THE USE OF COMPUTERS IN LEBANESE BANKS

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in
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By
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Chapter I

INTRODUCTION

Worldwide, automated banking systems are in operation in an increasing number of banks and are handling paperwork of all kinds and varieties. It has been pointed out that the real value of the new set of banking computer-programs for credit analysis, long-range planning, and control lies in helping bank managers achieve more effective control over operations and better decision making. A purely objective and carefully customized system would enable bank managers to express their credit policy in concrete numerical terms, to supply their interviewers with consistent evaluation criteria, and to obtain standards for measuring their interviewers' performance.

Computers in Banking

Nowadays, due to the intense competition in the Lebanese financial sector, banks have become market-oriented. This change in the marketing philosophy has been felt recently especially at the branch level. But due to the instability of the Lebanese economy, which is in a state of depression, bank managers still lack the desire to adopt the innovations derived from electronic data processing whose impact would be to change their role and facilitate the ways by which policies and procedures are implemented and executed.
Since computers would facilitate the process and operations of decision making in banks, Lebanese banks should benefit from this technology and computerize all their operations in order to be fully equipped to face all the drastic economic changes taking place nowadays.

Background

The banking sector in Lebanon has grown tremendously despite of the war and the instability of the political situation during the last decade (See Table I). This growth, expressed by the increasing number of new banks and branches, was associated with a growing competition among the different banks. This means that banks have seen themselves in a position where they have to reduce their costs as much as possible or offer new and different services in order to be able to compete.

One of the main objectives of Lebanese banks is to manage their expansion and adapt to any change in the situation without losing control. In this respect, computerized banking information systems may prove to be an effective tool that helps in achieving these objectives if the purposes and needs of banks are well defined and the systems properly applied. A detailed description of the banking sector in Lebanon is presented in chapter two.
## Table I

Development of the Banking Sector in Number of Banks

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>Beirut</th>
<th>Mnt. L</th>
<th>Bequa'</th>
<th>South</th>
<th>North</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>Main office</td>
<td>70</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
<td>76</td>
<td>68</td>
<td>9</td>
<td>23</td>
<td>32</td>
<td>208</td>
</tr>
<tr>
<td>1974</td>
<td>Main office</td>
<td>71</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
<td>82</td>
<td>73</td>
<td>9</td>
<td>24</td>
<td>34</td>
<td>222</td>
</tr>
<tr>
<td>1977</td>
<td>Main office</td>
<td>75</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
<td>132</td>
<td>30</td>
<td>11</td>
<td>29</td>
<td>52</td>
<td>254</td>
</tr>
<tr>
<td>1980</td>
<td>Main office</td>
<td>82</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
<td>227</td>
<td>46</td>
<td>20</td>
<td>37</td>
<td>53</td>
<td>383</td>
</tr>
<tr>
<td>1983</td>
<td>Main office</td>
<td>84</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
<td>236</td>
<td>48</td>
<td>23</td>
<td>38</td>
<td>54</td>
<td>399</td>
</tr>
<tr>
<td>1986</td>
<td>Main office</td>
<td>87</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
<td>258</td>
<td>192</td>
<td>31</td>
<td>45</td>
<td>54</td>
<td>580</td>
</tr>
</tbody>
</table>

*Prepared by the author from unpublished data.*
Computers are basically a means to an end, and unless the results of the electronic data processing are used to obtain valuable information, the data processing itself is valueless. Computer data processing centers are becoming an integral part of the banking business scene; when a bank considers changing its actual data processing system into a computerized system, the decision will have its impact on the totality of the bank organization. Though the monetary outlays are of a major importance, their effect may relatively be insignificant in relation to the effects that the change may have upon the personnel, organization, and the operations of the bank.

The objective to be achieved by the use of computers is to aid and implement the operations of a bank. Usually, the real gains from this use takes the form of increased productivity, efficiency, reduction in costs, and better aids to management when undertaking decision making.

Statement of the Problem

Today, virtually no one questions the continued existence of computers as a significant factor in the life of an organization; nowhere is this true than in the banking sector. Nevertheless, there are still many unanswered questions regarding the impact of computers on banks and the role they will play in the future.
A bank must carefully define its goals and objectives and the main problems facing it. It must determine where it wants to go both in the short-run and in the long-run before it makes a significant investment decision, such as acquisition of a computer. The officers of the bank may view this decision from two points of view. They may view it as a decision involving only the internal information system and the operational procedures for existing services. In this case, the internal operational changes may be significant but they do not come through to the customer. Or they may view it as a decision involving expansion of the bank services and changes in management orientation. This, of course, involves a radical change which is felt both internally and externally.

