1998 was 847. Out of these, 559 employees were professional, technical and clerical workers, 329 of which, again, have taken different application software, such as Word Perfect, Lotus, dBase, Microsoft Word, Excel, Access, etc. The Bank has also a future plan of computerising the whole system. Though it uses them to word processing applications, the Bank now has 37 high capacity computers of which 10 are distributed to 10 Branches. This figure, of course, excludes a mini computer used at Head Office to process financial reports.

1.2. Objectives of the Bank

According to the Council of Minister's Regulation No. 200/1994, the purposes for which the Bank is established are the following:

Major objectives:

- to mobilise funds from sources within/outside the country
and provide medium and long-term investment credits
- to provide short-term agricultural credits

Sub objectives:

- to accept savings and time deposits and provide current
account services for its borrowers
- to buy and sell negotiable instruments and securities
issued by the Government, private organisations or any other person
- to participate in equity investments

- to draw, accept, discount, buy and sell bills of exchange, drafts and promissory notes payable within or outside Ethiopia
- to act as trustee
- to open and promote bank accounts with banks and banking correspondents in Ethiopia and abroad and
- to engage in such other activities as are customarily carried out by development Banks.

1.3. Organizational set-up

The Bank is now administered by a Supervisory Authority for Public Enterprises (in the Prime Minister's Office), a Management Board and a General Manager. Below these levels, there are 2 line departments which are commonly called lending/line Departments (Agricultural and Industrial), 4 supporting Departments, 3 Services, 12 Branches and 6 Sub-Banches that are accountable directly to the General Manager, 18 Divisions, 2 Client Guidance and Advisory Desks, 9 Sections, and 3 Units that are accountable to Departments/Services at the Head Office, 13 Sub-Banches that are accountable to Branches, and finally the operational level groups. For detail hierarchical level, see the organisation chart on the next two pages.

DEVELOPMENT BANK OF ETHIOPIA ORGANIZATION CHART

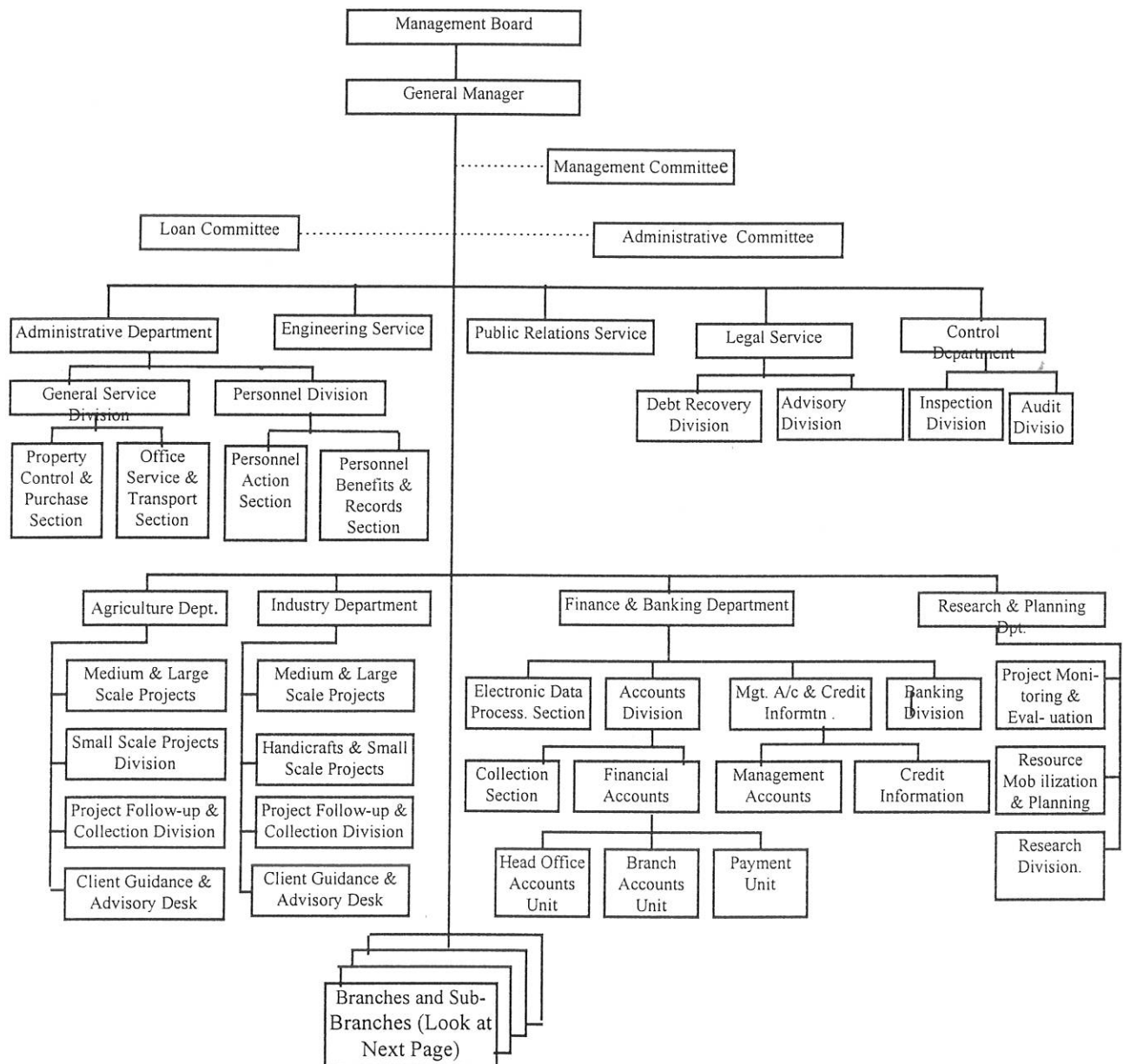


Figure 1.1 Organizational Chart of the Development Bank of Ethiopia

BRANCHES AND SUB-BRANCHES ORGANIZATION CHART

FOR THE DEVELOPMENT BANK OF ETHIOPIA

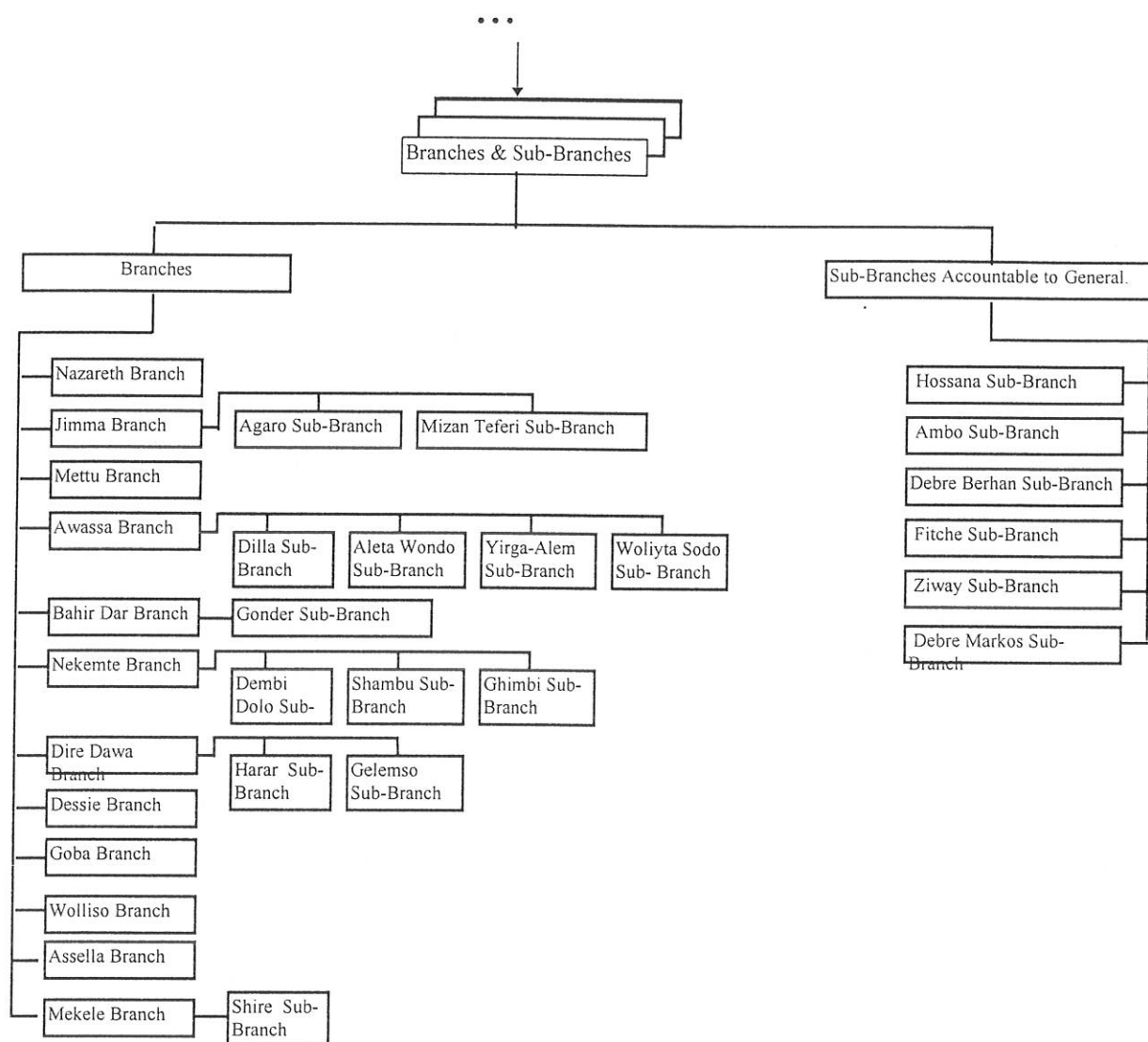


Figure 1.2. Organisational chart of Branches and Sub-branches of the Development Bank of Ethiopia

1.4. Statement of the problems

1.4.1 The Bank does not maintain complete information on its clients, line of

business/industry, etc.:

There is no as such electronically stored database on the status of client's business, legal issues, the condition of the collateral(s) held as a security against default, inspector's financed projects performance reviews, accurate number of clients by region and type of business and sources of fund, follow-up reports, location of projects, etc. The Bank does not maintain also a database of relevant external information for decision making like project profiles in a region, the performance of other projects, their number, etc. This incompleteness of client or business information is a result of manual loan processing. Thus, integration of the data and generation of various reports that are used to monitor activities can be achieved through computerising the processes.

1.4.2. High risk of industrial concentration in the Bank's portfolio:

According to Bruck's [1995] recommendation on the Association of African Development Finance Institution sub-regional seminar held in Arusha, Tanzania, greater emphasis should be given on the overall development banks profitability and financial soundness in order to maintain themselves in the market. This being the case however, higher risk of industrial concentration prevails due to lack of information. For the time being, loans to grain-mill are discontinued. Hotel loan is also out of the projects financed by the Bank in few regions of the country. To few other investment areas to which the Bank considered as high rate of defaulting

from experience, the percentage of the total cost of the projects the Bank covers is decreased to about 50%.

1.4.3. Lack of reliance on the accuracy of records/reports:

Since the data are maintained in the form of hard copy files, and the fact that reports are usually prepared in hurry to make them available in the time interval set for decision making purposes, they are highly prone to errors which lead to wrong decision. It is very common to report a balance by the name of a client after he/she has been given a clearance. Working out, for example, principal outstanding, principal arrears, interest not yet due, and interest arrears with two/three accountants for the whole loan ledger cards of hundreds and sometimes thousands become very tedious. Under such circumstance, it is very likely for many errors to occur. A good example is the figure reported by Finance and Banking Department and Research and Planning Department for the annual outstanding loan for the year 1996/97. A difference of Birr 171 million was reported. It is not exaggerating to say that the reports and also the records approximate rather than explain exactly the position of the respective loans. Usually reconciliation is made through telephone conversation. This, too, results in high cost.

Inaccuracy of records also results in problems of performance allocation which pertain mostly to financial reports. Many year-end collections from loans are treated as suspense until the close of the fiscal year and don't offset loan balances. Therefore, collections of a certain year are postponed to the year coming. This problem is aggravated when significant loan repayments are made at the end of the year.

1.4.4. Delay in the preparation of reports:

Obtaining information on time is vital to make informed decision by any decision maker. However, in the bank, since most of the operations are manual, much delay is encountered to collect data, to compile it, to prepare a report, and to distribute it to the concerned bodies as requested or as per the standing instruction set for. Thus, by the time the reports reach the decision maker, they become useless and be simply shelved. The same is true for credit information request about a specific client from other financial institutions, courts, municipalities, etc. This problem is also faced for monthly, quarterly , and annual reports on the total loan applications, outstanding, collections, disbursements by sectors that are useful in indicating how well the Bank is performing.

For example, balances of loan portfolios of each month are expected to reach the Research and Planning Department, which is supposed to summarise loan information, from different Departments, Branches and Sub-branches within 10 days of the following month. However, they usually reach at this Department after a month or two and sometimes three months later. Annual report of the year 1996/97, for instance, was delayed until the end of September 1997. Another example is that, according to the discussion I have had with loan officers, collecting addresses of 132 clients from each individual files took two days for two loan officers. Had there been a computerised database, it might probably be a few minutes job for one loan officer.

The delay is partly caused by the formats and reports. Report and formats are developed by another department. Their contents are not in the way data are initially stored. These result in loss of important information that should have been obtained from the units.

1.4.5. Lack of standardization, duplication of efforts and data redundancy:

Sometimes, loan proposals are prepared and submitted to the Bank by clients showing that they are doing well. This deviates to some extent from the standards of the Bank. Information that are requested by the Management, Management Board, Supervisory Agency or external bodies such as the National Bank and the Ministry of Finance are usually different in form from the information kept and prepared manually. In such cases, they need to be modified further, may be the whole process again.

Data/information redundancy is created when the same data/information is captured and/or stored in multiple places. It consumes storage capacity and disrupts the data integrity. In the Bank, the same information with slight modification is prepared by different departments. For example, 'loan position' reported by Branches and Sub-Branchees and Credit Information and Management Accounts Division to the Research and Planning Department are almost similar. Thus, duplication of efforts definitely occurs.

1.4.6. Communication gap:

Lack of complete information creates communication gap among the units of the Bank, like between the Client Guidance and Advisory Desk and appraisal Division, appraisal Divisions and Engineering Services, Finance and Banking Department and lending Departments or Legal Service and (Sub-) Branches, etc.

1.4.7. Not well designed formats

The forms used by the loan information system are not in a ready to use manner. Some are not consistent; others contain unnecessary question and are not usually properly completed. They are not updated despite major changes in the operation. For example, the Bank has decentralised its Branches and Sub-branches three years ago. However, many of the forms are intact as they were. The formats are, thus, crowded with unnecessary spaces to fill-in data which by this time do not apply to Head Office/(Sub-) Branch.

Some formats do not have form name at all, date entry spaces, the office they belong, the destination while they should be completed by other units, same colour copies are distributed to different units, unnecessarily duplicate copies, and confusing words are used.

1.4.8. Lack of Security to loan information

The loan information is accessible to anyone in the Bank. The client's file can be taken out by other Departments or Services of the Bank so long as the head of that unit authorises. This exposes information the Bank holds on a client.

1.4.9. Problem of integrity

As a result of the problems described before, quite many reports issued monthly, quarterly, etc. do not approximate figure of the Bank irrespective of their timeliness and accuracy. It is quite common that reports ignore all or part of (Sub-) Branches activities.

1.5. Objectives of the study

1.5.1 General objective

The major objective of this study is to assess the current status of the loan information system, to identify its problems, to define requirements, and to design and propose computer-based loan management and monitoring system.

1.5.2 Specific objectives:

To achieve this general objective, the following specific objectives have been formulated:

- to identify users of loan information systems;
- to assess the information needs of users;
- to analyse existing loan management and monitoring system;
- to identify its short comings;
- to identify data elements required in the operation;
- to identify key variables expected from the information monitoring system;
- to define requirements and propose communication networks;
- to design necessary databases;
- to define input, processing, output, control and security requirements of the proposed system;
- to suggest and recommend ways and means of installing and implementing of the proposed system.

1.6. Methodology

1.6.1. *Systems Analysis and Design*

During the course of the study, Structured System Analysis and Design is used. This is because Structured System Analysis and Design provides a systematic approach to designing and building quality computer system. Throughout the phases of analysis and design, it helps to the analyst proceed step by step, obtaining feedback from users and analysing the design for omission and errors. Moving too quickly to the next phase may require that the analyst return to rework earlier portions of the design. If, for example, several elements were omitted when examining the details of the data used within the system, all that might have been worked could be modified. Though such modifications increase cost and need more time, subsequent activities would be less costly and require less time. As a result, the system design will be accurate and complete. In the process, form design or source documents and other appropriate tools and techniques were used at various parts of the analysis and design life cycle [Kandell and Kandell, 1995].

Upon following the systems development life cycle, it tried to address points like survey of the current system using different fact finding techniques, identifying problems of the existing system, defining user requirements, drawing proposed system requirements, selecting feasible solution, designing the new system. Implementation, hardware and software selection are not covered.

Tools applied in the systems analysis and design are described on using them during the progress of the work and symbols used to some are annexed in Appendix A with explanations. Alternative systems analysis and design methodologies are discussed in section 2.6, Chapter2.

1.6.2. Data Collection

1.6.2.1 Interviews:

Discussion was held with 15 staff users of the loan (monitoring) information and those that are engaged in the actual loan processing in order to have understanding of the problems of the existing system and to get idea as to what requirements the proposed system should have. The people interviewed were those at Division Head level and above and senior loan officers, accountants, and auditors. The reason for the selection of this group is that almost every report passes through them so that they could provide comprehensive information as to what is going on in that particular Department/Service/Division. As members of management committee, their participation in the Bank's strategic decision-making which is helpful to know what kind of information is important in decision-making regarding loans and monitoring them is another reason to select them for interview. All those interviewed were only at Head Office. For the Branches and Sub-branches questionnaires were used. An interview guide used is annexed in Appendix C.

1.6.2.2. Questionnaire:

In order to have different views from larger users, especially those that are at different branch and sub-branch levels, questionnaires were distributed to 45 staff of the Bank 25 of which were to the Branches and Sub-Branches. 34 questionnaires were returned making the total response rate to 76%. Of these returned questionnaires 18 and 16, i.e., 72% and 80% were from (Sub-) Branches and Head Office, respectively. The questions on the questionnaire were almost similar to what was interviewed. A copy of the questionnaire used is annexed in Appendix -D.

1.6.2.3. Observation:

Observation was conducted in order to see the work flow, medium of storage, access time, and methods of acquiring information and for what purposes do users use the available computers. Also looked at was the electronic data processing center like the available computers, speed of processing user friendliness, the services rendered, security maintained, etc. The result of the observation is not different from the response obtained through the questionnaire.

1.6.2.4. Document analysis:

Different documents were analysed to get an understanding about the policies and regulations of the government, rights, duties, and responsibilities, objectives,

goals, and activities of the Bank. Working manuals, organisational charts, different forms, clients files, etc. were looked through.

The data collection process did not include those external users like clients, financial institutions, etc. The reason for this is that a study had been undertaken on users' attitude towards the Bank's information handling system before two years. Though the study was conducted to assess the performance of the Bank in view of restructuring the total system, it identified loan problems and included the views of clients and related bodies through face to face discussions and questionnaires. Taking into account the time and other limitations, that study was consulted regarding the clients problems and their requirements.

1.6.3. Sources of data:

Different sources of information are used for the study. The following are the commonly used sources of information:

System users: encompass users of the loan/monitoring information system including the Management, Departments, Services, Divisions, Branches, and Sub-branches. Being involved practically in their day-to-day operation and exposed to practical problems, staff of the bank are taken as good sources to the study. They know well as to how the system operates, the activities engrossed, the means upon facing problems, and so on. This is identified by interviewing them and collecting their views through questionnaires. Classification of users of the system is discussed later in Chapter Four.

Forms and reports: are other useful sources of information for system processes and data flows applied in this study. Different forms that are being used by the systems are analyzed to know whether redundancy of data elements exist, information in the forms and reports is complete, relevant, etc. Exhaustive lists of the forms and the respective data elements and their structure are annexed in the Appendix.

Procedure manual: being list of activities of what and how people do in the Bank, procedure manual helps in determining detailed loan/monitoring activities important in detailed system design.

1.7. Significance of the study

- It reduces risk of defaulters: The existence of a database about projects financed by the Bank will help to avoid concentration of identical projects in a region and minimise rates of defaulters.
- It helps to provide timely, relevant, and quality information: Currently due to the problems mentioned in the statement of the shortcoming, the information provision is untimely, erroneous, and of less quality (e.g. in terms of format, content, etc.) for the decision makers. Thus, these existing problems are expected to be solved by the proposed computerised information system.
- It enables to obtain information that are currently unavailable outright: Irregularly requested information, especially those of external ones, are very unlikely to match what

is available at hand. There are also information that are ignored due to the difficulty of data analysis manually. In such cases, the new system will hopefully be flexible to handle these kinds of problems.

- It will meet information requirements of users: Based on the activities that the users are engaged in, their information needs as has been observed from past information requests, etc., information will be ready at any point of time or will be stored in the way that helps easy retrieval when desired. This will help to satisfy the information needs of users which will again help the Bank to have more clients. In this way, it will assist the Bank to withstand the fierce competition that is now prevailing as a result of the liberalisation of the economy. Information need of decision makers will be of emphasis to monitor loan operations.
- The study is expected to narrow the communication gap: Communication will be improved among various departments, divisions, services, sections, branch and sub-branches of the bank.
- Control will be enhanced: Availability of different forms of data improves control and, of course, performance.
- It allows staff to use their time more efficiently: The project analyst, officer or technical staff will spend their time which is being used presently to prepare reports and other non-project areas on studying projects and related activities.

- It allows ease of use: A system should be as easy to use as possible. It should be, as current computer-based systems dictates, user friendly. Thus, the current complexity and awkward manual loan handling system will get improved.

1.8. Scope and limitations of the study

In such huge organization, systems analysis and design couldn't be done by an individual. The study is, thus, confined to study the current system, define user requirements, requirements of the new system, and undertaking system design. Even then, exhaustive study is not taken rather samples are used in many cases.

The study does not also include selection of specific software and hardware to be used by the proposed system. Only elementary suggestions are made with this respect.

Due to shortage of time and other problems, I limited the sample size to twenty percent of the total population.

CHAPTER 2

LITERATURE REVIEW

2.0. Introduction

The concept of banking activity is developed as a means to facilitate trade and to handle financial aspect of production, distribution, and exchange. It largely came into being after the idea of specialization/division of labor by Adams Smith. The development of money system to facilitate exchange between producers is also another cause for the expansion of banking [Hovle and Whitehead, 1987].

Different types of banks exist nowadays. Banks, in this context, refer to those financial institutions which basically deal with money and related activities, such as lending and/or depositing money. These banks are different from country to country depending on their choice of specialized activities or as determined by the local government decree by proclamation on establishment or later while on operation. Commercial banks, construction and business banks, national banks, development banks are some examples. Discussion of each of them is beyond the scope of this study. Therefore, attention is given to development banks, in general, and specially the Development Bank of developing countries. In the few paragraph hereon, points such as what development banks are, their evolution with special emphasis to that of Africans only, their importance, and finally the need for computerizing them are discussed.

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2.1. Definition and Functions of Development Banks

"Development Bank is a bank established to make intermediate and long-term loans for the purpose of supporting economic development within a country." [Woelfel, 1994, 299]

It is a bank with the basic objective of promoting economic development through providing short-term working capital, medium and long-term loan to productive enterprises in developing economies [Harlander and Mezger, 1971]. Most of them are geared towards grassroots economic assistance. They are always located in dispersed rural and urban areas so that they can diversify the loans they offer.

To look into detail, development banks perform variety of operations. Among them are the following:

- Specialized advisory and consultancy services
- Provision of working capital financing
- Assisting restructuring of enterprises
- Program for entrepreneurial enterprises
- Creation of non-bank financial intermediaries (easing, insurance, brokerage firms, savings institutions)
- Achieving autonomy in investment decision making, project selection, and the provision of technical assistance
- Emphasis on environmental development
- Removal of subsidized loan from operations and their transfer into separate trust at the expense of third parties [Bruck, 1995].

Different development banks perform often specialized activities and are taking an increasing variety of forms and functions. The promotion of modern sector in the economies of developing countries, i.e., fostering the development enterprises in the field of industry, commerce and finance, and extending in some case to agri-business and commercial agriculture are among their emphasis [Raj, 1980].