The pressure to computerize the individual bank usually results from one of two causes. The bank may be experiencing an overload in the operations area which traditional bookkeeping equipment cannot handle; this can be defined as a short-term cue which mainly falls under the heading of operational pressure. Or the bank may be looking for future developments in the banking industry in order to improve its competitive position; this can be defined as a long-term cue falling under the heading of policy making.

The problem arises from the large investment required for purchasing a computer which has involved a great deal of money for any bank, usually more than had been bargained for. One
Consequence of this has been that many banks are unwilling or simply unable to invest the additional resources necessary to develop an effective program. The most obvious example of this can be seen in the area of investment in people. Many banks are paying large salaries for qualified computer personnel, and at the same time have not provided adequate training for the rest of their own employees. The result has been a very low utilization of very expensive and potentially powerful equipment.

Problem Questions

In the process of development, the following questions will be answered:

- What are the benefits of using computers in Lebanese banks?

- What is the impact of computers on the performance of Lebanese banks?

- What criteria have been adopted in determining the need for a computer in Lebanese banks?

- How data is being manipulated in Lebanese banks?

- What are the types of jobs that are processed in Lebanese banks and their resource requirements?

- What are the newly released banking computer programs?
Statement of Purpose

Computers are becoming an unavoidable means for getting jobs done in all fields, and especially banking. In this sector, a variety of information has to be grouped and analyzed; plans have to be set ahead of time; and the controlling process has to be done on a continuous basis. All these operations can be easily performed by computers. From here the importance of using computers in Lebanese banks arises.

Thus, the purpose of this study is to provide the reader with a descriptive analysis concerning the use of computers in Lebanese banks and to identify the needs of these banks and how best to meet them. It is hoped that such a study would be especially useful to banking professionals, banks management, bankers, and software engineers.

Performance Objectives

The researcher attempts to achieve the following performance objectives:

- To evaluate and analyze the existing computer systems in Lebanese banks; and to identify the needs of these banks in this respect and how best to meet them.

- To explain the advantages of using computers versus the manual processing of information in banks.
- To analyze in what respect does a computer facilitate the bank operations.

- To have a look towards the use of computers in Lebanese banks in the near future.

Definitions

Some key terms used in this study are briefly defined in the section that follows.

Management information systems (MIS): "It is a network of computer-based data processing procedures developed in an organization and integrated as necessary with other manual, mechanical and/or electronic procedures for the purpose of providing timely and accurate information to support decision making and other necessary management functions." \(^1\)

The phrase "computer-based" used in this definition might not be an absolute requirement in a management information system of a very small concern; but since this system is expected to produce information that is more timely and more accurate than that produced by a traditional information system, a system processing these capabilities is generally not feasible in large organizations, like the case of the study, unless a computer is utilized.

EDP system: EDP stands for electronic data processing; it is composed of the hardware, software, and environment.

EDP system concept: It is an approach which starts with the entire data processing system and breaks down into its organic interrelated components.

Hardware: Is a term used to describe the various electrical, mechanical and electronic components that make up a computer system. Going into the details of the hardware components, we talk about the central processing unit (CPU), the main memory, the input devices (such as terminals, scanners, tapes and disk readers), the output devices (such as terminals, printers, and plotters), the storage devices (such as tape and disk media), and if any, the communication facilities with distant or close alien computers.

Software: Is a term used to describe the many service facilities with which the manufacturer can backup the technical efficiency of his equipment. It refers to the various program aids supplied by the manufacturer. They can be classified into two categories: the system software, normally supplied by the manufacturer, and the application software which is a set of programs that serve the computer user.

Environment: Refers to the physical facilities available which facilitate or even make possible the use of the data center efficiently; such facilities are:
The uninterruptible power system (UPS): Is used in case of a total power failure or to regulate the source of power used in supplying the data center.

The air conditioner units: Maintain the total data center environment within a certain temperature range normally 16 - 21 centigrade and acceptable relative humidity.

The raised floor: Is a kind of elevated false floor under which circulates all the wiring and cabling of the system in addition to the electric ducts. It is used in most of the large data centers.

The fire alarm system: Is a special fire extinguisher that operates the fire security system.
Chapter II

REVIEW OF LITERATURE

In the twentieth century, the banking world has seen a continuing progress towards fully computerized operations. At the start of the century there were few mechanical aids, with all ledgers, passbooks and statements being written by hand. By the 1920's, banks had graduated to mechanical accounting machines and, because of staff shortages combined with an increase in business, this trend towards mechanization was a continuous process. The staffing and expansion difficulties were tackled more forcibly in the 1950's with assistance from electronic data processing techniques. It was in this period that banks ordered their first computers.

Computers and the Banking World

The early installations were of an off-line nature, i.e., data had to be sent for processing at the computer center and printed reports produced. These reports provided the branch statistics and accounts balances that had originally been held in the form of ledgers or record cards. Throughout the 1960's more of the clerical work was computerized, and eventually by the end of the 1960's many accounts were computerized.