The scope of some development banks extends to retail banking activities, i.e., basically short-term type while others limit their activities mostly to medium and long-term projects with little involvement in short-term areas, specially in those areas where other financial institutions are not willing to invest. This view is supported by Maurer, et al [1995] who defined development banks as banks which do not perform what most commercial banks do. They involve in areas where others shun to invest and funnel major amounts of capital into projects of dubious profitability. They promote projects that are considered unprofitable through providing the required fund in the form of short-, medium-, and long-term loans.

A number of factors influence effectiveness of development banks. Their services need to benefit countries' growth to get into a comprehensive economic development strategy. They should select markets carefully, serve unmet capital needs; play active role in generating good development opportunities often by performing activities out side of its functions such as technical assistance, project development, and advisory; husband economic development resources carefully; commit to social shape; look credible in the eyes of potential investors; capable of generating revenues to sufficiently cover costs (i.e., credit worthiness); and balance their role as financial institution and economic developer [Parzen and Kieschnick, 1992].

Development banks are expected to follow nationally accepted priorities and development objectives, such as creating employment, acceleration of economic growth, more equitable distribution of wealth and income, promotion of regional industrial development. Moreover, their activities could also range from financing projects to joint financing with private fund. In fact, development banks have been serving as handmaidens of governments in the implementation of their plans [Twinomusingusi, 1995]. To achieve these activities, they need to expand regional and rural branch development banks.

Development banks as Parzen and Kieschnick [1992] expressed have conflicting roles. They must be both sustainable financial institutions and as well be a cost-effective development vehicle. In other words, they are in opposing objectives. On the one hand, upon investing in risky investment areas, they could incur losses. Losses are, however, unavoidable in economic competition. Under such conditions, the goal should be on successfully adjusting the losses and come out to be profitable [Pazen and Kieschnick, 1992]. On the other hand, the banks are expected to be profitable. In fact, many of these banks are profit making institutions with the additional, non-profit making functions. Generally, these banks are not always successful because undertaking such projects may at times be contrary to what was initially forecasted, and may be more than revenues to offset losses incurred.

Here comes the need to monitoring the loan granted since uncertainty is an intrinsic character of a project. Thus, on going monitoring is used to identify risks, assess the specific and overall impact of each element, assess each element probability of occurrence, identify risk management options and document the processes dealing with risk [Levene, 1996].

Such figures will be of very useful if they could be summarized and be available to decision makers on time so that they are used as an indicators of performance and benefit more in preventing incurring additional losses or improve good performance further in a better way. Computers that are easily accessible to decision makers could help much in this respect.

Monitoring is about establishing the 'where' and the action that should be taken if there is any deviation from the plan. The objective of monitoring is to accumulate performance data, analyze significant deviations and forecast the impact of the project [Levene, 1996] both on the performance of the bank and contribution to a country's development. It aims at assessing what is happening and how the bank performances. The steps followed in monitoring credit are to gather information from all the relevant project participants; to consolidate the data collected into graphs and/or further reports; to analyze all the information; and finally to draw conclusions [Levene, 1996].

An effective and efficient monitoring system would depend upon such factors as the effectiveness of the follow-up, size of operation, type of industries and segments of economy financed, geographical coverage and the resources in terms of finances and manpower at its disposal [Punja, 1980].

It helps to identify the flow of additional, unanticipated benefits from a project, assisting the speedy implementation of the project and its efficiency and profitable performance thereafter in order to recover its investment [Punja, 1980].

Monitoring being, among others, a comparison between plan and actual performance, may lead to revise the detail working schedule or revise the plan and budget, or, in extreme cases it may entail to the level of changing objective(s).

Monitoring loan identifies the types of risk associated with a financed project such as technical, financial, resources, and schedule risks [Levene, 1996].

Determination of performance is essential for a development bank to measure the degree of effectiveness. Parzen and Kieschnick [1992] mentioned that an effective development bank produces net economic development benefits at the lowest possible cost and performs well enough to attract and retain capital. They need to review thoroughly their impact relative to the resources they invest.

In general, to cope up with the rapid economic and business environment, development banks must reinvest themselves and sustain their contribution to development [Bruck, 1995]. To this effect, they must change the way they tackle their operations, adapt new ways of doing activities, initiate new services to their clients, maintain their social content, replicate themselves in new geographical areas, broaden their investment base etc.

2.2. Evolution of Development Banks

This part summarizes evolution of development banks of Africa. Immediately after liberation, almost all countries of Africa initiated to come out of their backward development stage they found themselves. Partly, with an imposition of international financial institutions such as International Monetary Fund and World Bank, governments of third world countries have

established development banks to pace ahead steps in industry and improve agriculture and minimizing the social problems such as unemployment, poverty, etc., thereby.

In the process towards industrialization, African governments tried to promote new projects which require huge amounts of borrowed capital. This called for financial institutions, largely development banks, both for technical limitation and financial supervision.

The majority of African development banks were established after independence; and these banks were mostly the respective country government's ownership and instrument for the development of virtually all sectors of the economy. Development banks were also created in those countries where there were many other banks and no shortage of entrepreneurs or serious lack of investment capital. In these countries, the established development banks got customers from commercial banks who borrowed short term credit and later rolled over for subsequent periods [Harleandel and Messenger, 1971].

Thus, development banks are new kinds of institutions in Africa, largely post World War II creation. Though initially started in 1908 at a private share company level, the Development Bank of Ethiopia, which was established in 1951 by the Ethiopian government, was the first development bank in Africa. This Bank was followed by Uganda Development Corporation in 1952 which served as exemplar to the establishment of most other African development banks [Harleandel and Messenger, 1971].

The area of activity of these banks, however, varied from bank to bank and country to country. Some of these development banks have engaged in one or many activities of the following: supplying fertilizers and plant pesticides to increase agricultural productivity,

cement to increase construction, electric power for industrial use, transportation facilities and communication networks, etc.[Park, 1980].

Development banks were looked for as a suitable place for governments' development initiatives. During this process of establishing development banks, host governments were supported by international financial institutions.

2.3. Importance of Development Banks

Development banks are useful to promote, facilitate, and finance establishment, expansion and modernization of projects in agriculture, industry, and services such as tourism through providing short, medium, and long term loans [Twinomusingusi, 1995].

They are called upon to take up projects promotion in places where entrepreneurial initiative is lacking or inadequate. This relates to the need for the regional dispersal of industries, the encouragement of small-scale enterprises and the development or adoption of appropriate technology, and the filling in of gaps in the industrial structure by taking up the manufacture of basic, intermediate and ancillary products [Nadkarni, 1980].

Development banks provide a means of assessing investment needs and allocating investment resources in different sectors of an economy. They are suitable to administer funds so as to customize appropriately to local needs according to the national plan. They also reassure lenders/donors that the resources are rationally-under proper supervision- towards agreed objectives [Gordon, 1980]

Government owned development banks, in their process of supporting development agriculture, small industry, housing, public water, etc., have been serving as a channel to funds from international financial agencies/donors, such as the World Bank [Raj, 1980]. They also perform important but non-bank functions such as technical assistance. This paves way to have access to manage grants or bi-lateral finance cooperative allocated to development.

They contribute a great share in alleviating problems that the developing countries have. Examples include reducing high rate of unemployment, existing inequalities in standard of living, unbalanced trade and financial equilibrium, low standard infrastructure facilities, high cost and shortage of energy supply, limited available fund compared to present indebtedness and saving possibilities, and unskilled human power [d'Estaing, 1980].

In the process of raising living standards of a developing country, development banks, like other financial institutions, have been agents to development. They are essential in diversifying industries in the rural areas to provide employment and to keep the people from moving to cities. They also serve as a means to fill the gaps especially in areas that have been neglected by private banks and other financial institutions. The need to create broader economic opportunities in the rural areas is partly levied on these banks [Virata, 1980]. Development banks have been permanently perceived as instrument for attaining the objectives of rapid industrialization [Raj, 1980].

Development banks undertake careful industrial project consideration, allocate properly the highly intensive capital investment and develop technological requirement of these projects so as to avoid repeating investment mistakes observed in the past [Virata, 1980].

They contribute a lot in pushing the respective developing countries towards self-sufficiency by giving farmers guidance to be familiarized with business and industry to enable transfer assets from agriculture to business/industry. They improve assistance to agro-industries like oil seeds processing, rice and wheat mills, coffee, dairy farming, hotel and tourism industries, saw mills and timber processing and steel rolling and wire drawing units [Twinomusingusi, 1995]. In this way, development banks assist uncultivated agriculture from being exhaustively used. i.e., they help in discouraging the drive for intensive agriculture using irrigation and drainage systems, high yield crop varieties, fertilizers, pesticides, processing equipment and storage units which are needed to keep up production. The banks are called upon to finance the cooperative movement in the process of self-sufficiency [Virata, 1980].

Existing entrepreneurial tend to prefer to the most favorable and fully developed locations. some governments have attempted to lure them to these locations through placement of loose zone restrictions and the provision of fiscal and tax incentives. Development banks have been serving as instruments for achieving rapid industrialization and the agents for removal of regional imbalances [Punja, 1980]. There are also many examples of development banks which without others assistance had taken up the promotion of projects in backward areas [Nadkarni, 1980].

They coordinate co-financing of a project with other financial institutions in cases of huge financial requirement of projects [Virata, 1980].

Development banks are a vital bridge between the broad development plans and macro-economic policies of governments and the day-to-day application of these policies to the productive enterprises which development banks deal [Raj, 1980].

It is indeed one of the prime economic functions of the government of any developing country to stimulate the flow of domestic savings and to see that these are mobilized through appropriate institutional channels in order that they may harness the country's development needs. With the development of an indigenous sector, the banks meet the challenge of an increasing local currency by mobilizing primary savings, i.e., in addition to purveying long-term credit to industry [Raj, 1980].

Generally, development banks participate in stabilizing economic growth by increasing basic needs satisfaction, financing labor intensive medium and small scale industries which are linked to agricultural output and generate export earnings. They emphasize consideration of projects in terms of socio-economic benefits [Virata, 1980].

2.4. Necessity of Computerization

Banks were initially working on stable, predictable, and reliable environments. They provided checking and saving account and granting of relatively straight forward loans. Later, however, loans became increasingly complex and large; specialized banks began to appear. These banks would often share the risk of huge loans with one another [Reynolds, 1988].

In particular, being oriented towards development activities, development banks have been providing a long-term loan for up to 15-20 years. They are highly subject to risk of inflation, currency rate fluctuations, etc. They have also been getting into terms with foreign donors or financial institutions which involved complex transactions and hence difficult to handle manually. For example, revolving funds which are to be disbursed again and again from what

has been collected as a repayment of the initial loan until the terms specified in the contracts are met.

Banking and indeed the entire financial services industry have long been undergoing major changes in their day-to-day operation or otherwise using a rapidly advancing technology.

Reynolds [1988] pointed out that advancement in computer technology not only changes what banks do, but also changes the very nature of what bank is.

Among the components that need sound considerations, Picciotto [1993] described, reliable information system and adequate controls as points that every viable development financial institutions can be built. For reliable information system again, computerization of operation is important.

Experience shows that institutions need automation seeking assistance in three areas. These are: achieving growth, improving management control, and preparing for new competition [Williamson, 1987].

For companies to succeed nowadays, computerizing the working environment is essential.

Computers serve as a tool to handle large volume of information at minimal response time to boost productivity of information, goods and services [Prentice Hall, 1993].

Automation, in particular computers, will help development banks attract customers by providing improved customer service; it brings about growth through providing new products and services. It enables the banks to operate efficiently and effectively. By computerizing customer transactions and document processing, institutions improve speed and accuracy of

operation. Moreover, it enables proper system to be put in place to deal efficiently with issues such as credit analysis and contract management that are required to meet needs being identified by the banks. It allows management to undertake on time decision making by providing information on, for example, trends and patterns of the performance of the bank.

For many organizations, in fact, computers have proven to be central to their success, and the way to coping with an industry in transition. The computer technology is used not just to automatic support functions; it is used to implement business strategies and can be said it as the lifeblood of banks [Reynolds, 1988].

It helps to cope up with competition. Due to computerization, many development banks have been able to venture out of their traditional way of processing activities. It enables to respond to environmental changes. And those who have been successful are those that embrace this technology, and use it carefully in setting business strategy. Computers made new products/services possible, because they have allowed people to keep track of unmanageable numbers and have brought down the cost of doing transactions.

Computers, in this case, are doing more than changing how individual banks work. Therefore businesses must stay aware of what technology is being introduced and what competitors are using, or they are liable to find themselves locked out of projects [Reynolds, 1988].

2.5 Need for Management Information System with Computer Applications

Management information system enables information resource management. It aims at supplying the right information at the right time to the different levels of management to used in their decision making process. The information provided could be manually produced

and/or computerized. The information in most of the cases gets more summarized as the levels become higher.

Each level makes different kinds of decisions. The information requirements also differ like wise. If the operation is computerized, the reports/information expected to be fast, decision making will be improved. Monitoring operations could be handled easily.

2.6. Alternative Systems Analysis and Design Methodologies

System analysis and design is a costly endeavor. Installing a system without a system analysis and design method could lead to great dissatisfaction among the users. Therefore, system analysis and design methods allow to systematically identify problems and user requirements, propose alternative solutions to the problems, and design the system in order to improve activities through the use of computerized information systems.

There are a number of systems analysis and design methodologies. Structured Systems Design, Structured Systems Analysis, Structured Systems Analysis and Design, Jackson Systems Development, Information Engineering, Object Oriented Analysis and Design, Soft Systems methodology, etc. are examples of methodologies for systems analysis and design [Avison and Fitzgerald, 1993; Whitten et al., 1989; Clifton and Sutcliffe, 1994; Kendall and Kendall, 1995]. These are discussed below.

i) Structured Systems Design -- It deals with the definition of smaller modules and identifies characteristics that lead to the efficient arrangement of these modules within the overall design. Structured System Design is a concerned with the selection and organisation of

modules and interfaces that would solve a pre-defined problem without any contribution to the definition of that problem. This non contribution to defining the problem is the major limitation of this method because development of an information system requires both analysis and design aspects to be addressed. The benefits obtained by design would be wasteful if the definition of the original problem is not well stated or inaccurate.

ii) Structured System Analysis -- This methodology came as result of the earlier development of a structured system approach to design. As discussed before Structured System Design is concerned with the selection and organization of modules and interfaces that would solve a pre-defined problem. The development of an information system requires to address both analysis and design aspects. This method defines the original problem first before beginning to design it. It defines what the system should do before deciding how the system should achieve them.

It is conceived to be applicable in the system development irrespective of the level of automation and size of the system. In practice, however, Structured System Analysis is mainly used in environments where at least part of the system is automated [Avison and Fitzgerald, 1993].

iii) Structured Systems Analysis and Design -- It is a data-driven methodology that places emphasis on data modelling and advises analysis and specification views with data flow diagram and entity relationship diagram with detailed rules and guidelines.

It includes both the conventional approach and new techniques and tools. Being a structured method, it allows to define user requirements more accurately and conceive alternative solutions irrespective of how the existing system works. Maintenance is also addressed at the time when the need for enhancement in operational system arises [Whitten, et al., 1989].

By separating the systems analysis from systems design activities, this method makes it easier to judge the proportion of time spent on either analysis or design [Avison and Fitzgerald, 1993]. It breaks down the system development into phases with each phase further divided into steps and activities [Clifton and Sutcliffe, 1994].

Thus, in contrary to other methodologies that might result in a vast amount of information gathered but no conclusions could ever be reached, this method splits the activities to be done into phases for systems analysis and systems design. This partitioning helps to have an appropriate time share to either of them as the work demands [Avison and Fitzgerald, 1993].

Moreover, the following reasons support this methodology:

- Data structures which reflect the natural relationships among business entities provide a stable picture for defining information requirements
- Systems built around data structures are less designer dependent and more objective than those designed by function and
- Users see system in terms of the data that the systems maintain, and new requirements are expressed in data terms.

If the databases of the new system are built according to such data-driven methodology, they will contain accurate and up-to-date data, meet all current output requirements, meet future requirements without many changes to the system. Any additions can be added easily to appropriate entities [Whitten et al., 1989].

Among others, principles that are used by this methodology are: development of work should be based on tangibles such as agreed report formats rather than broad statements of requirements; logical design should be separated from physical design; data structures should determine system structures.

It has gone through many versions [Clifton and Sutcliffe, 1994]. It is being updated to fit the needs of systems developers. Latest versions give weight to entity relationship modelling. Due to these benefits and others, this method is followed in this work.

iv) Information Engineering -- The base for this methodology is the belief that data are the heart of an information system and that the data are considerably more stable than the processes or procedures that act upon the data. It does not consider processes in detail. Besides the techniques used in this methodology change as new and improved technique emerge [Avison and Fitzgerald, 1993].

v) Jackson Systems Development -- The primary purpose of this methodology is to produce maintainable software, and its emphasis is on developing software systems. It does not address topics of project selection, cost justification, requirement analysis, user interface, user participation, etc. Also it does not deal in detail with file or database design. This method is

not comprehensive for it does not cover the systems development life cycle [Avison and Fitzgerald, 1993].

vi) Soft System Methodology -- This method supports that the whole system rather than a particular function should be studied in an organisation. The developers this method argue that systems analysts apply their craft to problems, which are not well defined. These fuzzy, ill structured or soft problems are common in organizations. It is relatively easy to model data and processes, but to understand organizations, it is essential to include people in the model who could have different objective, perspective and attitude [Avison and Fitzgerald, 1993].

This methodology was envisioned as a way to model a world that is often chaotic by using 'rich pictures,' ideographs that capture characteristic organisational narratives [Kendall and Kendall, 1995].

Soft System Methodology concentrates on understanding problem situations, rather than developing solutions. This method uses rich pictures as a very useful way of getting the user to told about the problem situation [Avison and Fitzgerald, 1993]. Therefore, this method is not appropriate to the problems the Bank has. Nor the data the Bank maintains.

vii) Prototyping -- It is the result of fourth generation languages. It has been rarely considered as a method of developing information system due to the limitations associated with it. It is used where the systems design is to be tested thoroughly first [Avison and Fitzgerald, 1993]. According to Whitten et al. (1989), it is similar to the 'code, implement, and repair' methodology of the pre-structured era. Since it comes up with one alternative, it is very

costly if that option is incorrect. Being much of the proportion of the total cost goes to prototyping is another drawback to this method. It, however, participates end user.

viii) Object Oriented Systems Analysis and Design methodologies -- There are different kinds of object oriented methods developed by different scholars. These methodologies originate from the concept of object oriented programming languages. Object oriented systems analysis and design methods are developed to support object oriented programming technology. A method has not yet been followed as the leading one. Hence, there are diverse approaches to object oriented analysis and design. Some of the methods are Object-oriented Analysis, Object-oriented Analysis and Design, Object-oriented Systems Analysis, Hierarchical Object-oriented Design, and Object-oriented Systems Design [Clifton and Sutcliffe, 1994].

Object oriented systems development methods are more suited to organizations that are being making constant shift, increasing need for rapid systems development and maintenance. The techniques of object orientation are to work well in such kinds of situations where complicated information systems are undergoing continuous maintenance, adaptation and redesign [Kendall and Kendall, 1995].

CHAPTER 3

SUMMARY OF THE SURVEY RESULT

3.0. Introduction

Fact finding is one of the activities of system analysis and design. It is the base in understanding the system under study and identifying its shortcoming. These findings could be made using different data collection techniques: interview, questionnaire, observation, document analysis and literature review.

During the survey, data were collected in different ways. 45 questionnaires were distributed; 15 interviews were conducted; documents were analyzed, procedure manual, formats, and reports were looked through; the actual work flows were observed. In this chapter summary of survey result with interview and questionnaires are discussed. Since the results obtained through observation and document analysis are similar, the conclusions do also apply to them. Many of these points are discussed in the statement of the problems and systems analysis of the current system. The results are figured out here for completeness sake only. General statistics to questionnaire looks:

	<u>Number</u>	<u>Percentage</u>
Population	303	100
Sample	60	20
1. Questionnaires distributed	45	75
Branches	25	56
Head Office	20	44

2. Interview	15	25
Response rate - Questionnaires	34	76%.
1. Branches and Sub-branches	18	72%
2. Head Office	16	80%

3.1. Rating performance of the loan handling system

In general, the performance of the loan handling system is valued as follows.

Table 3.1 Performance rating

Rank	Frequency	Percentage
Very good	5	10
Good	5	10
Fair	29	60
Poor	10	20
Total	49	100

Most of the respondents rank the Bank's performance as Fair followed by Poor. Equal number of staff chose Very good and Good as shown on the table above. This indicates that the performance of the Bank has problem. Responding the reasons for ranking the above frequencies, the results are indicated below.

3.2. Reasons for performance rating

Many respond inflexibility, incompleteness, lack of reliability, accuracy, consistency, and delay as the major causes for the ranks of the deficient performance. The percentages are given in the next table.

Table 3.2 Reasons for deficient performance

Reasons	Frequency	Percentage
Lack of reliability, accuracy, consistency	38	76
Delay	20	40
Difficulty in retrieving manual system information	10	20
Inefficient use of computers	8	16
No readily balances (daily, monthly, etc.)	8	16
Good in general scheme	5	10
Absence of important data	3	6
Lack of qualified personnel	2	4

3.3. The current loan management and monitoring system

As shown from table 3.3 below, larger proportion respond the problems of timeliness of their information requirements as their first choice. Presentation of information not in the form required is another problem with the higher rank.

The steps used and items included in the feasibility study on project appraisal basing international principles by UNIDO and World Bank, but customized to fit the Bank's own specifications, in-built control on disbursing loans, project completion evaluation report describing implementation of follow-up of projects, handling of complex loans are strengths to mention.

On the other hand, lack of awareness of the effects of a transaction to some body else in the loan system, information unavailability at predetermined interval of time or insufficient copy of a report, disagreements of reports prepared for same items using same sources.

Table 3.3 problems of the current system

Problems	Rank in frequency						
	1st	2nd	3rd	4th	5th	6th	7th
Information is not timely	27	10	16	-	-	-	-
Information is obtained as required	16	22	6	5	-	-	-
Raw data is not summarized	-	6	15	9	11	-	-
Much of the data are not collected	12	4	6	16	6	-	-
Much of the data are not relevant	-	5	-	-	-	-	10
Difficult to search a document	7	-	11	-	5	10	-
Important information are not produced	-	-	-	7	11	-	-

3.4. Problems to computer output

Table 3.4 shows that timeliness is the highest ranked problems related to computer printouts.

This is mainly due to the batch system the Bank uses to data processing. Note that this problem applies to Head Office only, because all Branches and Sub-branches are manually doing the loan records. These (Sub-) Branches get monthly financial statements from Head Office.

Table 3.4 Problems of the computer outputs

Problem of computer output	Frequency	Percentage
Delay of outputs	25	51
Incomplete data	14	29
Inaccuracy of computation	12	25
Lack of important information	12	25
Inflexibility of the outputs	11	22
Unavailability	11	22
Inconsistency of reports	9	18
Error in data entry	7	14

3.5. Problems of the loan reports

Table 3.5 Problems of loan reports

Problems to loan outputs	Frequency	Percentage
Delay	26	53
Inflexibility	21	43
Inaccuracy	19	39
Inconsistency	13	27
Non response	2	4

53% of the total surveyed population response that delay is the most troublesome to their operation. Inflexibility of the outputs is another major problem identified. There is a difficulty of obtaining necessary information on time. Unless reported on time, the information may not be important at all, especially in the Bank where information should be given outright. Of course, the problem of accuracy is also a regularly observed problem which might greatly affect the faithfulness of the Bank towards the clients.

3.6. Views on formats used

Half of the respondents respond that the formats for inputs and reports do not contain complete information. The technical words used in the formats being using are another problem they chose. Table 3.6 looks at it.

Table 3.6 Reasons for formats being used.

Reason for limitation of formats being used	Frequency	Percentage
No consistency	31	63
Full of jargon (technical words)	17	35

Confusing words	7	14
Duplicate questions	5	10
Long complex to fill	3	6
Left blank	2	4

3.7. Respondents time on processing loans

Table 3.7 Respondents time to processing loan

Percentage of time spent doing loan related activities	Frequency	Percentage
45 - 60	2	4
61 - 85	4	8
86 - 100	41	84
Left blank	2	4
Total	49	100

As shown from the above table, employees' activities cover 86 - 100% of their time on processing loans confirming the data just described as reasonably correct.

CHAPTER 4

ANALYSIS OF THE CURRENT SYSTEM

4.0. Introduction

In this chapter, processes of the current system are analyzed using different structured systems analysis and design tools. Further explanations are also narrated to help read the diagrams more clearly. Finally user requirements and requirements for the proposed system are drawn.

4.1. Process description of the current system

The loan management and monitoring system is linked to different system of the Bank. The system uses data from different sources. Some are produced from within itself and others from outside the system. As is shown in the context of level data flow diagram in figure 4.1 on page 51, external entities to the system are Management, Loan Committee, Control department, Research and Planning department, Engineering service, Legal service, Clients/Applicants and other External Institutions (which include financial institutions, different government Ministries and other organizations, such as other banks (private and government), Chamber of Commerce, Ministry of Health, Agriculture, and others). Each supplies data to or receives information from the system. Sources of external data the system obtained from these entities are the following:

- Project supporting data - from Research and Planning Department of the Bank
- Loan agreements/contracts - by the Legal service
- Approved/Rejected loan proposals - from Management

- Reports on the impact of loan grants - from Management
- Impact of loans grants or symptoms to problems on loans - from Management
- New loan applications and loan applications to rescheduling, additional, or re-allocation of previous loan-from clients
- Interest rate directives - from National Bank of Ethiopia via Management
- Legal advises and loan agreements - from Legal service
- Loan proposals to be reconsidered or to be corrected - from Loan Committee
- Procedure manual, policies, regulations, and circulars of the Bank
- Debt clearance - from other banks
- Insurance debit and credit notes -from Insurance companies
- Request for credit information - from client/auditor of a client
- Statistical data like census population - obtained from Central Statistics Authority
- Import statistics from *External Trade Statistics* - publication of Ministry of Finance
- Tax regulation - from Custom Duties Office and Inland Revenue Authority
- From other banks
 - Debit and credit advices,
 - Checks (certified or uncertified)
 - Cash payment order (C.P.O.)
 - Responses to credit information
- Court decision - from Ministry of Justice
- Different government proclamations
- Salary and pension information from Pension and Social Security Authority.

The system releases its outputs to external entities. Major of them are listed below:

- Exceptional reports to management

- Additional, reallocation, or re-scheduling application to management
- Loan proposals to loan committee
- Credit information to court/external auditors of client business via Control department or direct to client
- Reminders to the client to repay the installment due
- Letter of acceptance/rejection of the loan application
- Request for evaluation and bill of quantity
- Estimation of construction cost of the financed project
- Actual and plan of loan approval, disbursement, collection, withdrawal reports
- Clearance of uncertified check deposited to the Bank

For a schematic presentation, look at the context diagram, Figure 4.1 on the next page 51.

Symbols used in the data flow diagram are explained in appendix A.

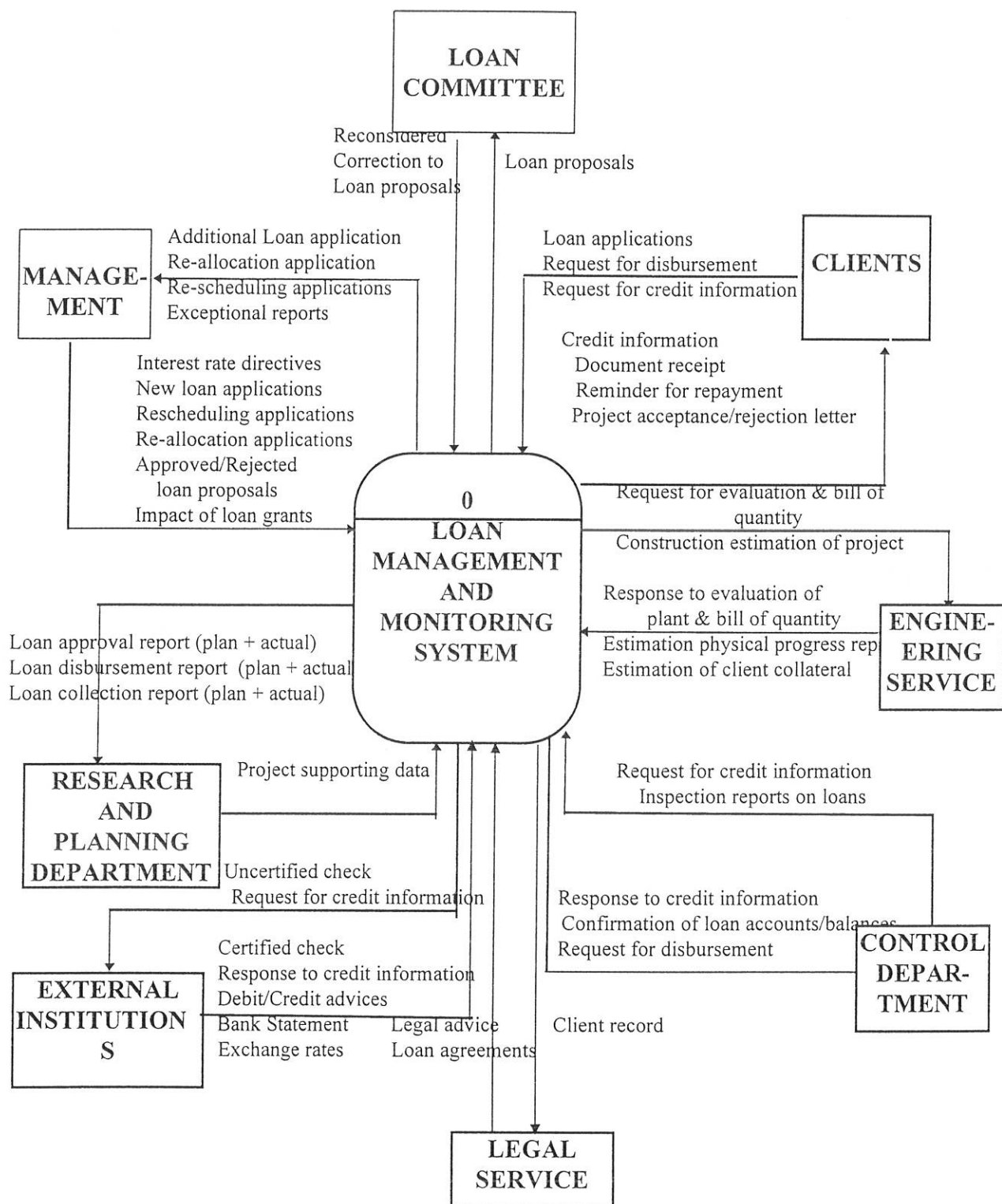


Figure 4.1 Context Data Flow Diagram

The loan management and monitoring system shown on the context level diagram, Figure 4.1. on page 51 has the following sub-systems.

- Handling of loan application,
- Project appraisal,
- Follow-up and recovery,
- Loan collection process
- Loan disbursement process, and
- Updating of loan accounts.

The major emphasis and time-taking activity of these is the project appraisal of loan applications. Figure 4.2, page 53, shows the relationship among these sub-systems.

Discussion of each sub system is given for each component later.

4.1.1. Handling Loan Application Queries

The first process of the Bank regarding loans begins with application for loans on specific area of investment. This process is depicted in Figure 4.2 as process 1.0 on page 53 and further decomposed in Figure 4.3, page 56.

Written loan applications reach loaning Department managers' offices from either the General Manager, or direct from postal or fax messages. The Department managers then verify the application and distribute to the concerned units. If new loan application, it will be sent to Client Guidance and Advisory Desk. Otherwise, it will be handed over to appraisal and Projects Follow-up and Loan Collection Divisions. Moreover, the Client Guidance and Advisory Desks welcome all applicants (prospective clients) coming physically. These Desk units discuss with potential borrowers on the potential investment areas they brought with. The heads of the Desk units communicate to applicants whether the project idea is in line with the projects to be financed by the Bank or not as per the Bank's selection areas for investment.

The Bank's selection of investment areas are determined from, first and for most, its objective-development. Any project that does not have contribution to the country's development, at least in principle, is not financed by the Bank. Another requirement is the level of saturation of an economic activity in a certain sector and region of the country. To determine this factor, the growth of defaulters in a sector, sufficient (increasing) number of identical or similar projects in the same area, the existence of other financing organizations in the area under discussion, etc. are looked into by the researchers of the Bank.

The data flow diagram on page 56 shows that once discussion is made to the applicant, he/she/they will be assigned to a Desk officer. The applicant is given an application form and guideline brochure of the Bank stating his/her/its rights and obligations and documents to fulfill. Upon receiving complete documents, the Desk officer registers the application, dispatches request to credit information to financial institutions and the Finance and Banking Department of the Bank, if it is at Head Office, or accounts units of the respective Branch or Sub-branch¹, if at branch or sub-branch. Document receiving form is filled-in and given as confirmation to the applicant for all documents received. Based on the information obtained from the applicant, preliminary assessment form is completed and an internal memo is written to the Engineering Service to estimate collateral, progress of project construction, etc. If the project is expected to consume considerable water or electric power, the Client Guidance and Advisory Desk also writes to the authorities requesting a confirmation to the possibility of accessing the new project to them.

When requirements are fulfilled, the Client Guidance and Advisory Desk recommends the application to the loaning Department. If the request is to Branches or Sub-branches, similar processes are followed except title differences. Thus, a Branch or Sub-branch manager forwards the applications to Loan Officer(s) of that particular Office. When the request is above the limit a Branch or Sub-branch is authorized to handle, the loan application is sent to Head Office after completing the preliminary application requirements.

¹The term Sub-branch, unless specified, refers to those sub-branches that are directly accountable to the General Manager not to immediate Branch.

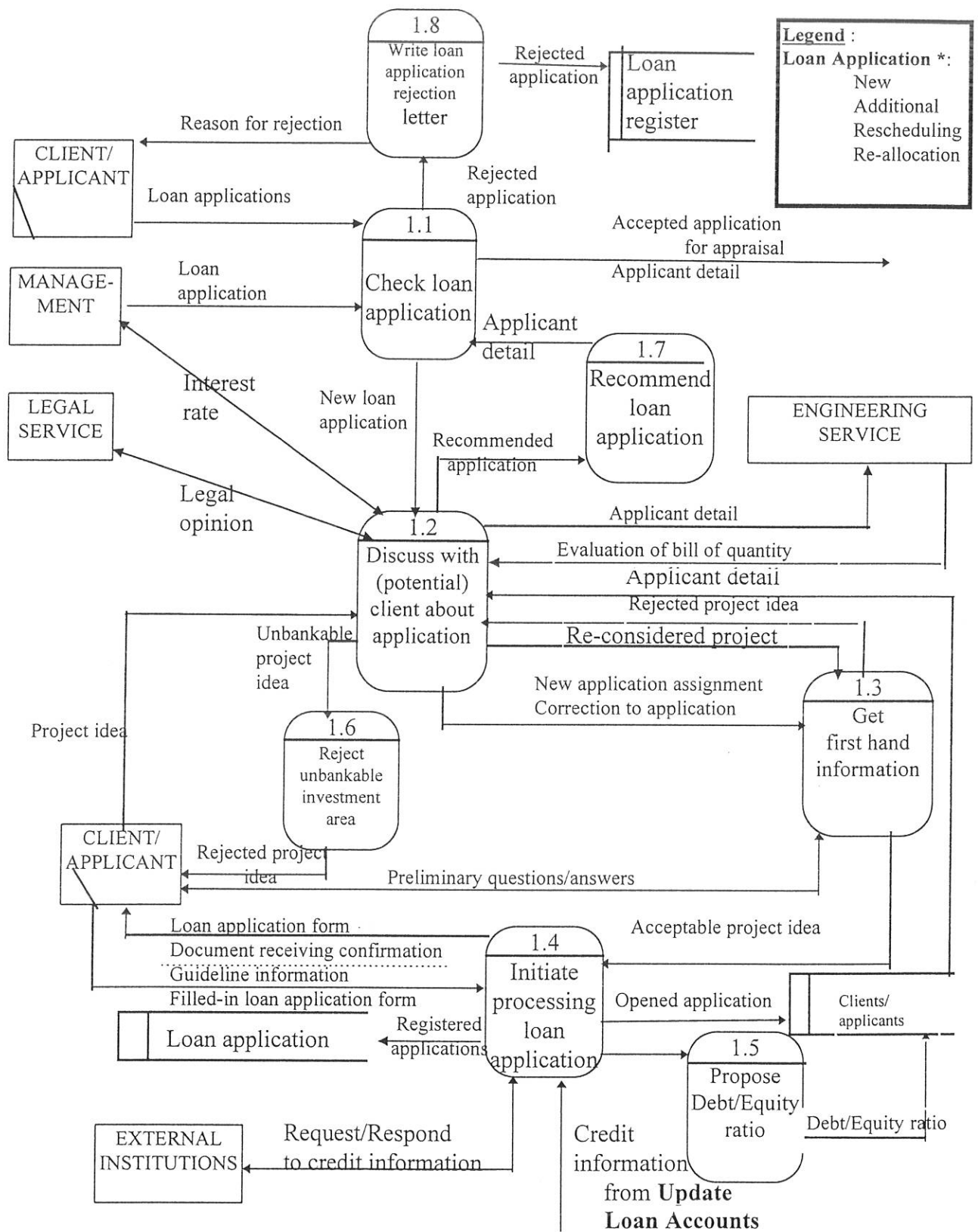


Figure 4.3 Lower level Data Flow Diagram - **Handling Loan Application Queries**

4.1.2. Feasibility Study and Loan Recommendation

Different approaches are followed by different financial institutions on handling credit processes. It is largely dependent on the objective of the institution and its area of specialization. Besides short-term credit processes, development banks, by their nature, involve in complex, risky, long-term credit provision which require relatively sophisticated handling system. As a result, though the current orientation is towards financing viable projects, projects whose outcome are against what were in the feasibility studies also encounter, especially to new and huge investments and/or new regions of the country. One possible cause for this could be the lack of adequate and accurate external data.

As can be shown in Figure 4.2, page 53, the feasibility study utilizes the records in the client files that is initiated by the Client Guidance and Advisory Desk. General guidelines and principles are followed on studying projects. The major elements are thorough study of marketing aspects such as the demand and supply, pricing and marketability of the products or services of the project; financial viability; technical feasibility; organizational (administrative) aspect; and other data relevant to feasibility study of the project. The weaknesses and strengths of any project study lies how it addresses these issues. The Development Bank of Ethiopia appraises its projects following these guidelines but with the customization of their presentation.

After the appraisal is gone through, the Department/Branch/Sub-branch submits the proposal to respective Loan Committee. The decision could be either to reject, approve, reconsider, or suspend the project. If rejected, to be reconsidered, or suspended, the appraisal will be returned to the Department/ (Sub-) Branch Manager. If approved, the minute will be

transferred to Control Department or its representative at (Sub-) Branch and then submitted to General Manager or (Sub-) Branch manager as the case may be. Again, if the application amount is greater than the limit the General Manager is authorized to approve or reject, the General Manager submits to the Management Board who passes decision and returns back to the General Manager. Based on the decision, the General Manager either sends to the lending Departments/Branches/Sub-branches to let them know the acceptance or rejects the project proposal. If accepted by the Board or General Manager, the minute will be sent to the Legal Service to process loan agreement. (Sub-) Branch managers also have a maximum ceiling to approve but vary from (Sub-) Branch to (Sub-) Branch. Finally, the applicant is informed the result of the decision in writing. Additional or re-allocation projects are handled in similar way, except with additional loans less than or equal to 25% of the previous loan of a client. These requests are directly handled by the General or (Sub-) Branch Manager without intervention of the Loan Committee.

4.1.3. Follow-up of Projects

Financed projects are closely followed-up to release disbursements, to remind repayments each time when due, and to know the status of the project. Three steps of follow-up are being practiced. These are: follow-up while projects are under implementation, follow-up upon completion of a project, and regular follow-up.

The follow-up officers visit project sites and prepare follow-up reports stating the current status of financed projects. Releasing disbursement, among others, bases this report. The follow-up report is also the base for additional loan requests.

To recover the loan, reminding letters are written to clients and/or informed on telephone, if they have any. Mostly, since formal reminders from Finance and Banking Department reach the Projects Follow-up and Loan Collection Division late, by the time they are ready to the Division, if not all, many of them are subject to further screening. Hence, only those reminders to which the client has not yet settled are sent. If a client is incapable to repay the sum according to the repayment schedule and if the officers and higher authorities in the hierarchy are convinced of this, extension of repayment period could be allowed. This is shown in figure 4.2 as process 4.0 on page 53.

4.1.4. Loan Disbursement Process

Once the loan application is approved and the loan agreement signed between the borrower and the Bank reaches the Projects Follow-up and Loan Collection Division, processing disbursement follows. The first step is to check whether items for which the Bank disburses are covered by Insurance (e.g., for imported items - marine insurance, for building construction - fire insurance) and the contribution to be made by the client are fulfilled. The client contribution from the total expenditure of the project could be made either in cash or in kind. If the contribution is in kind, the Division/Branch/Sub-branch requests the Engineering Service to estimate the contribution made. Provided the estimation is about the same or larger to the requirement specified in the feasibility study, request for disbursement is prepared. This request is submitted to the Department/(Sub-) Branch manager for approval. If the Department Manager approves, the request for disbursement voucher becomes ready, signed by the appraising Division head, appraising Department manager, Controller, if at Head Office or (Sub-) Branch manager and Accountant, if at (Sub-) Branch. Finance and Banking Department receives the voucher, checks whether it meets requirements it should suppose to.

If so, the Department either prepares cash transfer letter, or gives check to withdraw from the Bank's account held with the Commercial Bank of Ethiopia, or deposits the sum in the client current account maintained by the Bank. Client then withdraws the sum. This is shown in process 3.0 on Figure 4.2, page 53, at a higher level.

4.1.5 Loan Collection

Loan repayments could be made in the following ways (Figure 4.4 on page 62):

- in cash at Head Office or (Sub-) Branch where the client has taken the loan
- in cash but in office different from where the loan has been taken
- deposit in (Sub-) Branch or Head Office current account held with Commercial Bank of Ethiopia to which they have taken the loan
- deposit in (Sub-) Branch or Head Office account held with the Commercial Bank of Ethiopia but in the account of the Office the loan has been taken
- through check of any bank (private or government).

Handling of loan collection similarly is different depending on how the collection is made. If collection is in cash, Loan Repayment Slip is prepared and cash is received. The slip serves as a source document to record the collection to client's account. Credit Summary together with a copy of Loan Repayment Slip serve as sources for collections in cash from other offices of the Bank different from where the client has taken the loan. Other banks' credit advices and checks are also used for loan repayments through other banks. In such cases, credit advices are considered as repayments if and only if the balance appears on the Bank Statement received from the Commercial Bank of Ethiopia or the check is certified by the Check

Clearing House at the National Bank of Ethiopia or the respective banks the checks are referring to.

Based on the source documents, repayments are recorded in the client's account by the Finance and Banking Department or the respective (Sub-) Branch account unit. The following data flow diagram depicts the flow of data in handling the loan collection process.

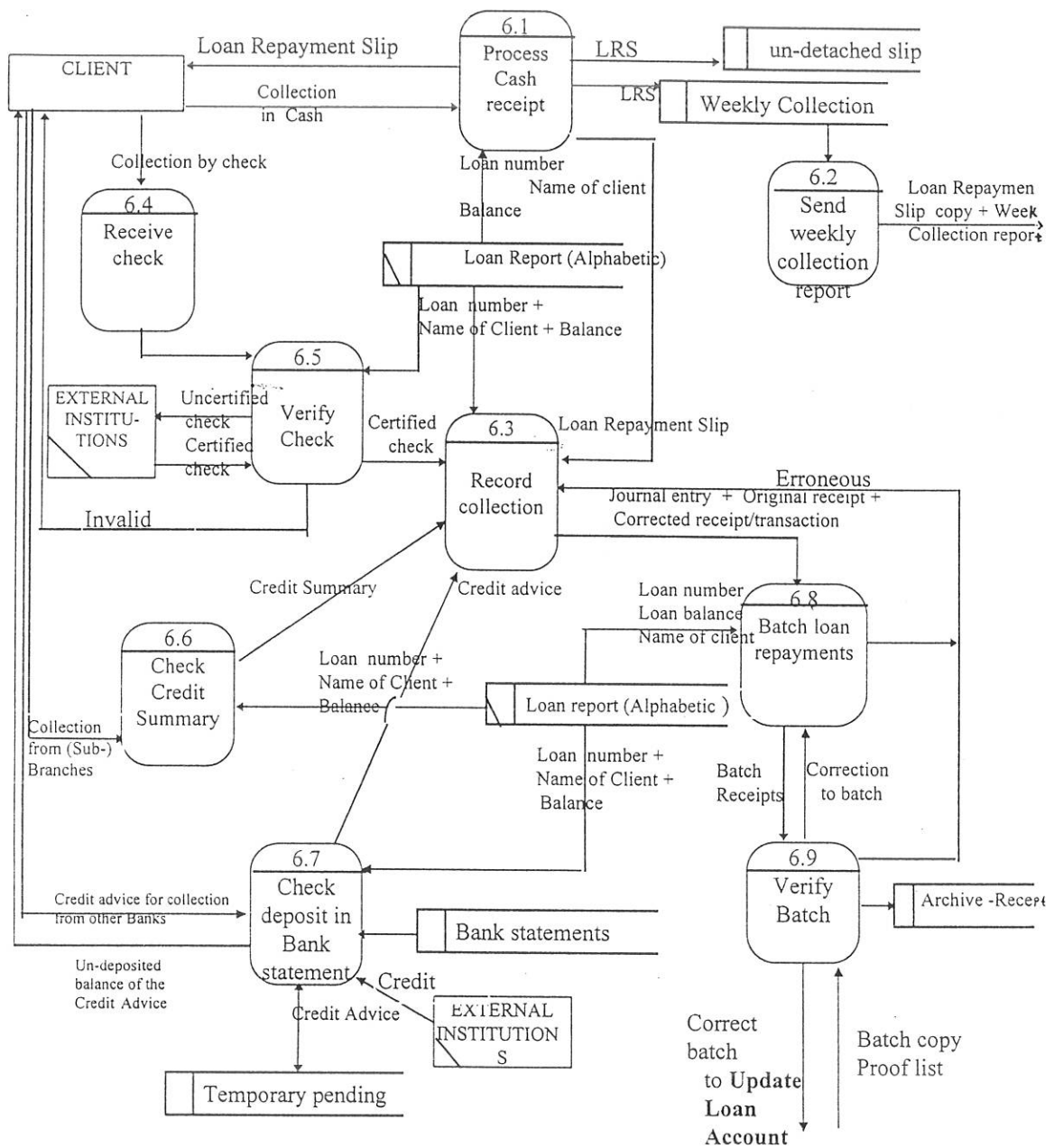


Figure 4.4 Lower Level Data Flow Diagram: Process Loan Collection

4.2. Entity-Relationship Modeling

It is also called entity modeling. Data flow diagram shown before illustrates the data in motion together with the data stores in use to update them during the process. On the other hand, entity relationship illustrates data at rest [Whitten, et al, 1989]. Entities fall in three categories: real - are actual things. e.g. clients; activity -are happenings e.g. financial transactions; conceptual - are more abstract e.g. cost centers. [Clifton and Sutcliffe, 1994]. The importance of entities is that they form data framework for the new system.

At this level those entities to which they can be expressed by data are identified. To this end, forms and reports of the Bank are reviewed. For each entity identified, attributes are drawn from these documents together with selection primary key to distinctly refer each entity. The entity relationship diagram is explain in detail and refined when dealing the data analysis of the new system in Chapter 5.