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In the middle of 1960's, the utilization of branch terminal equipment linked directly to computer centers was becoming a feasible proposition. This culminated in the early 1970's with the introduction of a sophisticated on-line real-time system in banks. The use of on-line real-time facilities was most applicable to big banks because of their method of operation, whereby all depositors have passbooks which are updated with every transaction.

With the expansion of branch business, many branches have become inadequate with regard to the number of counter positions that can be utilized, the lack of storage and of staff working space. Consequently, should a manual system have to be maintained, the branch would of necessity have to be rehoused if standards of customer service were to be maintained. However, to service a given number of accounts and transactions under an on-line real-time system requires only 60% of the floor space of a manual branch. Thus, branches that were under pressure in terms of accommodation with a manual system were redesigned to provide more customer service positions and thereby eliminated the need to obtain new and costly premises.


So the opening of new branches for working in an on-line situation were carried out in smaller premises with resultant savings. However, the greatest advantage with regard to on-line working was the siting of terminal units at strategic points to carry out limited banking services and to provide on-time and up-to-date information.

The Lebanese Banking Industry

The banking sector has always witnessed a tremendous success and growth in Lebanon. This success was not the result of haphazard and pure luck. It was the consequence of many well known economic and political factors in the country and the region which have blended together to give the banking sector in Lebanon the importance it has.

The Lebanese banking sector reached its peak between 1969 and 1974, its "golden age". During the last decade many of the economic and political factors have changed due to the political and security situation. Consequently, the banking sector witnessed a change in its evolution.

The first two years of the Lebanese war, i.e. 1975 and 1976 caused a major disturbance in the industry. When the war

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began in 1975, the banking industry structure was very
centralized geographically. Very little branching existed then
in the regions, and most banks had only one main office, mainly
the headquarter in the downtown area in the center of the city
Beirut. In 1975, the city center became a dangerous area
disrupting the banks operations. Some of the banks stopped
their activities, while others have operated from safer
locations.

In effect, for security reasons, banks were not always
able to withdraw money from the central bank. Moreover,
some loans were not repaid, and deposits were decreasing as
people, in their preference for the security of liquidity,
saved less and withdrew more. Most banks have seen themselves
obliged to impose restrictions on withdrawals. Eventhough the
figures do not show any regression in the consolidated balance
sheet of commercial banks (L.L. 12,314 million in 1975), there
has been a serious drawback at the level of many banking
services.

After the year 1977, banking resources have been showing
a very high growth rate despite the fact that the Lebanese economy
was far from being in its best shape and that security problems
remained more acute than ever. This growth was the consequence
of a geographical decentralization of the banks and of the
remittances of Lebanese expatriates mostly working in the
oil producing countries.

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6 Banque du Liban, Bulletin Trimestriel, issues related to
the years 1979 - 1984.
In effect, 1977, a relatively calm year, permitted banks to open new branches and expand their territorial coverage. The number of branches reached 354 at the beginning of 1978 while it was 237 in August 1975 (Refer to Table I). Moreover, a number of banks moved their headquarters and branches to more secure locations. In addition, money has flown into the country from outside. This flow of capital is primarily money sent by Lebanese emigrants to their families, or political sums sent to the different parties of the Lebanese conflict, and which were financed mostly by outsiders.

The bad economical situation which was more accentuated with the Israeli invasion in 1982, and its consequences had adversely affected production and investments in all the economic sectors of the country, and hence restricted growth in the banking industry.

Nowadays, the Lebanese economy is witnessing a state of stagnation. The whole country and its economy need rebuilding, but no major steps are undertaken because a common and clear vision to the political situation has not been reached. For the banking sector, the passing of time with no improvement in the economic situation means that the stage of growth has come to an end and that serious threats are arising.

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Banking managers are completely aware of this reality and express their fears in different ways. Most of them are rather pessimistic concerning the future of the industry. Few of them still expect the growth to continue in the next few years. This reflects a turning point in the history of the industry. The supernormal growth period which was due mostly to remittances that entered the country during the past ten years associated with a high inflation rate and a lack of investment opportunities now seems to be over.

The major threats that are facing the banking industry today are described in the following sections.

Competition

The Lebanese market, with ninety two commercial banks and 380 branches for a population of less than four million, is saturated. Some managers think that some of the already established banks will not survive. Nevertheless, competition do not seem to worry those managers overly. Even though, Lebanese banks deposits have been growing at a much faster rate than foreign banks, due to the latter cautious strategies adopted since the beginning of the war in 1975. It is to be noticed that banks that are totally Lebanese are the ones more concerned about competition with foreign banks because the client has to consider totally or partially foreign banks as safer with the present conditions in the country.