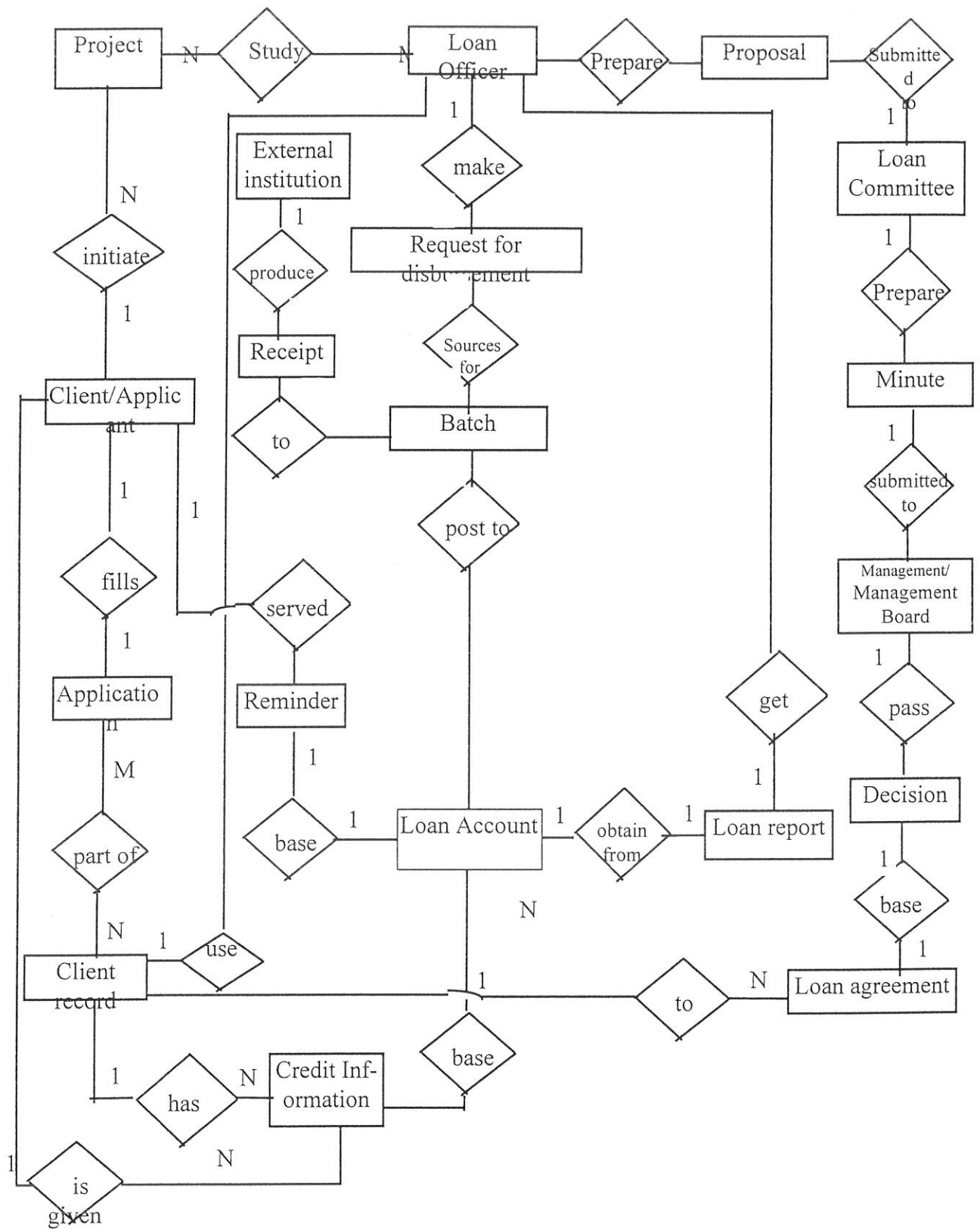


Figure 4.5 Entity-relationship diagram before normalization

Attributes of the entity relationship of diagram figure 4.5 (page 64)

Entity: Project

Attribute:

Project name
Start date
End date
Location
Officer assigned
Date applied
Date received at appraisal Division
Amount applied for
Project condition/Status
Duration taken to complete

Entity: Loan account

Attributes:

Master file
Office
Branch +
Head Office
Reporting month
Date issue
Name of client
Loan number
Address:
Region +
Woreda +
Zone +
Kebele +
House number +
Telephone no. +
Postal code +
City
Loan amount
Date loan granted
Principal interest rate
Commitment interest rate
Principal repayment due
Interest repayment due
Principal repayment interval
Interest repayment interval
principal repayment schedule
Transaction file (repeats 1-n times)
Transaction type
Reference number
Value date
Interest days
Transaction amount
Principal share of the amount

Interest share of the amount
Interest calculated
Principal not due
Interest not due
Principal overdue
Interest overdue
Balance in commitment
Balance brought forward
Balance carried forward

Entity: Loan reports

Attributes:

Loan reports
Alphabetic +
Numeric
Loan collection & disbursement
Loan recovery report
Date printed
Period they refer
Name of the office they refer
Transactions
Beginning balances
End of Balances

Entity: Credit information

Attribute:

Name of client
Client number
Loan balance
Principal outstanding +
Principal arrears +
Interest memo +
Interest arrears
Date requested
Date reported
Name of reporter
Telephone number

Entity: Loan officer

Attributes:

Name of loan officer
Position
Profession
Office
Head office
Department
Division
(Sub-) Branch
Project assigned
Project proposed
Project reconsidered

Entity: **Request for disbursement**

Attributes:

Payment to
Amount paid
Loan number
Date of contract
Contra account
Total loan amount
Previous disbursement
Current disbursement
Disbursement-to-date
Commitment balance
Interest rate

Entity: **Client/applicant**

Attribute:

Name of applicant
Project type
Address:
 Region +
 Woreda +
 Zone +
 Kebele +
 House number +
 Telephone number +
 Post office box
 number
Nationality

Entity: **Reminder**

Attributes:

Loan number
Name of client
Address
 Region +
 Woreda +
 Zone +
 Kebele +
 House number +
 Telephone number +
 Post office box number
Date overdue
Principal arrears
Interest arrears
Total overdue
Next principal due date
Next interest due date

Entity: **Application**

Attributes:

Date applied
Name of applicant
Applicant address:

Region +
Woreda +
Zone +
Kebele +
House number +
Telephone number +
Post office box number
Project location
Region +
Woreda +
Zone +
Kebele +
(House number] +
(Telephone number] +
(Post office box number]

Project type

Nationality

Project condition

On operation +
New
Cost of the project
Amount requested +
Client's contribution +
Construction work +
Product instruments +
Working capital
Client's contribution
In cash +
In kind Collateral
Estimated Birr +
Type of collateral
Customer
 Government +
 Individuals +
 Private enterprise

Entity: **Proposal**

Attributes:

Client name
Project name
Date proposed
Date started
Prepared by:
 Officer +
 Division +
 Department +
 Branch +
 Sub-branch

Entity: **Loan Committee**

Attributes:

Name of Loan committee

List of members:

Name +
Department/Service/Branch/
Sub-branch +
Position in Committee

Date of summit

Committee decision on the
application

Entity: **Minute**

Attributes:

Date of minute
Name of members
Composition
Suggestion:

Approval +
Rejection +
reconsidered +
Suspended/Penned

Date project recommended

Reference

Place

Time

Entity: **Management/**

Management Board

Attribute:

Name

Position:

Board of directors +
Board member +
General Manager +
Branch Manager +
Sub-branch Manager

Action:

Approve +
Reject +
Reconsider +
Suspend

Date of action

Entity: **Decision**

Attributes:

Date decision made
Office decision made
Name of decision maker
Position
Type of decision

Approved +
Rejected +
Reconsidered +
Suspended

Entity: **Loan agreement**

Attributes:

Date of contract
Interest rate
Commitment charges
Service charge
Loan number
Proration of disbursement
Borrower name
Borrower ID
Terms and conditions
Installments period
Month +
Year
First date of repayment
End date of installment

Entity: **Batch**

Attributes:

Batch number
Batch Date
Batch Month
Batch Year
No.
Sources of fund
Commodity code
Office number
Account period
Account month
Account year
Batch type
Transaction type
Collection +
Disbursement +
Other charge +
Adjustment
Loan number
Value date
Voucher number
Loan amount
General ledger code
General ledger amount
Originating office:
Prepared by
Name +
Title +
Office +
Date
Approved by
Name +
Title +

Office +	Amount deposited
Date	Amount withdrawn
Received at EDP by	Entity: Collection receipts
Name +	Attributes:
Title +	Date of repayment
Date	Client name
Keyed by	Amount repaid
Name +	Loan number
Title +	Loan balance
Date	Entity: Client record
Additional with	Attributes:
rescheduling	Client name
Additional with additional	Loan number
scheduling only	File number
Date of additional contract	Department
Amount of additional loan	Location
Total amount rescheduled	Date opened
Principal outstanding +	Project type
Commitment balance +	
Additional loan	
Due date for first principal	
repayment	
Interest capitalized	
Due date for first interest	
payment	
Due date for first principal payment	
Interval in months between	
interest due dates (12, 6, 3, 1)	
Interest rate on principal	
Interest rate on commitment	
balance	
Interest rate on service charge	
Repayment rescheduling	
Number of repayment +	
installment +	
Installment amount	
Schedule correction	
Rescheduling contract date	
Total amount rescheduled	
Commitment +	
Principal outstanding	
Branch to transfer account out of	
New loan number	
Entity: External institution	
Attributes:	
Name of institution	
Carrier	
Address	
Date transaction occurred	
Person deposited	

4.3. Data Dictionary

Data dictionary is a collection of data about data [Davis, 1995]. It facilitates communication by using common terms and definitions. It describes the fields in a database and information on the procedures. It is helpful to provide documentation, eliminate redundancies, determine the content of the data stored in the files, and serve as the starting point for developing the data screens and reports. It is described by examining the contents of data flows, data stores, and processes [Kendall and Kendall, 1995].

Symbols used	Description
=	is composed of or contains
+	and
{ ... }	is a repetitive element
(...)	either or but not both
	separator
[...]	optional element

The following data dictionary is a sample of data dictionary for 'Loan Application Form'. Note that this data dictionary contains only the name of the data store or data elements, the data type, alias (if any) and size.

Data Dictionary for 'Loan Application Form'

Loan application form = *Data store* The first manually filled form on applying for a loan.

Applicant Name + Nationality + {Address} + {Project Type} + {Project Location} + {Project Condition} + {Cost of Project} + {Client Contribution} + {Collateral} + (Market Agreement) + {Customer} + {Application Receiver} + Application Date + Application Received Date

Data Item	Description	Alias	Type	Size
Address	Details of where an applicant may be found and where letters, etc. may be delivered. {Region}+ [[Town City]] + {Kebele} + [House Number] + [{Telephone Number}] + [Post Office Box]	Location		
Agriculture	Area of investment such as poultry, cattle fattening, farming, fertilizer.		Alphabetic	30
Amount Request from the Bank	*Data element* Portion of the cost of the project to be covered by the Bank. [Cost of the project-[Client contribution + [Other Sources]]]		Currency	
Applicant name	*Data element* Name of the person applying for a loan	[Client Borrower]	Alphabetic	30
Application receiver	Staff of the Bank who receives the filled application form. = Name + Signature + Date			
Area Code	*Data element* A telephone code given to regions [not regional state]. [01 02 03 04 05 06 07 08 09]		Numeric	3
Cash	*Data element* Money in coin or notes form contributed to the project.		Currency	15
City	*Data element* Large and important town, only Addis Ababa in Ethiopian case	Town	Alphabetic	15
Client Contribution	Part of the cost of the project the client is to cover. [Cash In Kind cash + In kind]	Own contribution	Currency	15
Collateral	Property held by the Bank as a security against non-repayment or any possible damages to the project. Estimated Birr + Type of Collateral			

Construction Cost	Amount required for constructing building	Construction Work	Currency	15
Construction Work	*Data element*	Construction Cost	Currency	15
Cost of the project	Total expenditure of the project [Amount request from the bank + Client Contribution + [Other Sources] Construction Cost + Machinery Cost + Office Materials Cost + [Vehicle] + [Other Costs]]		Currency	
Customer	*Data element* Individual or organization that are buying or could buy the produce of the project. Government + Individuals + Private Enterprise		Alphabetic	
Date	*Data element* Date of signature by loan applicant or receipt of the loan application.		Date	9
Economic Activity	*Data element* Field of investment area the applicant chooses.		Alphabetic	30
Estimated Birr	*Data element* Approximate value of a collateral to be held to a loan applied.		Currency	
Extension	*Data element* Telephone code specific to the applicant		Numeric	13
Government	*Data element* Name of a government organization.		Alphabetic	30
House number	*Data element* Unique identification of the residence of the applicant or applicant project		Alpha-numeric	10
Industry	Investment area including manufacturing activities, mining, oil and flour mill.		Alphabetic	30
In kind	*Data element* Estimated amount in Birr contributed to the project in a form of physical entity/natural produce, not money		Currency	15

Kebele	Village where the applicant/project is in. [Name of Kebele Number of the Kebele]		Alphabetic	
Local Number	*Data element* Telephone code given to applicant or applicant's firm or organization to which the applicant may be found. Telephone Number + [Extension]		Numeric	10
Machinery Cost	*Data element* Expenditure to moving parts of a machine or machinery for the project.	Product instruments	Currency	15
Market agreement	*Data element* Agreement made by the applicant to purchasers, supplier, etc., if any.		Alphabetic	15 0
Name	*Data element* Name of the staff receiving the application form.		Alphabetic	30
Name of the Kebele	*Data element*		Alphabetic	20
Nationality	*Data element* Citizenship.		Alphabetic	15
New	*Data element* A project that has not started producing output.		Symbol	2
Number of the Kebele	*Data element*		Numeric	2
Office Materials	Cost of those moveable things, for example table, chair, in the office of a project.	Cost of Equipment Office Furniture	Currency	
On operation	*Data element* A project which starts producing output.		Symbol	1
Other costs	*Data element* Other related costs to the project that are not in the lists of cost components named or any contingent costs.		Currency	15

Other Sources	*Data element* Portion of the cost of the project coming from other sources, if any.		Currency	15
Own contribution	*Data element*	Client contribution	Currency	15
Private Enterprise	*Data element* Name of private enterprise.		Alphabetic	30
Project condition	The state of the project [On operation New]		Alphabetic	30
Project Location	Place or position the project. Region + Woreda + Kebele + [House number]		Alphabetic	
Post Office box	*Data element* Identification number given by the Ethiopian Postal Agency.		Numeric/ Alphabetic	15
Product Instruments Cost	*Data element*	Machinery Cost	Currency	15
Project type	[Economic Activity Sector]		Alphabetic	30
Region	*Data element* Name/number of a regional state the applicant/project resides in. [[Tigray Afar Amhara Oromiya Benishangul-Gumuz Ogaden Southern People Gambela Dire Dawa Addis Ababa] [1 2 3 4 5 6 7 11 12 13 14]]		Alphabetic /Numeric	20
Sector	Branch of investment {Agriculture Industry Service}		Alphabetic	10
Service	Economic sector like undertaking service rendering activity, such as hotel, garage, gas stations.		Alphabetic	30
Sub-total	*Data element* Amount Request from the Bank + Client Contribution + Other Sources		Currency	15
Telephone number	*Data element* Applicant identification number given by the Ethiopian		Alpha- numeric	13

	Telecommunication Authority to his/her/its/their telephone. [Area code] + {Local Number} + [Extension]			
Total	*Data element* Cost of the project		Currency	15
Town	*Data element* Center of population larger than a village but smaller than a city in which the applicant lives in or the project is located.	City	Alphabetic	15
Type of collateral	*Data element* Lists of the collaterals to be kept by the Bank on granting loan		Alphabetic	30
Vehicle	*Data element* Cost of conveyance like lorry, motor-car necessary for the project.		Currency	15
Working capital	*Data element* Cash requirement for daily operation. Example, For purchase of coffee in a coffee hulling machine		Currency	15

4.4. Documenting Process Specifications Using Structured English

It is a tool which is used to describe procedures. It avoids complications which might result from decomposing data flow diagram to the lowest level. Structured English is used to describe each process in detail. It is based on structured programming principles. Being close to program code, it can be used as a specification document to write programming codes [Clifton and Sutcliffe, 1994]. It can be easily changed to psuedocode. Unlike psuedocode which is used in defining detailed program algorithm, structured English is suitable to non-programmers. It is an end-user directed most of whom are program illiterate. As a result, computer jargons, nouns, verbs adjectives, etc. usage are restricted to the minimum possible.

Structured English is the marriage of English language with syntax of Structured programming [Whitten, et al, 1989]. Key words used in structured English vary. Some use START, IF.. THEN, IF...THEN...ELSE, IF...ELSE..IF, CASE_{i...n}, DO, DO... WHILE, etc. Others use REPEAT UNTIL, IF THEN ELSE SO, BEGIN, END, etc. [Clifton and Sutcliffe, 1994; Whitten, et al, 1989].

What is important to note is that a well structured English is written with a combination of three control structures. Namely: a sequence of instruction or group of instructions; a selection of instructions or group of instructions based on some decision criteria; and an iteration of instructions or group of instructions based on some criteria. The detail process is annexed in Appendix - B.

4.5. Information Currently Held by the System

Each Department, Service, Division, (Sub-) Branch has some sort of its own permanently filed data store. Only the lending departments (i.e. Agriculture and Industry), Branches, and Sub-branches maintain separate files for each client. These files are supposed to contain every transactions of the client initiated in the Bank. They, for example, maintain copies of property identifications, application letters, memos, request for disbursements, copies of request for disbursement voucher, etc. from lending Departments, Branches, Sub-branches, and different Departments of the Bank, such as Finance and Banking, Control, Research and Planning Departments. They are kept with lending departments, Branches, or Sub-branches originating them. In addition, if the loans are under court case, the individual files are taken to the Legal Service until the case is settled.

The Client Guidance and Advisory Desk maintains loan application register containing information like applicant's name economic activity, application date, requested loan amount, location, etc.

Though not up-to-date, financial information on individual client, information on financed projects by economic sector, sources of fund, etc., usually at the end of a specific month, are kept by the Finance and Banking Department. Besides, it issues various reports which hold important information to its own consumption, or supply information to credit information queries and to other Departments/Services. Branches and Sub-branches keep Ledger Card to each client by the respective financial account units.

Other units keep transactions file but sequentially by the date the sources are written or received and/or reference numbers, i.e., all mixing one another. Different files are maintained, however, to Departments/Services/(Sub-) Branches. Tracing a specific event is difficult in most cases. Besides, each of the units of the Bank keeps its monthly, quarterly, and annual report copies. The contents of these reports are shown in the annex.

4.6. Form Analysis

Many forms are on operation by the loan management and monitoring system. Reports used to monitor the loan activity are also identified. The types of forms and reports, the numbers of data elements, their originating and destination units, distribution, method of operation, and the number of copies of each of them are discussed below. Sample form for loan application is annexed in Appendix E.

<u>Formats/Reports</u>	<u>Copies</u>	<u>Originating office</u>	<u>Distribution/ Destination</u>	<u>Method of operation</u>	<u>No. of fields/ applicant</u>
Loan application form	1	CGADesk	Client file	Manual	40
Document receiving form	2	CGADesk	Original to applicant Copy to client file	Manual	26
Preliminary assessment form	1	CGADesk	Client file	Manual	30
Credit facilities form	1	CGADesk	Client file	Manual	24
Request for construction cost estimation form	1	CGADesk	Engineering Service	Manual	12
Credit information recordings format	6	CGADesk	Commercial Bank of Ethiopia Business and Construction Bank Awash International Bank Wegagen Bank Abyssinnia Bank Dashen Bank	Manual	12
Request for evaluation of plant and bill of quantities	1	CGADesk	Engineering Service	Manual	25
Monthly loan collection report	2	PFLC/(Sub-) Branches	Research & Planning Department One copy retained by PFLC/(Sub-) Branch	Manual	6
Monthly summary of loan collection report	2	PFLC/(Sub-) Branches	Research & Planning Department One copy retained by PFLC/(Sub-) Branch	Manual	7
Monthly summary of loan approval/ disbursement	2	PFLC/(Sub-) Branches	Research & Planning Department One copy retained by PFLC/(Sub-) Branch	Manual	7
Monthly loan approval/ disbursement report	2	PFLC/(Sub-) Branches	Research & Planning Department One copy retained by PFLC/(Sub-) Branch	Manual	6
Monthly follow-up activity report	2	PFLC/(Sub-) Branches	Client file	Manual	5

Loan application register	1	CGADesk	Kept by Client Guidance and Advisory Desk	Manual	8
Project in pipeline report	2	Appraisal Divisions (Sub-)Branch	Department/(Sub-) Branch Manager Appraisal Divisions/(Sub-) Branch Loan Officers	Manual	10
Quarterly loan disbursement report	3	PFLC/(Sub-) Branches	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	5
Quarterly loan collection report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	7
Summary of Insurance activity report	3	PFLC/(Sub-) Branches	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	10
Monthly Credit Operation report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	20
Loan Approved report	3	PFLC/(Sub-) Branches	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	13

Loan Application Rejected report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	7
Loan Application Withdrawn report	3	PFLC/(Sub-) Branches	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	6
Project Under Progress report	3	PFLC/(Sub-) Branch	Research & Planning depart. Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	10
Summary of Semi-Annual activity Report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/ (Sub-) Branch officer	Manual	1
Semi-Annual Loan Approved Report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	15
Semi-Annual Loan Applications Rejected report	3	PFLC/(Sub-) Branches	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	8
Semi-Annual Loan Applications Withdrawn report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager	Manual	7

			Retained by PFLC Division/ (Sub-) Branch officer		
Semi-Annual Loan Applications Suspended/Sent to Branch report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	8
Semi-Annual Projects Under Process report	3	PFLC/(Sub-) Branch	Research and Planning department Department/(Sub-) Branch manager Retained by PFLC Division/(Sub-) Branch officer	Manual	11
Loan request to first disbursement form	1	CGADesk	Client file	Manual	47
Number of days taken in loan processing form	1	CGADesk	Client file	Manual	13
Number of days taken in loan processing form-from loan request to disbursement	1	CGADesk	Client file	Manual	13
Weekly activity report	2	Loaning Divisions/ (Sub-) Branch	Loaning department/ (Sub-) Branch managers Retain by the Divisions/ (Sub-) Branches	Manual	25
Summary of loan appraisal	3	Appraisal Division/(Sub-) Branch	Research and planning department Loaning department/(Sub-) Branch managers Retain by the Divisions/(Sub-) Branches	Manual	31
Credit information	1	PFLC/(Sub-) Branch	Client file	Manual	15
Request for disbursement	1	PFLC/(Sub-) Branch	client file	Manual	11
Loan disbursement approval report form	1	PFLC/(Sub-) Branch	client file	Manual	48

Appraisal/Rejection of present disbursement request form	1	PFLC/(Sub-) Branch	client file	Manual	9
Loan repayment slip	3	Finance and Banking/(Sub-) Branch accounts unit	Client file Control Department Retained by the originating office	Manual	14
Additional contract form	2	Finance and Banking/(Sub-) Branch accounts unit	Electronic data processing section Accounts Division/(Sub-) Branch Accounts unit	Manually batched but processed by EDP	48
Loan transaction data record form	2	Finance and Banking/(Sub-) Branch accounts unit	Electronic data processing section Accounts Division/(Sub-) Branch Accounts unit	Manually batched but processed by EDP	9
Rescheduling contract input form	2	Finance and Banking/(Sub-) Branch accounts unit	Electronic data processing section Accounts Division/(Sub-) Branch Accounts unit	Manually batched but processed by EDP	14
Input for changing loan account number	2	Finance and Banking/(Sub-) Branch accounts unit	Electronic data processing section Accounts Division/(Sub-) Branch Accounts unit	Manually batched but processed by EDP	48
Additional contract input form	2	Finance and Banking/(Sub-) Branch accounts unit	Electronic data processing section Accounts Division/(Sub-) Branch Accounts unit	Manually batched but processed by EDP	45
Loan waived form	2	Finance and Banking/(Sub-) Branch accounts unit	Electronic data processing section Accounts Division/(Sub-) Branch Accounts unit	Manually batched but processed by EDP	16
Request for disbursement voucher	4	PFLC/(Sub-) Branch	Finance and Banking (two copies) Control department Retained by originator	Manually batched but processed by EDP	24

Credit information - Legal service to Management Accounts and Credit Information	1	Legal Service	Finance and Banking/Account units of (Sub-) Branch	Manually batched but processed by EDP	15
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Abbreviations:

PFLC -Project Follow-up and Loan collection Division

CGADesk - Client Guidance and Advisory Desk

Appraisal divisions - Micro-enterprise and Small-scale and Medium and Large-scale Divisions

4.7. Defining User Specifications

- Lack of forecasting is a common problem to most of the borrowers or applicants. They speculate a certain sum to be granted at specific interest rate and within a specific time interval, generate revenue, and repay the sum borrowed thereof. Due to a number of problems from both the client and the Bank, some get desperate and withdraw their request even if the loan request is approved and ready to be released to the applicant. Some don't utilize the amount at all due to, for example, loss of market (paying the commitment charge without any benefit). The Client Guidance and Advisory Desk should assess the average length of period for processing a loan and alert in advance applicants with acceptable projects on the possible price fluctuations of raw materials, building costs, possible loss of market, etc. taking different statistical data published by statistical bodies or as surveyed by the Engineering Service or Research and Planning Department of the Bank. Authorities should monitor the average length at least in a quarter interval.
- Desk should maintain highly secured record of the project idea proposed by an applicant.

- Desk should have lists of potential clients who initiate project idea that are not in the list of an economic activities the Bank finances. A project which is prohibited to be financed and hence rejected at present does not necessarily indicate that it will always be so. Thus, the Desk units should keep list of applicants that propose unbankable projects as potential applicants in the future. The same applies to lending Departments/(Sub-) Branches for those projects that are sensed as not feasible upon studying projects but rejected for the time being. For example, if a project is rejected for lots of imported materials demanding considerable hard currency beyond what can be available through auction, it may be reconsidered when the to be imported items are available locally.
- The Bank should investigate potential investment areas in different regions of the country. Profile of regional states like possible investment areas and their degree of attractiveness of these investment areas, capability of investors in the regions, etc. as identified by the Bank itself or the regions themselves and latter verified by the Bank's technical experts are very important. A database of such sort is of much helpful to the Bank if utilized effectively by the Desk when discussing with the potential borrowers.
- Mechanism should be set by the Bank to assure that the disbursement requested to purchase items is a fair price, no second hand items are purchased, and the clients have really paid their own contribution. Note that the Bank does not allow clients to purchase second hand items. Different means were suggested during the survey. One way could be by having a database of average costs of original items at the market which is to be updated every time.

- A record on clients' withdrawal report examined by the internal auditors or bodies outside the line Departments/(Sub-) Branches is to be available. Besides, quite a number of clients request additional loan as if the project appraisal had problem. Recurring causes for this additional loan should be summarized and kept in the record so as to help the project loan officers to approximate the total cost a project might take and improve their appraisal in the future, thereby.
- Report on the number of clients whose commitments are canceled, the total balance of these commitments, regions, economic activities, sources of funds, period of time they have stayed in commitment, clients opinion on them (if possible), reason(s) for non-utilization or under-utilization of the amount which could be directly updated, is to be produced by the system for monitoring the loan operation.
- Borrowers may be unluckily, unwise, or dishonest. Given the risk of involving in lending, the problem could be overcome by dealing with secured transactions with borrowers. In this secured transactions, promises to repay the loans are backed by collateral [Fleisig, 1996]. Hence, collateral and their proper follow-up reports need to be available to authorized personnel on demand by the Project Follow-up and Loan Collection Division at Head Office or officers of the respective (Sub-) Branch. Other important information related to these collateral is the type of collateral the Bank should keep as observed from past performance of the Legal Service on selling the collateral of defaulters.
- List of collateral together with right custody to documents have to be maintained. Documentation of collateral (like house/project map) the Bank accepts in lieu of the loan it grants are kept scattered. Some are in the Administrative Department; others in the

Legal Service who receive them; and many of them are under the custody of the Credit Information and Management Accounts Division which is supposed to maintain them.

- Those documents that are in the clients' files are exposed to mischief. This is because the files are accessible to any staff in need of them from any Department/Service. The same is true to (Sub) Branches. There is no control mechanism to trace what was in the file or what is not. The file clerks of the respective Departments/(Sub-) Branches accept the returned files without any check. And of course, they can't. Clients, upon clearing their loan, sometimes do not get documents they have given. Therefore, only authorized employees and probably only those authorizing disbursement should have access to physical clients' files.
- Branches and Sub-branches need proper communication network with one another and to the Head Office.
- Financial ratios are indicators of the financial performance of the Bank. They are among the reports needed by the decision makers for the purpose of monitoring the loan. The current classification of accounts is not suitable to calculate them outright. For instance, current maturing loans are not separated from loans that are not, causing problem to accurately determine current ratio. The current practice is that they are manually produced by units other than the unit who actual works on them. If computerized, the computer itself should produce these ratios and if appropriate latter checked by an assigned unit every time they are produced.

- The reports from Finance and Banking Department are not in the form easily readable and ready-to-use. They must be further processed before they are being useful. They are subject to further addition, subtraction, and other manipulations. Staff need to have access to their information requirement outright when they need.
- Loan reports produced by the Finance and Banking Departments should be on line accessible to authorized personnel, especially line Departments, during the working hours of the week days of the Bank.
- Reminders are to be prepared taking into consideration the repayment time intervals rather than in six months interval uniformly as is the case in use now. There are loan repayments at present that are due in one months, three months, six months and one year interval.
- There is a delay of about three months in preparing reminders. By the time they are ready after these periods, their contents become no of use. Mechanism should be set to ready them within two weeks after the update of a particular month.
- The repayment schedules the present system handle are in one month, three month, six month, and a year intervals. No options are available to clients who can pay bi-weekly or bi-monthly, etc. The new system should maintain these options into account and hence be flexible to accommodate any number of periods.
- The repayment periods don't take into account the production life cycle- a cycle for products starting from operation with inputs to converting outputs produced by these

inputs to another inputs for another round. For example, repayment periods cannot be in two, four, five, seven, eight, ten, eleven months or more than a year interval.

- Repayment schedules should take into account the seasonal demand of the products and services of the financed projects, when it applies so.

4.8. Alternative Design Solutions

In the previous sections, attempt has been made to describe the current system and define the requirements. Data flows, entities, sample data elements, and their relationships are shown. There are a number of ways to implement user requirements. The next step is the selection phase of the system analysis where possible design alternatives are to be identified. The levels of decision to be made in this regard are[Whitten et al., 1989]:

- The level of data that are already stored in the computer and the degree to which these files or database can be modified
- The degree of automation - identification of tasks to be manual and computerized.
- The person-computer interface - whether the tasks to be input are batch or on-line or a combination. Also important is the type of output method, such as visual display screen, paper printout, microform, etc.
- The method the data to be stored - i.e., whether centralized in a database or distributed in different databases.

These options need to be evaluated against the operational, technical, and economic feasibility.

4.8.1. Level of computerization

Currently, in the Bank, computers simply replace the works done previously by type writers. They are used for word processing. Nothing more. As shown in section 3.7 (form analysis), the only computerized operations are loan accounts and the related different loan reports and credit information in the Finance and Banking Department at Head Office part of project data analysis with CONFAR software - a project appraisal software. In all (Sub-) Branch, reports are manually produced. The data are stored in loan cards - a paper printed records and hard copy client files. They are not easily modifiable and flexible. More is said on this point of the current system in the statement of the problem.

In the new system, however, computers will perform many tasks, especially in timely report generation to monitoring the performance of the Bank as shown in the level of automation in the next section.

4.8.2. Degree of automation

No matter how computerized the loan management and monitoring system might be, there still will exist processes that are to be manually done. One activity of selection phase is to identify activities to be computerized and those that remain manual. This serves as the initial stage to alternate systems design solutions.

In view of this, the following activities of the loan management and monitoring system are to be computerized or supported by computers:

- Initiate processing loan and entry of data on receiving application
- Access to Guidelines of requirements to loan application
- Reports on applications rejected, withdrawn, and suspended
- Obtain date an application is first applied and transferred to appraisal units
- Get number of days taken in processing loans
- Access to applicant personal data, address (client's residence and the project), investment choice, amount requested, list of collateral to be held, etc.
- Check completeness of the data against data in the applicant file on application
- Check whether an applicant has borrowed a loan before and get credit information, if the applicant has taken any.
- Propose debt/equity ratio
- Produce reports on received loan applications
- List documents received from the applicant
- Report on applicant's collateral information
- Assignment of loan application
- Get project supporting data
- Analyze the collected data on a project at the time of feasibility study-already available
- Review draft loan proposal
- Make further improvement on the proposal
- Prepare disbursement approval report
- Prepare Request For Disbursement
- Approve request for disbursement
- Verify the approved Request For Disbursement
- Identify loans with/without insurance coverage and expiry data the coverage
- Get reports on approval visa-vis disbursement for end of a month, quarter, year

- Get achievements compared to plan for a month, quarter, year
- Obtain number of projects requesting additional loans, rescheduling or reallocation
- Get monthly, quarterly, semi-annually, annually comparative performance figures
- Get daily, weekly, semi-annual, and annual reports on summary of performance, loan approvals, application rejected, withdrawn, suspended, and under progress.
- Record loan collection receipts
- Verify collections recorded
- Reject infeasible project application
- Check disbursement application
- Reject disbursement application
- Record to current account
- Record disbursement to client's loan account
- Effect payment
- Prepare reminders
- Input transaction - presently available
- Post transaction - presently available
- Update interest (interest memo and interest arrears) - presently available
- Update principal (principal outstanding and principal arrears) - presently available
- produce reports (on-line display or in paper printed form) - presently available
 - Loan reports (by alphabet or by loan numbers)
 - Loan recovery report
 - Loan collections report
 - Loan disbursements report
- Take back up on tape drives
- Credit information provision

- Segregate current maturing loans from those that are not
- Prepare loan repayment slip
- Check loan repayment slip
- Receive cash
- Acquire any user defined queries

On the other hand, the following activities remain manual in the new system:

- Send repayment slip copy to loaning departments
- Reject loan repayment (coming in the form of check deposits, credit advices, etc.)
- Check deposits in the bank statement (for collection from other banks) against the advices received
- Conduct preliminary investigation
- Analyze the collected data - partially
- Write-up project proposal
- Discuss with client/applicant
- Get first hand information
- Prepare loan application rejection letter
- Recommend loan application

4.8.3. **Methods of data storage**

In the process of selecting a feasible solution, two data storage systems are considered: centralized and distributed. In the next few pages, these alternative solutions are discussed in terms of their advantages and disadvantages.

i) Centralized system

In this system, all permitted users are allowed to have access through terminals or in the form of hard copies from a centralized database. Data on the clients applications, project (feasibility study and follow-up), loan account records are held at a central point.

Advantages of centralized system:

- Integrity and security of data can be controlled
- Specialization of activity can be maintained
- It is less complex and less difficult to construct than distributed system [Sinha, 1997]. It simplifies the work of data processing
- Users can obtain all stored information at a time. They do not have to log into another database to access certain information. Hence relative completeness is achieved at a point
- It is a good alternative to attain economics of scale, etc.

Disadvantages:

- End-users are separated from computers and often are dissatisfied
- It is a near to monopoly and unresponsive to user information needs [NCR, 1980]
- It is incapable of effectively using and managing very large number of distributed resources
- Responsibility to activities is degraded
- It has a control over setting priorities to run a certain job at the time of tight time schedule [NCR, 1980]

Disadvantages:

- It is difficult and complex to build the network to distributed database compared to centralized system
- It is not suitable to a poorly connecting communication network. Its performance depends on the communication network
- It entails additional cost for the network requires special devices used to set appropriate security measures needed when sharing the scatteredly distributed resources and to protect loss of messages across the communication network.

4.8.4. Requirement of the new system

Different outputs, inputs, database and securities are expected from the new loan management and monitoring system. The output, input, database and security requirements for handling loan queries, appraising and following-up of them and keeping proper loan records are discussed below.

4.8.4.1. Output requirements

The required outputs expected from the system are:

- On-line display (or in paper printed form) of the requirements for application.
- On-line display of the investment areas that the Bank finances.
- On-line display of the maximum percentage that the Bank covers on each project line.
- On-line display of the regional profile (investment opportunities) database. Example, possible investment area, number and capability of investors in the region, the infrastructure facilities, incentives the region could provide, etc.

- On-line access to loan reports of the Bank's financial record
- On-line display of number of applicants together with a combination of economic activity addresses, requested loan amount, guarantees /collateral/ held, date of application, etc. when needed only.
- On-line display of lists of pending, withdrawals with the amounts, economic activity, addresses, etc., when the need arises, status on pending or withdrawing the project.
- On-line display of loan applicants transferred from branch with loan amount economic activity, (sub-) branch name.
- On-line display (paper printout) address of the applicant and the project.
- On-line lists of documents held as guarantee to loans granted
- On-line display of lists of potential applicants whose projects are not bankable for the time being, their investment interest, addresses, project they were applied for, etc.
- On-line checking of date the loan application is received, handed to project appraisal units, ends of appraisal or submitted to Loan Committee/Mangers, etc. for each project until the disbursement is released
- On-line display of days taken for each project finalized from the initiation to first disbursement or until the approved loan is fully disbursed
- On-line display of approved date for each project or group of projects
- On-line display of the number, economic activity, type, addresses, and amounts of projects approved, rejected, on pipeline
- On-line display or checking of projects' follow-up report
- On-line insurance records of clients (e.g. insurance expiry date)
- On-line checking of non-performing loans
- On-line checking of lists of names, types, and economic activities and addresses of projects that receive reminders along with the name of officer dispatching them

- On-line display of reports on weekly collection and disbursement of a particular period
- On-line generation of reminders
- On-line display, check, modify and control of ad hoc queries

4.8.4.2. Input requirements

Inputs that are useful in producing the output identified in the output requirements are used.

That is, inputs like information in the debit or credit advices, proposals, applications, loan agreements, credit information, interest rate directives, etc. are required.

4.8.4.3. Process and Security Requirements

Computer security is defined as ensuring the confidentiality, integrity, and availability of components of computing systems, i.e., hardware, software, and data, against the threats of computer security of interruption, interception, modification and fabrication [Pfleeger, 1997].

The main objective is to ensure that the system is protected from accident and intentional errors and use, including fraud.

In order to maximize the usefulness of information, management of it should be given due consideration like any other resources. In doing so, security of information or generated database of the Bank is highly essential.

Internal control should be designed into the system. Access restriction to unauthorized end-users, backup and recovery for files are important control. Timing has to be set to input a data to or access output from a database irrespective of authorization. The recipient of the output or

the one entering data must be specified. Validity of data entered also matters. Thus, completeness of all the required fields on entry of the inputs, control over proper inputs, range of values, self checking digits to check data entry error, etc. need to be assured.[Whitten, et al, 1989].

There are countermeasures that attempt to prevent exploitation of the vulnerability of computing systems [Pfleeger, 1997]. These include encryption, software control, hardware controls, physical control, and more importantly awareness of the problem, and periodic review.

Despite the non-existence of totally secure system, the Bank should try to achieve the security mechanism possible by restricting access to data/information of the system to authorized personnel. With this regard, the Bank should maintain security by stratifying the users according to their information/data need. Every user has to have a password to protect the data/information against misuse. Modification to the data need to be allowed only upon authorization. The remaining users to the system could only access data by deactivating the option to change part of the record. The physical data on clients like hard copy client file should move only by few authorities, not to everybody on request as is the case at present.

4.8.5. Method of organization of the database

Database could be organized in a hierarchical, network, or relational structures. Hierarchical structure, also called tree structure, is a parent-children record relationship between data elements. Though tends to be efficient in processing and retrieving information, it is not

flexible making operation difficult. It is mostly used with a conventional file structure [Whitten et al., 1989].

Network structure, on the other hand, is a database that sees it as a network. It allows multiple parent-multiple children records relationship and is suitable for programming of complex applications. Redundant data elements are used to lower complex relationship.

Relational database structure -the recommended option - is a structure that treats data as a series of two dimensional tables (called relation) where the rows of the table represents the records and column contains attributes [Kendall and Kendall, 1995]. The information in one table may be related to the information in another table. The Relational Database Management System (RDBMS) is used to set these relationships automatically. It is efficient in handling ad hoc queries. Relationships are not stored physically, instead relationships are inferred when needed [Whitten et al., 1989].

RDBMS is known for security controls. It provides a number of security functions based upon user identification or group membership, a user can be allowed to, or denied access to a database [Bruce and Dompsey, 1997].

CHAPTER 5

LOGICAL DATABASE DESIGN

5.0. Introduction

Data is the core of any information system. In producing information, we capture data, store data, process data, and update data to produce new data in the form of useful information [Whitten, et al, 1989]. They have to be modeled properly so that they be flexible to future processes or output requirements that might come. Data modeling, again, could be either physical or logical. Physical data modeling show how the system will be implemented (including hardware, software, people involved in the system). This is explained in chapter 6.

On the other hand, logical modeling is implementation independent. It describes how the system operates, i.e., events of the system and the data required and produced by the events [Kandell and Kandell, 1995]. It is used to construct more stable system which is flexible and maintainable, to better communicate with users in non-technical language, to help analysts understand the system and hence remove biases resulting from the way the existing system is implemented, to reduce the risk of missing functional requirements, to narrow the scope of the problem to manageable level by identifying key entities [Whitten et al, 1989]. The logical data modeling can be portrayed using entity-relationship modeling.

5.1. Entity relationship modeling

Data collected on people, event, etc., as said above, are stored in a file/database. To extract a meaningful information, their relation must be defined. The relationship is shown using entity relationship diagram. This diagram serves to describe the relationships among the data. It does not indicate data flow or process rather emphasizes on stored data. It consists of relationships and attributes to entities that could describe the data.

This part of the design is a continuation of data modeling using entity relationship, section 4.2. Refinement for the unnormalized entities is made in this chapter. Entities are objects about which data are stored. They are with some characteristics called attributes having relationships among each other.

For the time being, relationship between/among entities are discussed below pending the normalized list of entities and their relationships until late in the chapter.

The entities identified in section 4.2 and refined later at the end of this Chapter have the following relationship:

- Relationship between PROJECT and CLIENT/APPLICANT has a one-to-many relationship. That is, a PROJECT can be initiated by group of APPLICANT/CLIENT (taken as one via a representative) and a(n) CLIENT/ APPLICANT can initiate many PROJECTs. A CLIENT/APPLICANT again fills many APPLICATION FORMs. Thus, their relation is one-to-many.
- One or more PROJECTs are related to one or more LOAN OFFICER. Many LOAN OFFICERs can be assigned to many PROJECTs and vice versa - a many-to-many relationship.

- The occurrence of a defaulting CLIENT entails one or more REMINDER depending on how many projects the CLIENT defaults to pay to the Bank. However, occurrence of REMINDERS can be zero if the CLIENT pays the installment on time according to the agreements.
- There is also a direct relationship between PROJECT OFFICER and project PROPOSAL. A project PROPOSAL can be prepared in one or more PROJECT OFFICERs and a PROJECT OFFICER can appraise one or more projects and prepare project PROPOSAL.
- An instance of a project PROPOSAL is seen by only one LOAN COMMITTEE. Whereas, a LOAN COMMITTEE can have a look at more than one PROPOSAL. Though their relation is strong, some proposals to, for instance, additional loans less than or equal to twenty five percent of the previous loan and any reallocation and rescheduling loans are directly given to management for decision.
- The relation between MANAGEMENT/BOARD and DECISION is a one-to-many relationship, i.e., a MANAGEMENT/BOARD can pass many DECISIONs but only one DECISION is made by only one MANAGEMENT/BOARD. There is a strong relationship between these instances. No project appraised escapes the decision by management/Board. The relation is relevant to all financed projects.
- Every LOAN AGREEMENT requires a DECISION but not necessarily the other way round. The relation is mandatory for the LOAN AGREEMENT to exist. However, every DECISION does not bring about the preparation of LOAN AGREEMENT. For example decisions to reject, suspend, reconsider, or correct a proposal do not let loan agreement possible. The LOAN AGREEMENT is also part of CLIENT RECORD.
- Since the new system uses an on-line system, BATCH will not be part of the entities. Approved REQUEST FOR DISBURSEMENTs are directly inputted to the TRANSACTION RECORD and update the loan account balance concurrently. The

relation between TRANSACTION RECORD and REQUEST FOR DISBURSEMENT is relevant and direct. The relation is also strong that for every approved loan REQUEST FOR DISBURSEMENT, the TRANSACTION RECORD is affected. However, a TRANSACTION RECORD could have many REQUEST FOR DISBURSEMENTS. The relation is one-to-many.

- Though not at same time, since client can apply to many loans, the relation of LOAN AGREEMENT and CLIENT RECORD is one-to-many. This means, LOAN AGREEMENT and CLIENT RECORD have a direct relationship—one-to-many.
- The LOAN AGREEMENT serves as a base to MASTER CLIENT RECORD. The relation is one-to-many. This is to say every LOAN AGREEMENT is associated to one MASTER CLIENT RECORD but a MASTER CLIENT RECORD could have one or more LOAN AGREEMENT, more specifically when a client gets into more than one LOAN AGREEMENT.
- CREDIT INFORMATION is linked to CLIENT RECORD and CLIENT. Many CREDIT INFORMATION can be requested by a CLIENT/APPLICANT and filed to CLIENT RECORD. Thus, their relation is one-to-many. On the other hand, a CREDIT INFORMATION is based on a MASTER BALANCE RECORD. Thus, every CREDIT INFORMATION is related to one and only one MASTER BALANCE RECORD.

5.2. Data Analysis

An entity-relationship model is created in section 4.2, Chapter 4 (pages 59-64). However, it has to be further verified for its goodness. According to Whitten, et al. (1989), a data model is good in relative terms:

- When it is simple in the sense that all the data elements in an entity describes only that entity; and for an occurrence of the entity, all its data elements assume one and only one value.
- When it is free of redundancy - meaning a data element should describe not more than an entity
- When the data model is flexible enough and adaptable to future needs

These could be achieved by transforming the structure of the data elements into less complex structure using a technique called data analysis. Data analysis again uses a procedure called normalization [Whitten, et al, 1989].

5.2.1. Normalization

It is the transformation of a complex data structure of entities to a simpler, more user view directed to attain easy maintainability. Three steps are followed in normalizing a data structure: first, second, and third normal form.

i) First normal form - This step of the data analysis aims at getting rid of repeating groups for entities and identifying primary keys[Kendall and Kendall1, 1995]. In doing so, breaking the elements into two or more parts may be important. Some entities at this first stage could already be in the second or third normal form.

For simplicity purpose, demonstration of normalization is given to LOAN ACCOUNT entity. The LOAN ACCOUNT consists of a repeating and non repeating elements as shown below:

Entity: LOAN ACCOUNT**Attributes:**

Master file	Principal repayment due
Office	Interest repayment due
Branch +	Principal repayment interval
Head Office	Interest repayment interval
Reporting month	principal repayment schedule
Date issue	Transaction file (<i>repeats 1-n times</i>)
Name of client	<i>Transaction type</i>
Loan number	<i>Reference number</i>
Address:	<i>Value date</i>
Region +	<i>Interest days</i>
Woreda +	<i>Transaction amount</i>
Zone +	<i>Principal share of the amount</i>
Kebele +	<i>Interest share of the amount</i>
House number +	<i>Interest calculated</i>
Telephone number +	<i>Principal not due</i>
Postal code. +	<i>Interest not due</i>
City	<i>Principal overdue</i>
Loan amount	<i>Interest overdue</i>
Date loan granted	<i>Balance in commitment</i>
Principal interest rate	<i>Balance brought forward</i>
Commitment interest rate	

Balance carried forward It can be splitted into MASTER RECORD and TRANSACTION RECORD. Thus, the first normalized form looks like the following:

Entity : MASTER RECORD:**Attributes**

Office	<u>Name of client</u>
Branch +	<u>Loan number</u>
Head Office	Address:
Reporting month	Region +
Date issue	Woreda +
	Zone +
	Kebele +

House number +	Commitment interest rate
Telephone number +	Principal repayment due
Postal code +	Interest repayment due
City	Principal repayment interval
Loan amount	Interest repayment interval
Date loan granted	principal repayment schedule
Principal interest rate	

Entity: TRANSACTION RECORD:

Attributes:

<u>Transaction type</u>	Principal share of the amount
Reference number	Interest share of the amount
<u>Value date</u>	Interest calculated
Interest days	Principal not due
<u>Transaction amount</u>	Interest not due
	Principal overdue
	Interest overdue
	Balance in commitment
	Balance brought forward
	Balance carried forward

Elements of the *transaction file* are repeated for every transaction. It could be separated and be treated like another relation with TRANSACTION RECORD with the key fields

Transaction type, *Value date*, and *Transaction amount*. The remaining half of the elements of the LOAN ACCOUNT entity could be named as MASTER RECORD with main keys *Name of client* and *Loan Number*.

ii) Second normal form - the emphasis is removing transitive dependencies. In this step of data analysis, make assurance is made that all non-key data elements are dependent on primary key(s). Partial dependencies are removed and placed them in a different relation. Here only entities that have a combination of keys are examined [Whitten, et al, 1989]. Each data element is looked through whether they describe the entity fully or not and merge those

that do not to more appropriate entities. In other words, the attributes that depend on the full combination key will remain in the entity. Others will transfer to new or existing entity as the case may be [Whitten, et al, 1989]. In order for the relation to be in a second normal form, every attribute must be dependent on the primary key [Kandell and Kandell, 1995].

Coming back to the MASTER RECORD and TRANSACTION RECORD which are changed to first normal form from previously, they are changed to second normal form in the following ways. The keys to the MASTER RECORD are *Name of Client* and *Loan Number*. Then follows to determine whether all the non-keys are described by only *Name of Client* or *Loan Number*. That is, to determine whether all the values of the non-key items require both *Name of Client* and *Loan Number*.

Non-key items from MASTER RECORD that are fully described by the *Name of Client* are: *Address (Region, Woreda, Zone, Kebele, House Number, Postal code, City)*. While *Office (Branch or Head Office)*, *Loan amount*, *Date loan granted*, *Principal interest rate*, *Commitment interest rate*, *Principal repayment due*, *Interest repayment due*, *Principal repayment interval*, *Interest repayment interval*, *principal repayment schedule* are described by the *Loan Number* key. They do not need the *Name of the Client* key

Moreover, *Reporting Month*, and *Date Issue* of the MASTER RECORD are explained by neither of the keys, *Name of Client* and *Loan Number*. So they are grouped in a separate entity called REPORTING PERIOD. On the other hand, for the TRANSACTION RECORD, all the non-key attributes are fully explained by all the keys identified; hence, the entity TRANSACTION RECORD is in a second normal form.

Second normal form just described looks like the following:

Entity :MASTER CLIENT

RECORDAttributes:

Name of Client

Address :

Region +

Woreda +

Zone +

Kebele +

House Number +

Telephone number +

Postal code +

City

Entity: MASTER BALANCE RECORD

Attributes:

Loan Number

Office:

Branch +

Head Office

Loan amount

Date loan granted

Principal interest rate

Commitment interest rate

Principal repayment due

Interest repayment due

Principal repayment interval

Interest repayment interval

principal repayment schedule

Entity: REPORTING PERIOD

Attributes:

Reporting month,

Date issue

Entity: TRANSACTION RECORD

Attributes:

Transaction type

Reference number

Value date

Interest days

Transaction amount

Principal share of the amount

Interest share of the amount

Interest calculated

Principal not due

Interest not due

Principal overdue

Interest overdue

Balance in commitment

Balance brought forward

Balance carried forward

iii) Third normal form - This step checks for functional dependencies. Thus, a relation is in a third normal form if the non-key attributes are functionally dependent on the primary key and there are no transitivity. Checks are to be made as to whether the attributes describe separate entities. Any calculated/derived data element is deleted in this step. Those derived/calculated elements that require another element(s) in another entity for their derivation/computation are not deleted.

Taking the entities in second normal form identified previously, checks for their being in a third normal form is tested in this section. In the MASTER BALANCE RECORD, *Principal repayment due* and *Principal repayment interval* are dependent on the *Principal repayment schedule*. They are derived attributes. The same is true to *Interest repayment due*. Therefore, they are deleted from the MASTER BALANCE RECORD.

In the TRANSACTION RECORD, those elements *Principal share of the amount*, *Interest calculated*, and *Commitment balance* are derived/calculated attributes. However, since the values need another elements in the MASTER BALANCE RECORD, they will not be deleted. On the other hand, since knowing the *Principal share of the amount*, *Interest share of the amount*, the *Interest calculated*, and *Balance carried forward* help to determine *Principal not due*, *Interest not due*, *Principal overdue*, *Interest overdue*, and *Balance carried forward*, they are deleted from third normal form.

The LOAN ACCOUNT when in third normal form looks the following:

Entity: MASTER CLIENT RECORD

Attributes:

Name of Client

Address :	House Number +
Region +	Telephone number +
Woreda +	Postal code +
Zone +	City
Kebele +	

Entity: MASTER BALANCE RECORD

Attributes:

Loan Number

Office:

Branch

Head Office

Loan amount

Date loan granted

Principal interest rate

Commitment interest rate

Interest repayment interval

principal repayment schedule

Entity: REPORTING PERIOD

Attributes:

Reporting month,

Date issue

Entity: TRANSACTION RECORD

Attributes:

Transaction type

Reference number

Value date

Interest days

Transaction amount

Principal share of the amount

Interest share of the amount

Interest calculated

Balance in commitment

Balance brought forward

Revised entity-relationship diagram is shown in the following page for the entities identified below.

Entities:

Client/Applicant

Application Form

External institution

Loan repayment slip

Client record

Project

Sources of transaction

Project officer

Proposal

Loan Committee

Credit Information

Master Balance Record

Reminder

Minute

Master Client Record

Management/Board

Decision

Loan agreement

Reporting period

Transaction record

Status

Registering Agency

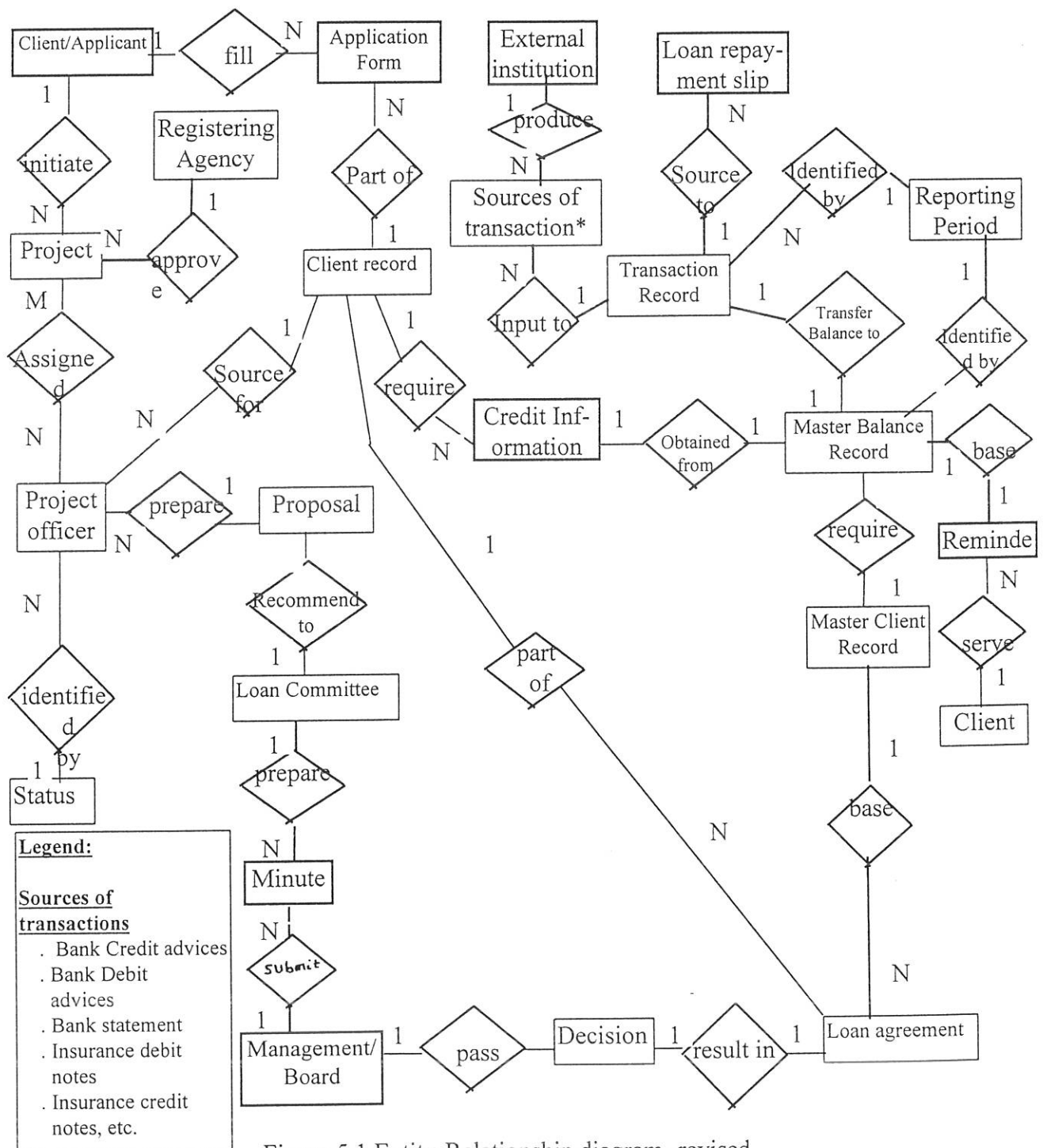


Figure 5.1 Entity-Relationship diagram -revised

CHAPTER 6

PHYSICAL DESIGN

6.0. Introduction

The purpose of the physical design is to design the loan management and monitoring system that fulfills the user requirements identified and implementing specifications made in the alternative solutions to computerization in Chapter 4 in a more user friendly way.

To this end, for the physical design to achieve the user requirements identified, end-users participation, fulfillment of current and projected functional requirements, and designing of information systems components (data and information, data stores, end-users, methods and procedures, etc.) are important [Whitten et al., 1989].

In this chapter, form design, database design user interface for physical database design using a prototype with Microsoft Access, and tests of the prototype are discussed. Implementation plan is also considered at the elementary level.

6.1. Form Design

The quality of systems inputs determines the quality of systems output [Kendall and Kendall1, 1995]. Input design is important to capture and get data in the form suitable to computer. For the purpose of this, input forms are to be carefully designed to achieve effectiveness, accuracy, ease of use, consistency, simplicity, and attractiveness. This applies also to visual display terminal screens.

In the proposed system, paper printed forms still continue to exist. For example, applicants will not be allowed to enter loan application data themselves. This is due to the nature of the application form and the type of applicants that the Bank accepts. Quite many of the applicants come from different corners of the society, such as merchants, ex-soldiers, peasants, etc. who do not, in most of the cases, have exposure to computers. Thus, a loan applicant is required to fill an application form and submit to the Client's Guidance and Advisory Desk for loan application data entry. Upon receiving the application, the Desk officers, as usual, checks for completeness. In addition, the loan application form is not something an applicant to fill outright. It demands many prerequisites, requires various documents to fulfill, estimation of collateral and project costs, product consumers, etc.

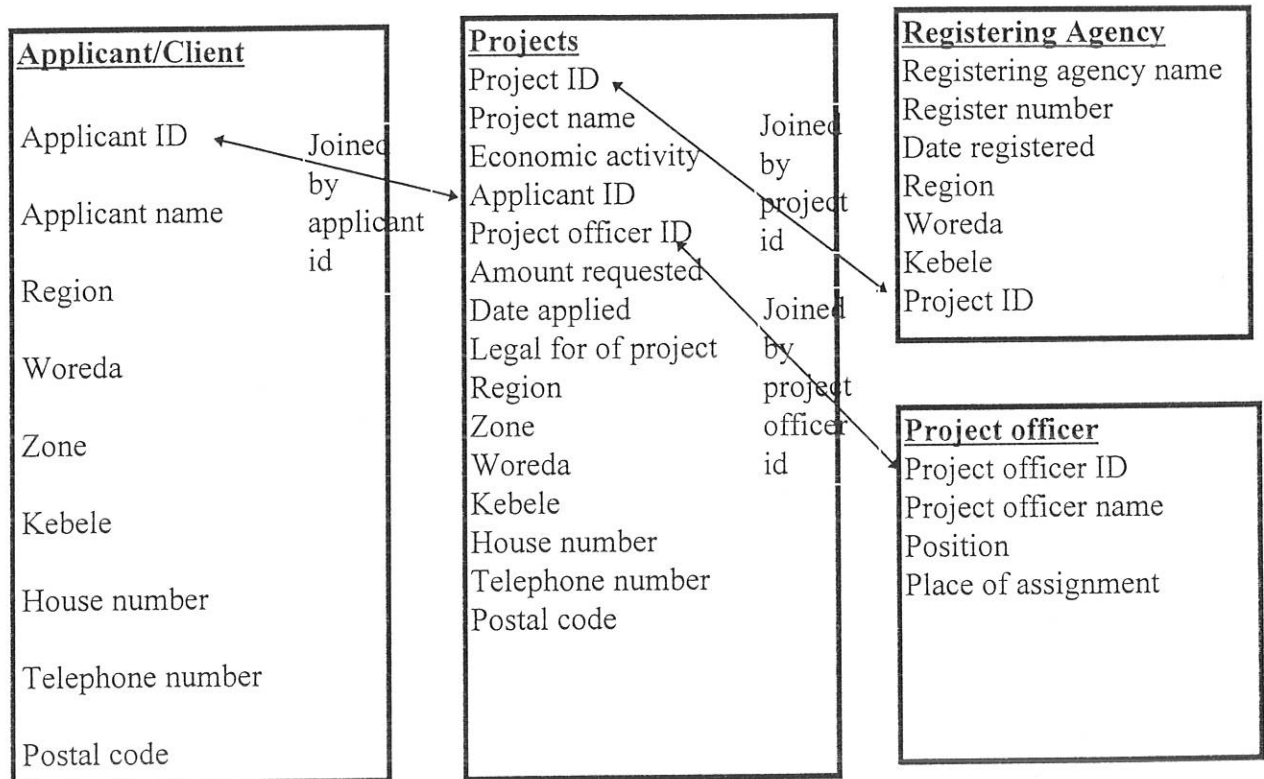
Only input form to Loan Application is designed below as a sample to form design.

DEVELOPMENT BANK OF ETHIOPIA LOAN APPLICATION FORM				Form Number ____ Date ____/____/____	
A. PERSONAL DATA (IF INDIVIDUAL APPLICANT):					
PERSONAL NAME _____ FATHER'S NAME _____ GRAND FATHER'S NAME _____ OCCUPATION _____ ID NUMBER _____ OFFICE ISSUING ID CARD _____ REGION _____ WOREDA _____ TOWN _____ KEBELE _____ HOUSE NUMBER _____ TELEPHONE NUMBER _____ POSTAL CODE _____					
B. PROJECT DATA:					
PROJECT TYPE _____ REGION _____ WOREDA _____ TOWN _____ KEBELE _____ HOUSE NUMBER _____ TELEPHONE NUMBER _____ POSTAL CODE _____					
C. ECONOMIC ACTIVITY: _____					
D. PROJECT CONDITION:					
☐ ON OPERATION ☐ NEW					
E. ESTIMATED COST OF PROJECT:					
CATEGORY	TOTAL COST	OWNER'S CONTRIBUTION		DEVELOPMENT BANK	
_____	_____	<u>IN CASH</u>	<u>IN KIND</u>	<u>ETHIOPIA</u>	<u>LOAN</u>
1. _____	_____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____	_____
E. COLLATERAL HELD					
<u>TYPE OF COLLATERAL</u>		<u>ESTIMATED VALUE</u>			
1. _____	_____				
2. _____	_____				
3. _____	_____				
4. _____	_____				
F. PRODUCT DEMAND:					
i) MARKET AGREEMENT (IF ANY) _____					
ii) CUSTOMER: ☐ GOVERNMENT INSTITUTION ☐ PRIVATE ENTERPRISE ☐ INDIVIDUAL					
<u>APPLICANT:</u>			<u>FOR DEVELOPMENT BANK OF ETHIOPIA:</u>		
NAME: _____			NAME OF OFFICER _____		
SIGNATURE _____			SIGNATURE _____		
DATE _____			DATE _____		

Figure 6.1. Newly designed Loan application form

6.2. Database design

Database is a physical implementation of a data store [Whitten, et al, 1989]. It is demonstrated using sample tables of relational entities shown below.



Physically the relations are joined using IDs as shown in the above figures as a relational database.

6.3. User interface

In designing the output the following points could be considered:

- Simplicity to read and interpret the outputs.
- The delivery time of the outputs on demanding them.
- Sufficiency of the output to assist all relevant end-users.

- Fitting the user requirements.
- Choosing the right output method. [Whitten, et al, 1989; Kendall and Kendall1, 1995].

Almost the outputs of the proposed system will be in the form of screen output. If at all, users need in a printed form, the 'what you see is what you get' parody applies. Thus, the reports, many of which are used to loan monitoring will be available on computer screen, on-line.

Thus, output design is tried to be discussed via the user interface.

Interface are the means by which the system user interacts with the computer. They could be many types. Examples include natural language, menus, forms fill, graphical user interfaces. Adopting a combination of two or more interfaces yield better performance [Clifton and Sutcliffe, 1994].

A well-designed screen is important for it is the place where users view the capabilities of the system. If it is not appropriately designed, users will get difficulty in doing their jobs, make more mistakes, and to the extreme might chase some of them away from the system permanently [Galitz, 1997].

So interfaces must be developed taking the users need into account. Meaningful symbols which could be comprehended easily by the end-users are useful for effective communication of the user and computer. Menus customized to the language of the users could also be good interfaces.

6.4. Prototype of the Loan management and Monitoring System

Prototype is a small set of representation of a system used to show how the new system looks like. It helps to incorporate changes according to users' comments. Prototyping is a rife with uncertainty about user requirements, user behavior and the feasibility of technical design solutions [Galitz, 1997].

It is a vehicle for exploration, communication and evaluation [Galitz, 1997]. It is used to include user views in the design and to get feedback. Being a prototype, it is not expected to be absolutely correct, process actual and complete data. It rather helps users visualize how the new system would look like in a reasonable accuracy. It may be of more depth and breadth to depict features of the design using menu where users could open their own interest, modify, print, etc. of records in a database. Nonetheless prototype does not encompass every activity of the design but part of it, more importantly those modules that could be given attention.

Prototyping has its own limitations. A highly polished prototype might seem attractive visually while it is not actually. This is prevented by understanding whether the software used for prototype is a use and throw type or actual system software [Galitz, 1997].

The prototype prepared for the Loan Management and Monitoring system has a main menu consisting of Loan Accounts Database, Loan Application Database, Project Database, and Exit to Database as shown in Figure 6.2. When clicking to one of the three databases, a lower

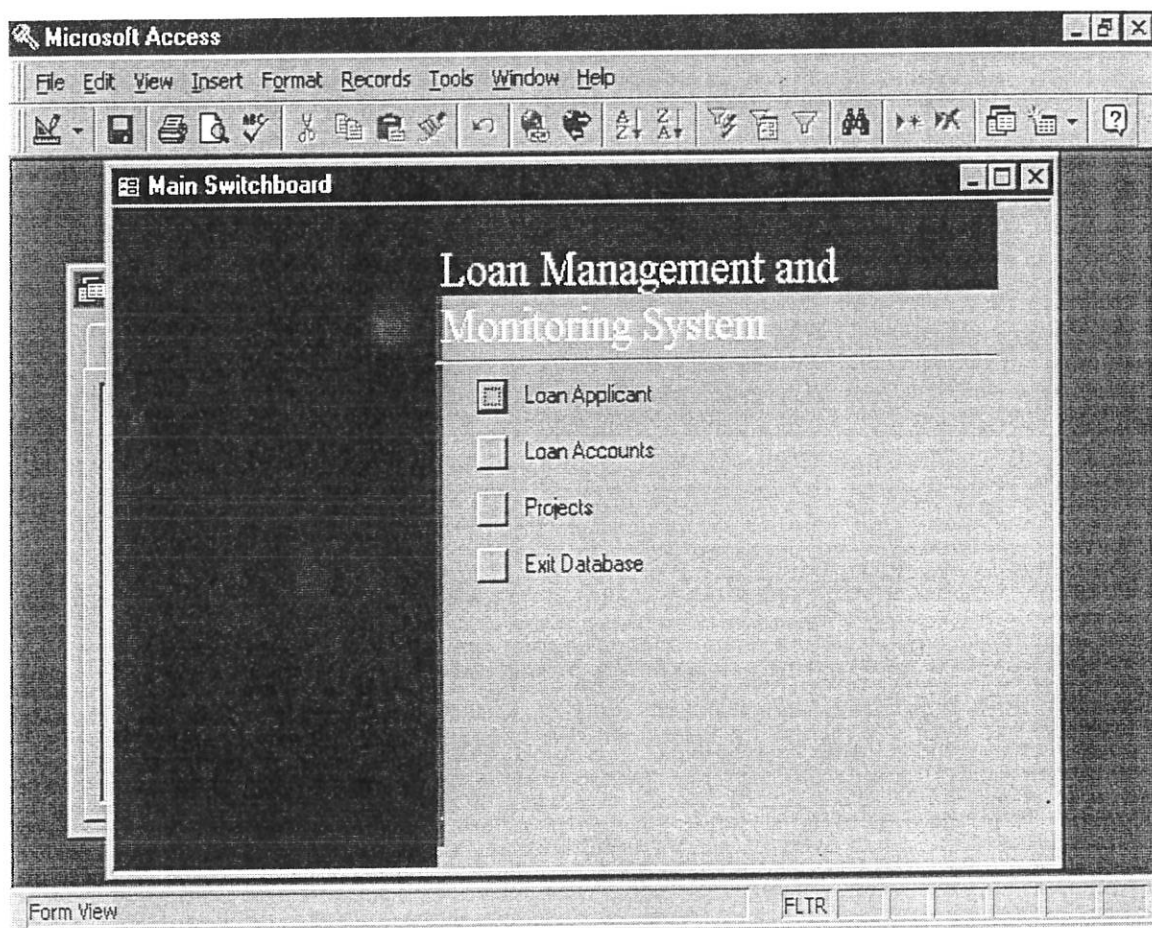


Figure 6.2 Main menu

level menu displaying Data Entry Forms, Reports, Exit to Database, and Exit to Main menu is available. Moving about the system is supported by options available in the form of buttons so that a user can move to the first, end, just the immediate previous or next, or any point demanded. The reports or formats available in the databases can be chosen from either the sub-menu to reports or forms or the customized pull down menu, or depending on the interest and permission, queries could be made to extract own information need from the database. Figures 6.3 to 6.5 show screen displaying such facilities.

Each menu or sub-menu has a title which is assumed to best describe the listings. Line separators are used to each reports and forms in the customized pull-down menu. Self checking mechanism and guidance are set by the prototype. Thus, entering invalid data is backed by the system itself with information to the user as to what to do or any permissible options.

Microsoft Access - [application]

Project ID: 23

Form Number: []

Date Applied: []

Applicant Personal Data

Name: Seid Ali

Region: 14 House Number: 345

Woreda: 7 Tele Number: 12-34-65

Zone: 1 Postal Code: 3333

Kebele: 2

Project Data

Name: Addis Pharmac

Economic Activity: Service

Region: 1 Zone: 1 Woreda: 1

Kebele: 1 House Number: 12-34-56

Tele Number: 12-34-56 Postal Code: 12-34-56

Project Condition: New

Market Agreement: []

Colateral: []

Government Institution: [] Private Enterprise: []

DeskofficerId: []

Record: 1 of 1

Figure 6.3. Loan Application Form

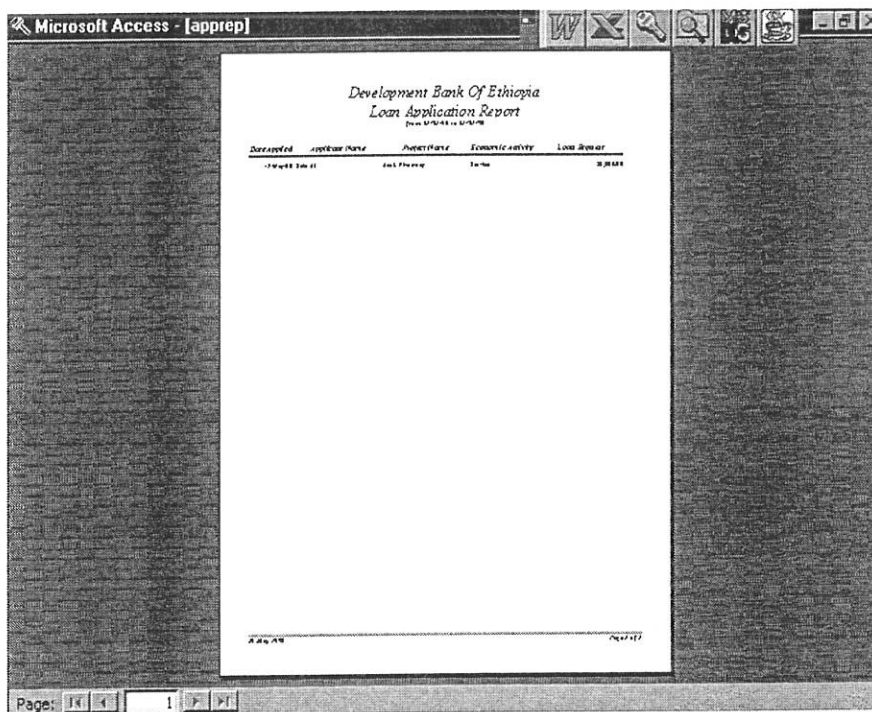


Figure 6.4. Report of
Loan applicant
for a month

The following figure shows an example of the message for invalid data entry.

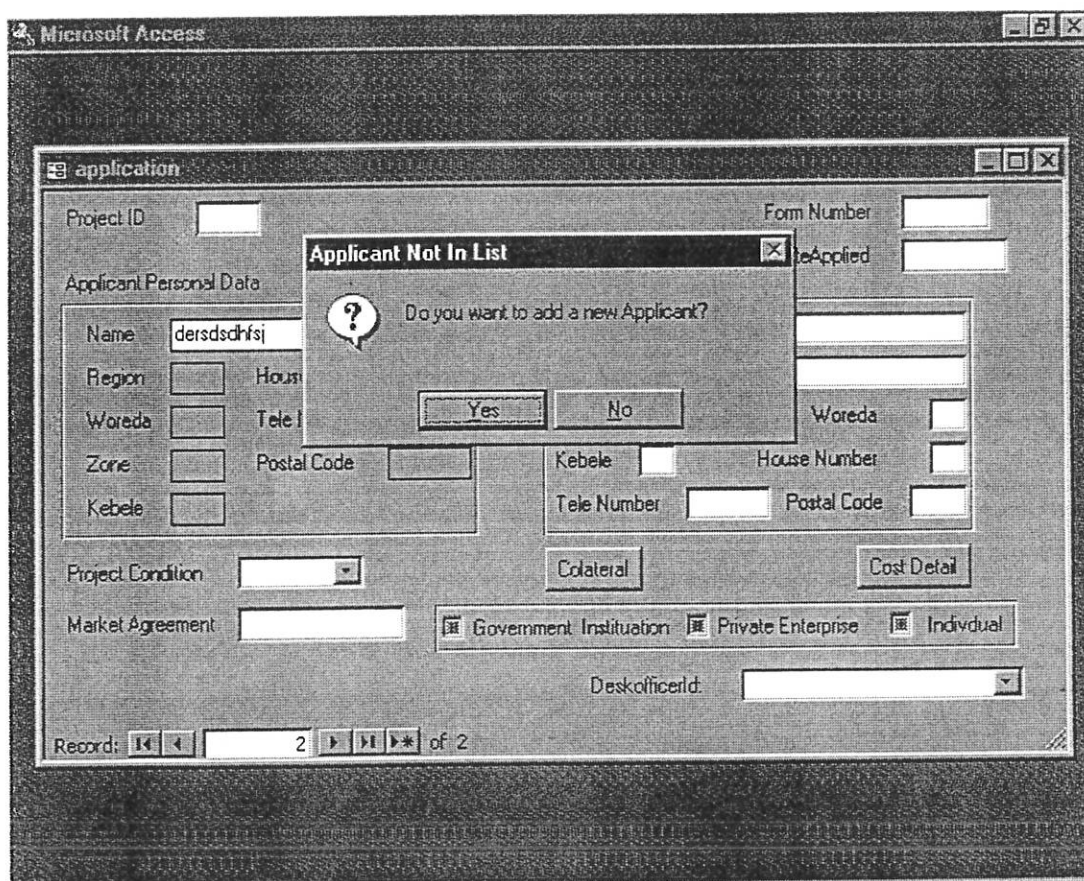


Fig. 6.5. Message displayed on erroneous data entry

More importantly, the database is password protected to prevent unauthorized users. Many reports are only in a read only mode so that a user gets information required without altering the database.

6.5. Testing the Prototype

Testing the Prototyping is used to minimize complications and costs that might be created when implementing the new system. Thus, testing : establishes a communication between developers and users, determines how well it meets the user requirements, minimizes error, brings a pool of mind, associates the design to a reality, overcomes limitations caused by adopting a number of design tradeoffs, overcomes problems that might be found late during implementation, and serves as an assurance that users can do their work more easily probably from what they use at present [Galitz, 1997].

Testing the prototype for Loan Management and Monitoring system was conducted. Four Head Office staff (one management member, one officer, one accountant, and one programmer) of the Bank were participated in the demonstration. First, the purpose of the prototype testing was explained to the participants that the prototype is just a small part of the actual implementation containing only few opportunities, and gives how the new system would look like. They were told that there are a number of functions that are not included in the Prototyping. Besides, the application software used for demonstrating the prototype, i.e., Microsoft Access does not mean that it is chosen as the best solution to perform the actual activities of the Bank. There are, in fact, specialized software dedicated to development banks, for example **Dbank software**.

During testing the prototype, participants commented on the following points: effectiveness on starting to use the prototype, recognition of system features, general screen layout, efficiency and aesthetics, recognition and understanding of screen board controls, icons, and messages, system navigation method using menus and buttons, comments on steps needed to accomplish a task, and views on system's feedback provided. Then, modifications were made accordingly to the prototype based on comments given.

6.6. Implementation considerations

After the system design is completed, hardware/network development is the next phase. At this level, activities such as determination of the desired system configuration, hardware requirement definition, obtain vendor list, develop and submit request for proposal to selected hardware vendors, evaluate vendor proposals, select vendor, negotiate contract, if it is approved will take place [Belasco, 1993].

Not enough alternatives suitable software to the Development Bank of Ethiopia were available during the study. One specialized software (**DBank Software**) to development banks and other (**MICROBANKER-** Citicorp information technology industries) to universal banking system have been tried to check against the facilities they provide. However, since I couldn't get information on the availability, cost, etc. I couldn't select a specific software.

Once the hardware and software vendors are selected and get into contact, implementation takes over next. In this phase, among the activities to be undertaken are [Belasco, 1993]: determine equipment list based on the needs of specific location to be implemented, order hardware from the vendor selected previously, determine requirements needed to enable the

network solution selected, establish access security to data, set the parameters and procedures for loading software in the file server, configuring the system by testing it, cabling and interfacing, train personnel on how to work with microcomputer in a networked environment, and finally actual installation of hardware and software [Belasco, 1993].

In general, system implementation has two phases: construction and delivery [Whitten, 1989]. The purpose of the construction phase is to create the hardware and software elements for the new system. For the hardware elements, this may involve site preparation and installation. For software elements, the construction phase includes computer programming. The purpose of the delivery phase is to place the new system into operation. Delivery includes end-user training, computer staff training, file conversion and loading, and systems conversion.

The post implementation review involves a final walkthrough to determine for any incompleteness. Conversion of the old system could be effected in many ways, each having its own advantages and disadvantages. Some of these are just immediately on installing the new system, parallel conversion, piecemeal conversion (probably by department, division, branch, or sub-branch, etc.), and staged conversion [Clifton and Sutcliffe, 1994; Whitten, 1989; Belasco, 1994].

6.7. System documentation

System documentation is not a one time job. It is worked as the system study is progressing.

Generally, contents of a documented system include:

- A description of the purpose of each routine
- A data flow diagram or the equivalent for each routine

- Specifications of all processing runs
- Source data requirements and input procedures
- Contents of logical files and database requirements
- Layout and contents of all output prints and displays
- Operating instructions amendment procedures
- All aspects of user participation [Clifton and Sutcliffe, 1994]

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 CONCLUSION

In this study, attempt has been made to examine the existing system, identify problems, define user requirements, and propose alternative computer-based system that would solve problems of the existing system identified.

To achieve this, interviews, questionnaires, observations, document analyses were conducted to collect data on the existing system. Problems, such as incompleteness of information, high risk of industrial concentration in the Bank's portfolio, degraded reliance on accuracy of reports/records, delay in reports preparation, redundancy and duplication of efforts, communication gap among units of the Bank, lack of integrity, etc. are identified.

These problems hinder on time production of various reports and decision making processes which are important to monitor the loans. As a result, proper monitoring of the loans which is helpful in determining how the Bank is performing and how will it perform is currently difficult to trace easily.

To have an understanding of the processes of the existing system, data flows, and data stores, the current system was analyzed using data flow diagram, structured English, and a sample of data dictionary. Form analysis was also used as part of the current system analysis.

Then, definition of requirements independent of the way they will be implemented are made using logical data modeling. Entities, attributes and relationship between entities were defined. Selection of alternative solution is analyzed. Activities that are to be computerized/assisted with computers are identified. Methods to implement the new system selected are on-line with distributed system. Finally, input, output, process and security requirements of the proposed system are dawn.

Logical database design is also discussed by refining entities, attributes, and relationships using a technique called data analysis. For this purpose, sample normalization procedure is adopted to simplify entities, eliminate redundancy, build flexible and easily adaptable data model.

The new proposed loan management and monitoring system is physically designed with a prototype using Microsoft Access. Users' view is included to the design as a feedback to the new system. The user interface is seen on designing the prototype. Sample form which is to be used by the new system is designed, too.

The nature of every bank differs from one another. Some undertake specialized activity and others universal banking. This brings to follow different approaches in solving problems by different financial institutions. Though not exactly be adapted as it is, financial institutions that involve in medium and long-term loan could similarly follow the procedure in this work.

It is to be noted that on studying their system, the study needs to be implementation independent to make it flexible to changes, participate end-users in the phases of the study, convince employees as to the need for computerisation and vividly show how the users work

could be improved greatly using prototyping of the proposed system. Cost-benefit analysis of adopting automating their system needs to be valued by an assigned group.

Other factors that affect automating a system of a financial institution are environmental influences (within a country, its neighbors, or regions of a continent), i.e., how financial institutions around are correctly working or planning to work in the near future, level of automation of that particular institution, skills of the employees and motivation towards the performance of that particular financial institution, etc.

Following the approach in this study helps to identify problems, define user requirements without worrying in-advance with the technology the system is going to use, identify requirements for the proposed system, obtain various alternative solutions instead of solutions based on the current system, design the system independent of the way it is going to be implemented, allocate the time resources the financial institution has to systems analysis and system design more reasonably so that the analysis and design comes up with appropriate solutions to the identified user needs.

The thesis does not claim, however, more than analysis of the current system and designing alternative computer-based solution. It is not by any means a complete and exhaustive study, rather samples are taken here there to exemplify using tools of system analysis and design and hopefully alert management proceed their plan to computerization and to help ready the staff of the Bank to the achievement, at least in mind.

7.2. RECOMMENDATIONS

Successful implementation of the Loan Management and Monitoring system is dependent on the commitment of management and users of the system. The Bank has an initiative towards automating its system. Computerizing its activities is part of its five year plan. Pushes from inside, such as the staff, and outside, like international financial institutions are also influencing for its implementation. When the Bank borrows, for instance, from these institutions, a certain portion of the loan they granted is allocated to the purchase of computers. Employees are being trained the technology inside the country and abroad. This trend indicates that sufficient conditions are on the way to be met to computerize the system. Moreover, this move is strengthening with users' blame on the inefficiency of the manual system the Bank is being using. The Bank needs to start adopting the computerized system to its activities.

Revisions to the definition of user requirements may need to be made on actually implementing the new system. So are output, input, process and security requirements discussed in Chapter 4.

Samples are used in designing forms and outputs (via screen design). Exhaustive identification of the relevant data items of the formats and reports from those that are not, missed data elements, eliminating redundant elements, correcting layout of formats of inputs and output, etc. should be conducted by a team from within or professionals in the field outside the Bank.

Only sample data dictionary is given just to indicate its importance to consistent definition of terms on using. Thus, each data element used by the system should be defined considering users own terms.

The software alternatives are not studied due to time limitation. Identification of possible lists, selecting suitable ones to implement the proposed system based on cost-benefit analysis is to be undertaken. Evaluation of software packages has to be made which may consider points like user friendliness, good documentation ability, simple command, standard editing and formatting, multiple copy put, on-screen help, file merge options, spelling checker, automatic save, automatic backup check, relational database management system interface, efficiency in a distributed system, support and updates of vendors, reputation, etc.

Hardware needs to be analyzed based on , for instance, the time required for average trisections, total volume capacity of the system, idle time of the processing unit, size of memory provided, the possibility of adding on to the system when needs come later, and the possibility of interfacing with equipment from other vendors, and stability of the vendors enterprise [Kendall and Kendall, 1995].

Systems implementation which is used to place the new information system into operation replacing the old system is to be held in detail as discussed in section 6.5. System documentation on reports, instructions to users, and specifications also need to be properly undertaken.

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APPENDIX - A : Description of structured Systems analysis tools

Among the structured systems analysis tools, data flow diagram and entity relationship modeling to show how the data within the system are working and sample data dictionary to define some data elements used in the process of handling loans or monitoring them are employed. In addition, detail processes that might be cumbersome to easily comprehend by data flow diagram are expressed by Structured English (Appendix B). Explanation to symbols used follow on these points.

Data Flow Diagram

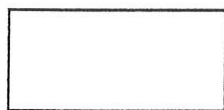
Data Flow Diagram (DFD) is one of the important tool to structured system analysis and design method. It is the first tool to model system components used by the system analyst [Hawryszkiewicz, 1994]. It employs the following four symbols.

i). **Process symbol** - could be a circle or a rectangle with round corner which represents what the system does. It changes data to outgoing information to either data store, source, sink, or another process. Each process is represented by a unique name and number inside this process symbol. Note that, the context level has only one process to stand for the entire system.

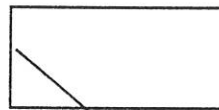


Process symbol

ii). **Source/Sink symbol** - represents external entities that are outside the system but supply data to or accept information from the system. They are represented by rectangle/square. The same symbol serves both as source and sink to system data requirements and output. To minimize complication, the source/sink symbol is marked a diagonal line across the left bottom corner of the symbol when used more than once.



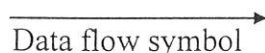
Source/Sink symbol



Duplicate Source/Sink symbol

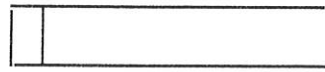
iii). **Data flow** - is an arrayed connecting line of processes to external entities, another processes, data stores, etc. Not all connections are permitted on constructing DFD. Rather flows of data can only take: among processes, from data stores to processes, from processes to data stores, from sources to processes, from processes to sink. [Hawryszkiewicz, 1994; Kendall and Kendall, 1995; Davis, 1995]. All other connections are not allowed.

Important also to note is that processes need to have at least one input data flow and one output data flow and all data flows must either originate or terminate at a process. [Kendall and Kendall, 1995].

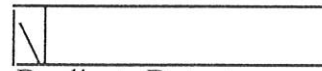


Data flow symbol

iv). **Data store symbol** - is not part of a context level data flow diagram. It stands for data at rest and implies that data must be held between processes [Davis, 1995]. Different reasons could be mentioned why data should be stored. Processes occurrence at different time periods, usage of data at later time in different situation for reference, correction to errors when occur, etc. can be taken as examples. Duplicate data store symbol is used by drawing a diagonal line on the left-bottom corner of the symbol to avoid complication.



Data store symbol



Duplicate Data store symbol

In the following four pages, a context, level-1, and sample lower level data flow diagram are shown. The lower level data flow diagrams are on 'Handling Loan Application' and 'Processing Loan Collection'.

2. Entity-Relationship

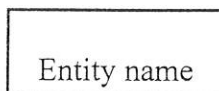
2.1. Entities

Entities are objects about which data are stored. They have a set of attributes which contain key elements distinguishing one from another. Their relationship could be a one-to-one, one-to-many or many-to-many. The strength of relationship is determined by the relative number of occurrences among the related entities.

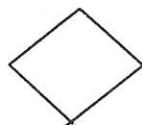
2.2. Attributes

Entities have some characteristics called attributes. Different attributes can be assigned to an entity. Each attribute is a data item to an entity. Among the attributes for an entity, there could exist a uniquely identifying key. When an attribute cannot uniquely identify an entity, combination of attributes could be used.

The following symbols are used:



Entity symbol



Relationship symbol

1:1, 1:N, N:M Relationship identifier

APPENDIX - B : Current process description using Structured English

Processing Loan Applications

BEGIN

Desk Head provides information on Bank's lending policies/applications for queerer

Desk Head discusses about the project the applicant brought with

IF the project appears outside the projects to be financed by the Bank

 Desk Head advises applicant to explore other areas of investment

ELSE

 Desk Head assigns an Officer to guide the applicant on procedures of applying the loan

 Desk Officer obtains first hand general information on the project

 Desk Officer receives prospective applicant

 Desk Officer provides the applicant the loan application form

 Desk Officer explains the content of the formats

 Desk officer responds all queries of the applicant

 Desk Officer receives filled-in loan application format and required document

 Desk Officer opens file for the project

 Desk Officer registers the loan application

 Desk Officer submits the applicant's file to Desk Head

 Desk Head checks and reviews the applicant's file

 IF not satisfied, THEN Desk Head returns loan applicant's file to Desk Officer for correction

 IF convinced about the project

 Desk Officer explains to Desk Head major uncover points

 Desk Head forwards applications to Engineering Service for review

 Desk Head requests financial institutions for credit information about the applicant

 Desk Head requests power and water supply institutions for commitment to supply the project

 Desk Officer proposes a preliminary debt-equity ratio

ELSE

 Desk Head rejects the loan application

 Desk Head writes internal memo to Department Manager

 Desk Head submits the applicant's file to the Department Manager

 IF convinced

 Department Manager writes a letter to the applicant stating the reasons for the rejection

ELSE

 Department Manager returns to Desk Head with comments on the memo to consider more points of the loan application

ENDIF

ENDIF

END

Handing Loan Applications to Division²

BEGIN

Department Manager receives loan applications from Desk and/or applications/proposals from (Sub-) Branch offices

Department Manager goes through the applications and/or proposals

Department Manager ensures for fulfillment of preconditions/requirements

IF any correction on applications or appraisals

Department Manager returns to Desk or (Sub-) Branch

ELSE IF appropriate,

Department Manager rejects the project

Department Manager writes a letter to applicant

ELSE

Department Manager sends application to concerned units or Division (i.e., Handicrafts & Small Scale Project (HSSP), Medium & Large Scale Industrial Projects (MLSSP) and Projects Follow-up and Loan Collection (PFLC)) for (re)-

appraisal

ENDIF

END

Project Preparation and Appraisal

BEGIN

Loan Officer(s) conduct(s) preliminary investigation on the project

Loan Officer(s) make(s) site visit to the project

IF major points uncovered in the preliminary investigation

Loan Officer(s) quit(s) further processing the project

Loan Officer(s) Communicate(s) the result to the Senior Officer/Team Leader

Senior Loan Officer/Team Leader reviews the investigation

If the convinced

Senior Loan Officer/Team Leader informs Division Head to reject loan application

IF convinced

Division Head writes internal memo to Department Manager to reject the application

ELSE

DO

Division Head communicates to Senior Loan Officer/Team Leader to reconsider

Senior Loan Officer/Team Leader communicates same to Officer to reconsider the project

Senior Loan Officer/Team Leader returns loan application to Loan Officer(s) with additional information

Loan Officer(s) reconsider(s) more points further based on the comments

Senior Loan Officer/Team Leader conducts close supervision

Loan Officer(s) communicate(s) findings to Senior Loan Officer/Team Leader

Senior Loan Officer/Team Leader communicates the result to Division head

² Department manager also applies to mean Branch or Sub-branch manager

```

    WHILE reasonably exhaustive factors are taken into account
ELSE
    Loan Officer(s) proceed(s) further processing loan application
    Loan Officer briefs Junior Loan Officer on how to handle the project
    (Junior) Loan Officer viz. the Senior Loan Officer/Team Leader prepare a
    questionnaire
    Junior Officer collects necessary data of the project
    Junior Loan Officer submits collected data to Loan Officer
    Loan Officer checks for missing of relevant data or information
    IF detects missed data, THEN Loan officer instructs Junior to collect additional    data
    Loan Officer analyses the data collected by Junior Loan Officer
    Loan officer with Junior Loan Officer perform computations with computers using
    COMFAR software
    Junior Loan Officer carries out financial projection
    Loan Officer checks financial projections made by Junior Loan Officer
    Loan Officer calculates financial and economic rate of return of the project
    Loan Officer writes first draft loan proposal
    Loan Officer submits the draft loan proposal to Senior Loan Officer/Team Leader
    Senior Loan Officer/Team Leader checks the basic assumptions taken
    Senior Loan Officer/Team Leader makes necessary revision
    IF needed, THEN Senior Loan Officer/Team Leader injects new ideas to project
    Senior Loan Officer/Team Leader recommends the project
    Senior Loan Officer/Team Leader gets typed second draft proposal
    Senior Loan Officer/Team Leader sends second draft proposal to Division Head
    Division Head receives and reviews the second draft for its standard adherence
    Division Head makes necessary final improvement
    Division Head gets third draft proposal typed
    Division Head submits final draft to Department Manager
    Department Manager reviews the proposal
    Department Manager sends to Division Head
    IF any correction/points to include, Division Head corrects/includes the proposal
    Division Head gets proposal in adequate copies
    Division Head sends back duplicate copies to Department Manager
    Department Manager submits proposal copies to Loan Committee
ENDIF
END

```

Rejecting Loan Application

```

BEGIN
    Department Manager receives rejected loan proposal from Divisions
    Department Manager look through the proposal
    IF convinced
        Department Manager writes a letter to the applicant stating the reason(s) for
        rejection
    ELSE
        Department Manager returns to concerned Division with comments.
    ENDF
END

```

Recommending Loan proposal

BEGIN

Department Manager submits proposal copies to Loan Committee

Loan Committee sends minutes to Controller

Controller reviews objectivity of the decision

Controller puts own suggestion on the proposal (reject, accept, add more points)

Controller sends to General Manager

IF General Manager agrees with the decision of the Loan Committee and Controller's suggestion

 IF the application amount is $\leq$ Birr 3 million

 General Manager passes decision

 General Manager returns decision to Department Manager

 ELSE

 General Manager passes to Management Board

 Management Board makes decision

 General Manager receives decision of Management Board

 ENDIF

ENDIF

IF decision is approval, THEN

 General Manager sends minutes to Legal Service/Department Manager

 General Manager sends minute's copy of Loan Committee to Division Head

 Division Head writes a letter to applicant/(Sub-) Branch

 Division Head hands in the letter to Department Manager

 Department Manager signs the letter and sends to applicant

ENDIF

END

Recommendation of Loan to the Loan Committee

BEGIN

Concerned Division head briefs Department Manager about the project

Department Manager receives draft loan proposal.

Department Manager reviews basic assumption(s).

Department Manager checks whether rules and regulations and accepted standards were adhered.

 IF not convinced

 Department Manager returns draft proposal to the Division with comments.

 ELSE

 Department Manager orders concerned Division head to have sufficient copies.

 Department Manager sends proposal copies to Loan Committee 48 hours before the meeting.

 Department Manager and Officer who appraised the project defend before the Loan Committee.

ENDIF

END

Follow-up of Projects

BEGIN

Loan Officer goes through the feasibility study

Loan Officer prepares discussion points to the client

Loan Officer conducts site visit

Loan Officer discusses with top-management of the project

Loan Officer assesses the implementation of the project smoothly as planned

IF not as planned, THEN Loan Officer finds out the reason(s)

Loan Officer writes his findings

Loan Officer submits follow-up report to Senior Loan Officer

Senior Loan Officer makes the necessary reviewing

Senior Loan Officer passes the reports to Division Head

Division Head recommends to extension of loan repayment period or to transfer to the Legal Services

Division Head sends reports to be filed in client file

END

Processing Requests for Disbursement

BEGIN

PFLC Division Head receives client's request for disbursement from Department Manager's office

Division Head assigns Senior Loan Officer to handle the request for disbursement

Senior Loan Officer requests Engineering Service by memo to evaluate physical progress of the project

DO

(Senior) Loan Officer requests for Insurance coverage confirmation

Loan Officer checks whether the requested amount is included in the approved loan proposal

IF the amount is not part of the approved proposal, THEN return to Department Manager

END DOWHILE

Officer checks whether fund has been released for the request previously

IF fund is not released, THEN Division Head returns to Department Manager

END DOWHILE

Officer checks the timing the request should be made

IF the request is not timely, THEN Division Head returns to Department Manager

Officer checks necessary documents to request for disbursement

Officer checks whether client has properly utilized past disbursements

Officer verifies whether implementation of project is as in the feasibility study or any changes

WHILE no reservations

Officer concludes either rejecting or recommending the disbursement, using the LDAR

Officer forwards the LDAR and request for disbursement to the Division Head

Division Head recommends approval or rejection of the disbursement to the Department Manager

WHILE no amendment

Department Manager returns to Division Head

Division assigns the Officer to prepare the request for disbursement voucher

Division checks the request for disbursement voucher
 Division Head signs the voucher
 Division Head submits request for disbursement and LDAR to Department
 Manager for signature
 ENDWHILE
 END

Authorizing Loan Disbursement

BEGIN
 Department Manager receives Loan Disbursement Approval Report (LDAR) from PFLC
 Division
 Department Manager checks the LDAR.
 IF not convinced
 Department Manager returns to PFLC Division for correction.
 ELSE IF appropriate
 Department Manager rejects the disbursement approval request.
 Department Manager returns to PFLC Division
 PFLC Division writes a letter to the applicant stating the reason(s) for rejection of
 the disbursement
 ELSE
 Department Manager approves the disbursement.
 Department Manager receives Request For Disbursement (RFD) voucher.
 Department Manager reviews the voucher
 IF any correction
 Department Manager returns to PFLC Division
 ELSE
 Department Manager signs on the Request For Disbursement (RFD)
 voucher.
 ENDIF
 IF first disbursement
 Department Manager sends LDAR and RFD voucher to Control
 Department.
 ELSE
 Department Manager sends LDAR and RFD voucher to Finance &
 Banking Department.
 ENDIF
 ENDIF
 END

Serving Borrower with Loan Repayment Reminders

BEGIN
 Department Manager receives loan repayment reminders (1st, 2nd, or 3rd) from Finance &
 Banking Department
 Department Manager checks the reminders
 IF any correction
 Department Manager returns the reminders to Finance & Banking Department
 ELSE
 Department Manager sends the reminders to PFLC Division

```

        WHILE no further correction
            PFLC Division assigns Officers
            Officers dispatch the reminders
        END WHILE
    ENDIF
END

```

Taking Decision on Defaulting Borrowers

```

BEGIN
PFLC Division Head receives loan repayment reminders from Department Manager
Division Head sends Officer(s) to dispatch the reminders to defaulters
Officer checks the reminders' accuracy
IF not correct
    Officer returns to Division Head
ELSE
    Officer(s) explains the defaulters the actions of non-compliance to loan agreement
    Officer communicates defaulters to comply to loan agreement through
    telephone/physically
    IF the borrower fails to comply with the reminders
        Officer reports to Division Head
        IF client does not respond to third reminder
            Division Head reports to Department Manager by memo for
            appropriate action
            Department Manger gets defaulter file
            Department Manager sends defaulter file to Legal Service
        ENDIF
    ENDIF
ENDIF
END

```

Transfer of defaulters to the Legal Service

```

BEGIN
Department Manager receives loan repayment status from PFLC Division
Department Manager receives reason(s) for non-repayment
Department Manager discuss with defaulting borrower(s)
Department Manager writes internal memo to Legal Service of the defaulters
(Sub-) Branch or Department Manager sends clients file with memo to Legal Service
END

```

Handling Additional Loan Request

```

BEGIN
Department Secretary records additional loan applications from General Manager's office or
from clients Department Secretary submits to Department Manager.
IF there is/are good reason(s) to reject
    Department Manager rejects the additional loan requests.
ELSE
    Department Manager sends to concerned Division.

```



```
        WHILE no further correction
            PFLC Division assigns Officers
            Officers dispatch the reminders
        END WHILE
    ENDIF
END
```

Taking Decision on Defaulting Borrowers

```
BEGIN
PFLC Division Head receives loan repayment reminders from Department Manager
Division Head sends Officer(s) to dispatch the reminders to defaulters
Officer checks the reminders' accuracy
IF not correct
    Officer returns to Division Head
ELSE
    Officer(s) explains the defaulters the actions of non-compliance to loan agreement
    Officer communicates defaulters to comply to loan agreement through
    telephone/physically
    IF the borrower fails to comply with the reminders
        Officer reports to Division Head
        IF client does not respond to third reminder
            Division Head reports to Department Manager by memo for
            appropriate action
            Department Manger gets defaulter file
            Department Manager sends defaulter file to Legal Service
        ENDIF
    ENDIF
ENDIF
END
```

Transfer of defaulters to the Legal Service

```
BEGIN
Department Manager receives loan repayment status from PFLC Division
Department Manager receives reason(s) for non-repayment
Department Manager discuss with defaulting borrower(s)
Department Manager writes internal memo to Legal Service of the defaulters
(Sub-) Branch or Department Manager sends clients file with memo to Legal Service
END
```

Handling Additional Loan Request

```
BEGIN
Department Secretary records additional loan applications from General Manager's office or
from clients Department Secretary submits to Department Manager.
IF there is/are good reason(s) to reject
    Department Manager rejects the additional loan requests.
ELSE
    Department Manager sends to concerned Division.
```



```

Division reviews the additional loan proposal.
IF not convinced
    Division rejects the additional request proposal
    Division Head returns the request back to Department Manager
    IF Department Manager convinced
        Department Manager rejects the request
        Division Head writes to the client a letter stating the reason(s) for
        rejection
        Department Manager signs and sends to client
    ELSE IF additional loan is <= 25% of the previous loan
        General Manager approves or rejects
        General Manager returns the decision to Department Manager
    ELSE
        Department Manager recommends to the Loan Committee.
        Loan Committee passes whether to accept or reject the loan
        application
        Loan committee submits the minutes to Controller
        Controller reviews the minutes and accompanying documents
        Controller puts own suggestion
        Controller passes to General Manager
        General Manager approves or rejects
    ENDIF
ENDIF
ENDIF
END

```

Reviewing Loan Repayment rescheduling or Re-allocation of Loan request

```

BEGIN
PFLC Division Head receives application for loan repayment rescheduling from Department
Manager
IF no up-to-date follow-up report on borrower's project, THEN Division Head assigns Officer
Officer evaluates the project
Officer submits own evaluation with recommendation to Division Head
Division Head looks through the evaluation made by Officer
Division submits own recommendation through internal memo to Department Manager
END

```

Assigning Disbursement, Rescheduling and Re-allocation Requests

```

BEGIN
Department Manger receives disbursement, rescheduling, re-allocation requests applications
Department Manager examines the requests
IF acceptable
    Department Manager sends requests to PFLC Division
ELSE
    Department Manager rejects the requests
    Department Manager orders PFLC Division to write a letter to applicant
    PFLC Division writes a letter
    PFLC Division submits the letter to Department Manger

```

Department Manager signs and sends to the applicant
ENDIF
END

Recommending Loan Repayment Rescheduling

BEGIN
Department Manager receives Loan Re-allocation draft proposal
Department Manager checks for objectivity.
IF not convinced
 Department Manager returns the proposal to PFLC Division with comments and suggestions
ELSE
 Department Manager writes Internal Memo to General Manager recommending the rescheduling.
ENDIF
END

Recommendation of Loan Re-allocation

BEGIN
Department Manager receives draft proposal of loan re-allocation.
Department Manager checks the proposal.
IF proposal accepted
 Department Manager approves.
 Department Manager recommends the request to Loan Committee
ELSE IF any correction
 Department Manager returns to PFLC Division.
ELSE
 Department Manager rejects the proposal.
 Department Manager informs the client in writing.
ENDIF
END

Finance and Banking Department/Account units of (Sub-) Branches

Coding Loan Contracts

BEGIN
Department Manager³ receives loan contract copy.
Department Manager sends to Accounts Division⁴.
Accounts Division checks the contracts and hands over to Financial Accounts Section.
Financial Accounts Section hands in to Payment Unit⁵.
Payment Unit consults chart of accounts as a source for the general codes or account numbers.
Payment Unit makes sure that it is a new account or unused code number.
Payment Unit gives last vacant loan number.
Payment Unit makes sure that all loan contracts are coded properly.
END

³ Department Manager is equivalent to [Sub-] Branch Manager

⁴ Division Head is similar to [Sub-] Branch Accountant

⁵ Payment unit applies to Accounts clerk in [Sub-] Branch

Department Manager signs and sends to the applicant
ENDIF
END

Recommending Loan Repayment Rescheduling

BEGIN
Department Manager receives Loan Re-allocation draft proposal
Department Manager checks for objectivity.
IF not convinced
 Department Manager returns the proposal to PFLC Division with comments and suggestions
ELSE
 Department Manager writes Internal Memo to General Manager recommending the rescheduling.
ENDIF
END

Recommendation of Loan Re-allocation

BEGIN
Department Manager receives draft proposal of loan re-allocation.
Department Manager checks the proposal.
IF proposal accepted
 Department Manager approves.
 Department Manager recommends the request to Loan Committee
ELSE IF any correction
 Department Manager returns to PFLC Division.
ELSE
 Department Manager rejects the proposal.
 Department Manager informs the client in writing.
ENDIF
END

Finance and Banking Department/Account units of (Sub-) Branches

Coding Loan Contracts

BEGIN
Department Manager³ receives loan contract copy.
Department Manager sends to Accounts Division⁴.
Accounts Division checks the contracts and hands over to Financial Accounts Section.
Financial Accounts Section hands in to Payment Unit⁵.
Payment Unit consults chart of accounts as a source for the general codes or account numbers.
Payment Unit makes sure that it is a new account or unused code number.
Payment Unit gives last vacant loan number.
Payment Unit makes sure that all loan contracts are coded properly.
END

³ Department Manager is equivalent to [Sub-] Branch Manager

⁴ Division Head is similar to [Sub-] Branch Accountant

⁵ Payment unit applies to Accounts clerk in [Sub-] Branch

Loan Repayment Process

BEGIN

Clients repay their debt through other Banks, direct to Head Office/Branch/Sub-Branch where they take the loan, or through any other (Sub-) Branch.

IF loan repayments are made at the Bank's office where the loan has been taken

 Prepare a loan receipt

ELSE IF collection is in office different from the office the loan has been taken

 Receive credit summary

ELSE IF loan repayments effected through other banks

 Receive credit advises

END IF

Code loan repayment slip/credit advises/credit summary

Prepare journal entry for the collection

Batch the journal entries

Verify the batches

Send batches to Electronic Data Processing section to posting

END

Process Reminders

IF Head Office

 Collection Section receives Loan Report from Electronic Data Processing Section

 Section Head looks through individual loan balances

 IF any correction, THEN Section Head passes adjustment

 Section Head assigns Accountant

 Accountant analyzes individual loan accounts

 If any correction

 Accountant passes correcting entry

 Section Head approves the journal entry

 ELSE IF arrears > 6 months

 Accountant prepares reminders in three copies

 If 2nd or 3rd times, THEN Accountant puts "SECOND REMINDER" or "THIRD REMINDER"

 Accountant hands over reminders to Section Head

 Section Head Checks remainders against the loan report and previous lists of reminders

 IF no correction

 Accounts Division Head gets reminders

 Accounts Division Head checks reminders

 Accounts Division Head submits to reminders to Department Manager

 Department Manager signs on the reminders

 Department Manager distributes to Industry/Agriculture Departments

 Respective Department Managers forwards reminders to Follow-up Divisions

 PFLC Division Heads verify the reminders

 WHILE no correction

 PFLC Divisions assign Loan Officers

 Loan Officers hands over the reminder to client

 END WHILE

ENDIF

ELSE (if Branch or Sub-branch)

Same procedure except the change of Accountant by (Junior) Accountant, or
Section Head by (Sub) Branch Accountant, and Division Head or Department
Manager by (Sub-) Branch Manger, and Industry/Agriculture Department
Manager or PFLC Division Head by (Sub-) Branch (Junior) Loan Officer

ENDIF

END

Appendix C: Interview Guide

Dear sir;

I am a student at the Addis Ababa University, the School of Information Studies for Africa (SISA), presently working on my thesis for MSc. degree in Information Science. The title reads as “A Computer-Based Loan Management and Monitoring System for the Development Bank of Ethiopia.” I am doing series of interviews with key people, such as you, who (will) use the loan information system and/or loan monitoring system of the Development Bank of Ethiopia provided.

Below are questions on areas we will discuss during the appointment we had. I want to first appreciate your positive will in patiently going through the questions in this interview guide and ready thereon. In the mean time, when necessary, I want to assure you that for any information you provide me, your name will be kept highly confidential.

Sincerely yours,

Seid Ali

Current system operation, processes, sources, volume:

- What are some of the basic activities/processes of your Department/Division/Service?
- What processes do you perform currently ?
- What are your mostly used sources of information and how frequently do you use them?
- Do you sense that communication gap exists among Departments, Services, Divisions, and (Sub-) Branches regarding loan processing or loan monitoring?
- If there is, could you mention where it lies and why?
- How many people (with position) are specifically doing processing of the loan or project monitoring in your Department/Division/Service?
- Who is/are served by the Department/Division/Service?
- What services do you provide them and their timeliness, if possible?
- Could you estimate the average daily, weekly, monthly, etc. work volume in terms of relevant unit of measure it could be expressed?
- How many, approximately on the average (daily, weekly, monthly, etc.), number of clients and related transactions per client do you process?
- What methods are you using now to keep track of them?
- How can these processes best be supported?
- Have you received any complaint about your manual system?
- If so, how did you react to them?

Strengths and limitations of the current system:

- What do you see as the strengths of the current system?
- What specific limitations does the current system have?
- Could you describe the problems you encounter when processing loan activities or monitoring projects?
- What are some of the problems you experience that might be dealt more effectively through a computerized system?

Reports and their completeness, standard, and timeliness:

- What types of reports are you correctly receiving, using, or releasing?
- Do the reports contain complete information taking into consideration users' needs?
- Are the forms you use standardized?
- Do you get all types of reports on the time you should get, or hand in all reports you should submit?
- If not, why?
- Do you think that the reports are being used effectively by you or the receiver as they are supposed to be so?

Applications of computers and their availability:

- How many and types of computers in the Department/Service/Division are there?
- For what applications do you use for these computers?
- Did you try to improve your system with the computers or was there any initiative/attempt to do so?
- If a computerized system is built, what would you like the new system to accomplish?
- Are there any new needs you will add to the new computerized system?
- Are you willing to participate in the process of computerization of the existing system?

General:

- Is there anything else that you think is important for me to know that I haven't asked?
- May I get back to you with a summary of our interview and also any further questions I might have?
- Among the staff who can help with this project, is there anyone in particular you would recommend that I talk to?

Thank you.

Appendix D: Questionnaire

Dear sir;

I am a student at the Addis Ababa University, School of Information Studies for Africa (SISA), presently working on my thesis for MSc. degree in Information Science. The title of my thesis reads as "A Computer-Based Loan Management and Monitoring System for the Development Bank of Ethiopia." I am collecting data from those who are working in or using the loan information system and/or loan monitoring system of the Development Bank of Ethiopia.

Below are questions that are related to your activities and some general questions for you. The questions are of mixed types, such as open ended, multiple choices, and questions to be ranked. Instructions are given in advance for each question or group of questions.

I want to first appreciate your willingness in spending your time to respond the questions in this questionnaire. In the mean time, I assure you that for any information you provide me your name will be kept confidential.

Sincerely yours,

Seid Ali

Address:

Seid Ali
Addis Ababa University
School of Information Studies for Africa
P. O. Box 1176
Telephone 51-11-88 Ext. 276
Addis Ababa

I. Current system processes, activities, and volumes

1. What processes do you perform currently?

2. Below are software packages currently available in the Bank. Please check the packages you personally use most frequently.

- ☐ Word Processors, e.g., Ms-word, word Perfect, word star
- ☐ Spreadsheet software, e.g., Excel, Lotus, Q-plan
- ☐ Database software, e.g., dBase IV, dBase V, Access, FoxPro
- ☐ Project appraisal software, e.g., Comfar
- ☐ Others (Please specify)

3. Do you think that part or all of your work with little or no difference is being done by some other Department/Service/Division/(Sub-)Branch in the Bank?

- ☐ Yes
- ☐ No

4. If 'Yes' in (3), which reports or operations and in which Department/Service/ Division/(Sub-)Branch are they being done?

5. Do your information requirements vary frequently?

- ☐ Yes
- ☐ No

6. If 'Yes' in (5), what do you think the reason(s) for the change?

II. Current system strengths and problems

1. How would you rate the loan information handling and provision system

- | | |
|---|-------------------------------|
| ☐ Very good | ☐ Fair |
| ☐ Good | ☐ Poor |
| ☐ Other (please specify) | |

2. Why?

3. What strengths do you see on the current system regarding handling of loan and monitoring them?

4. What are your major problems with the current information handling system? (Could you rank them by assigning 1, 2, etc. starting from the most difficult to less difficult one? You may ignore options that do not apply to you)

- ☐ The raw data is not summarized when needed
- ☐ Much of the data are not necessary
- ☐ Much of important data are not collected by the existing system
- ☐ Information is not obtained as required
- ☐ Information is not obtained timely
- ☐ Loan related reports important for my analysis are not produced at all
- ☐ It is very difficult to pick or search a particular document from a pile of documents
- ☐ Others (please list them below)

5. What are the most frequent problems you experience with computer output regarding handling of loan or monitoring system?

6. Among the problems you listed above, which one is the single most troublesome?

7. Why?

III. Reports, report formats and their completeness of information, timeliness, and relevance of information provided

1. Are most of the loan (monitoring) information you need from the existing system bounded by strict deadlines?

☐ Yes

☐ No

2. If 'Yes' in (1), would you please list the kind and frequency of information that you need to be ready on those deadlines:

<u>Types of information</u>	<u>Frequency of need</u>
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____
f. _____	_____
g. _____	_____

3. Do you write any report?

☐ Yes

☐ No

4. If 'Yes' in (3), could you list the reports you prepare currently?

5. What kinds of reports do you receive for daily activity, planning, decision making , general awareness, etc.

i) daily? _____

ii) weekly? _____

iii) monthly? _____

iv) quarterly? _____

v) semi-annually? _____

vi) annually? _____

vii) exceptionally? _____

viii) irregularly? _____

Answer question 6 and 7 by circling the appropriate number.

6. There are several errors in daily, monthly, quarterly, annual reports, etc. that must be corrected before they are useful.

Never	Seldom	Sometimes	Usually	Always
1	2	3	4	5

7. The reports reach you or submit to others on time.

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

8. What information/data do you receive which you do not need any more presently

- i) daily? _____
- ii) weekly? _____
- iii) monthly? _____
- iv) quarterly? _____
- v) semi-annually? _____
- vi) annually? _____
- vii) exceptionally? _____
- viii) irregularly? _____

9. You get the information provided from different units of the Bank valuable.

Strongly agree	Agree		Disagree	Strongly disagree
1	2	3	4	5

For questions number 10-13, please answer by circling one which you think appropriate.

10. How important are the loan reports produced in the Industry/Agriculture/Finance and Banking departments for your decision making and/or problem solving? (Circle one or give comments)

- a. Very important
- b. Not important
- c. I don't know the kind of loan related reports produced
- d. Any other comment (please specify)

11. How useful is the information released from the Client Guidance and Advisory Desk?

Not useful at all					Extremely useful
1	2	3	4	5	

12. How useful is the financial information provided by the Finance and Banking Department?

Not useful at all					Extremely useful
1	2	3	4	5	

13. How useful is the information provided by the Follow-up and Collection or project appraisal Divisions of both Industry, Agriculture Departments, and (Sub-) Branches?

Not useful at all					Extremely useful
1	2	3	4	5	

14. Are you satisfied with all your information queries?

☐ Yes
☐ No

15. If 'No' in (14), what do you think is/are the reason(s)? (You may circle more than one)

- a. The system is manual
- b. The employees are not cooperative
- c. The system has too long bureaucratic chain
- d. The report is full of technical words
- e. I don't know specifically but feel there would be a problem
- f. Other (Please specify)

16. Do you think the forms used by the loan system contain complete information to your satisfaction?

☐ Yes
☐ No

17. If 'No' in (16), why? You may circle more than one

- | | |
|--------------------------------------|-----------------------------|
| a. No consistency | b. Duplicate questions |
| c. Full of jargons (technical words) | d. Long and complex to fill |
| e. Confusing | f. Unnecessary questions |
| g. Others (please specify) | |

18. How long (in hours, days, weeks, etc.) do you require on the average to extract complete information on a client's loan of your interest?

19. What information/data do you need beyond what you receive presently?

- i) daily? _____
- ii) weekly? _____
- iii) monthly? _____
- iv) quarterly? _____
- v) semi-annually? _____
- vi) annually? _____
- vii) exceptionally? _____
- viii) irregularly? _____

IV. Activities that need computerization and other computer related questions

1. Do computers help you in your day to day operation?

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

2. Would you please put in priority the activities (information needs) you want to be computerized?

2.1. First priority

- i) _____
- ii) _____
- iii) _____
- iv) _____
- v) _____

2.2. Second priority

- i) _____
- ii) _____
- iii) _____
- iv) _____
- v) _____

2.3 Third priority

- i) _____
- ii) _____
- iii) _____
- iv) _____
- v) _____

Appendix E: Sample Loan Application formats

i)

Development Bank of Ethiopia
Agriculture Department
Client's Guidance and Advisory Desk

Date _____
File number _____

Loan Application Form

1. Applicant's name _____
2. Nationality _____
3. Address:
 - 3.1. Region _____
 - 3.2. Woreda _____
 - 3.3. Town/City _____ Kebele _____ House No. _____
 - 3.4. Telephone No. _____ P.o.b. _____
4. Project type _____
5. Project location _____
 - 5.1. Region _____
 - 5.2. Woreda _____ Kebele _____
6. Project condition:
 - 6.1. On operation _____
 - 6.2. Newly constructed _____
7. Cost of the project in Birr

	<u>Amount request from the bank for the project</u>	<u>Estimate of clients contribution</u>	<u>Other sources</u>	<u>Total</u>
7.1. For construction works	_____	_____	_____	_____
7.2. Agr. Machinery & other items Birr	_____	_____	_____	_____
7.3. Other fixed items Birr	_____	_____	_____	_____
7.4. Working capital	_____	_____	_____	_____
Total	_____	_____	_____	_____
8. Client's contribution for the project
 - 8.1. In cash Birr _____
 - 8.2. In kind Birr _____
9. Loan collateral(s)

Estimated Birr	_____
Type of collateral	1. _____
	2. _____
	3. _____
10. a. Market agreement, if any _____
 b. Product's customers: Government _____
 Individual _____ Private enterprise _____

11. I testify that all the data given above are correct

Applicant's name _____

Signature _____

Date _____

Loan application form receiver and registrar

Name _____

Signature _____ Date _____

Notice:

1. Owner's contribution

1.1. The Borrower has assure to cover at least 30% of the project cost

2. Collateral

2.1 If the project is in town or privately owned

The collateral will be 125% of the loan requested, of which estimated value expended on a project will be considered part of it.

2.2 If the project is in rural area

Properties to be held as a collateral will be 100% of the loan requested.

2.1 Insurance coverage is required for every properties held as collateral.

ii)

Development Bank of Ethiopia
Industry Department
Client's Guidance and Advisory Desk

Date _____

File number _____

Loan Application Form

1. Applicant's name _____

2. Address:

2.1. Town _____

2.2. Woreda _____ Kebele _____ House Number _____

2.3. Telephone No. _____

3. Project type _____

4. Project location /site/ _____

5.1. Town _____

5.2. Woreda _____ Kebele _____ House Number _____

5. Project condition:

5.1. On operation _____

5.2. Newly constructed _____

6. Cost of the project in Birr _____

	Amount request from the Bank for the project	Estimate of client's contribution	Other sources	Total
6.1. For construction machinery's Birr	_____	_____	_____	_____
6.2. Production Machinery Birr	_____	_____	_____	_____
6.3. Vehicle Birr	_____	_____	_____	_____

Working capital Birr _____
Others _____
Total _____

Documents received/ to be received/ with loan application

1 Industry permission Number _____ Permission Date _____

2 Urban land ownership certificate number _____

3 Date the certificate is given _____

4 Building plan number _____ Date plan approved _____

5 Building permission number _____ Date _____

Building work detail

Production machineries delivery

Delivery date _____ Number _____ Number of pages _____

Machineries catalogue delivery date _____ Number of pages _____

Raw materials delivery date _____ Number _____ Number of pages _____

If the loan request is from business companies,

1 Memorandum of Association approval date _____ Number of pages _____

2 Articles of memorandum approval date _____ Number of pages _____

3 Announcement on newspaper date _____ Number _____

Project study _____ Copies _____ Pages _____

Preparation date _____

Other documents delivered

1 _____
2 _____
3 _____

Applicant's name _____

Signature _____

Application form receiver and registrar

Name _____

Signature _____

Bank's use only

_____ To _____

DECLARATION

The thesis is my original work and has not been presented for a degree in any other university.



Seid Ali

The thesis has been submitted for examination with my approval as university advisor

Zewdie Shibrie, Dr.

May, 1998

Sisay Fisseha

May, 1998