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Banks are constantly looking for new ways and doing their best in order to satisfy their clients and attract new ones. For that, during the last decade a number of factors were combined and induced banks to grow in number of branches. In some cases, it was due to security reasons, in others, it was because some leading banks have done so and others have followed them, and sometimes because branching could be justified on a cost basis in comparison with expected increase in deposits.

Security and Political Instability

If competition cannot be considered the most serious threat to the majority of banks, there is a factor which surely is; this factor is political instability. If the country does not regain peace and stability soon, the banking sector will face very serious problems. This has already begun to show; a number of banks are passing through a critical period; the central bank has been obliged to increase its control over commercial banks and to interfere in many cases.

The fact that the banking sector has grown in spite of the war does not mean that the industry is not affected by the political situation. The erratic exchange rate of the U.S. dollar and other foreign currencies is only an example of the effect of such a situation. Bankers are constantly observing, studying and analyzing the rapidly changing events in the country and considering their implications and the alternative threats and options they have. With the increasing possibility
that the events may lead to political or at least administrative decentralization in Lebanon, bankers find themselves obliged to consider the possibility of such an occurrence and its effect on the industry in general and their banks in particular.

Nevertheless, the banking industry will not change drastically due to decentralization; the years of war have already caused a decentralization on a clientele basis. Opening new branches is a very likely way to react to decentralization and a number of banks have included it in their strategies. It should be noted however that opening a new branch in such a case differs from opening a branch five or even two years ago since the central bank has imposed recently new policies and regulations concerning this issue.

Improving the communication networks between head offices and branches is seriously being considered to avoid changes and relinquishing control over branches. It is here where computers may play an important role and smooth out the transition. Most executive bank managers are aware of such opportunities as reflected by their opinions concerning technologies which they consider to be of great help to the banking industry.

---

Personnel Issues

Political issues are not the only concern to the banking industry. Availability of skilled personnel can be a serious drawback. With the modern technology, the executive and managerial levels are expected to suffer from shortages while the operational level will be more than sufficiently available.

Since 1982, with the beginning of the economic recession, banks have stopped recruiting new operational labor except in urgent cases. Some of them have gone as far as to decrease their number of employees in order to reduce costs. Nowadays, the fields where banks are willing to recruit are the fields of computer and management information systems since they are suffering from a big shortage in this respect.

Government Regulations

Government regulations and the central bank requirements are also an effective factor in the banking industry. Before 1984, banks were required to report to the banking control commission at the central bank once every two weeks. In addition, reports concerning loans of more than fifty thousand Lebanese pounds with the names of borrowers were forwarded weekly and monthly to the central risk committee, which provides information to all banks concerning the position of any borrower.
After the collapse of the First Phoenician Bank, and as many banks are distrusted for speculating and contributing to the volatility of the foreign exchange market, the banking control commission requires now daily reports concerning the position of banks. Thus, keeping a closer eye on their operations. Such restrictions require a higher volume of transactions and record processing on the part of both, commercial banks and the central bank, at the time when both lack the technical and human resources to accommodate such processing requirements.

Organizational Structure

As the organization of any establishment is an important factor for its growth, success, continuity, or failure, a brief description of the banks organization imposes itself. All banks in Lebanon have a functional organization; even foreign banks that have a geographical or any other type of organization at the headquarters overseas, have in Lebanon a functional organization (See Figure 1).

Most interesting is the organization of branches and their relationship with the head office in Lebanon since the branches are centralized to a very high degree. Such a state has been hindered by serious operational problems during the last few years due to the security situation which had
Figure 1

The Organizational Chart for a Typical Bank in Lebanon

---

- General Manager
- Deputy General Manager

---

- Executive Secretary

---

- Executive Committee

---

- Auditing
- Research & Analysis

---

- Public Relations

---

- Legal Department

---

- Computer Dep.
- Operations Dep.

---

- Treasury Dep.
- Credit Dep.

---

- Software
- Accounting
- Hardware
- Personnel
- Computer
- Operations
- Finance
- Fixed Assets
- Reconcila.
prevented proper communication among the different branches and headquarters.

The majority of banks in Lebanon maintain communication with and control over their branches through formal reports sent regularly to headquarters. The frequency of such reports varies according to banks, from daily to weekly. During the war, the security situation had delayed and disturbed the regularity of these reports; however, banks have not found themselves in a state of isolation from their branches, for they all rely on more than one communication channel. Ongoing verbal telephone coordination with branch managers was always maintained, while internal auditing by representatives of the headquarters was sometimes affected by security factors.

It is to be noted that no bank relies solely on a computer network linking the branches to the central and master files. This method if used, could ensure effective and on-line control over the operations of branches during regular and crisis periods.

Introducing Computers in Lebanese Banks

The introduction of computers into Lebanese banks shows that it has been based on one unfortunate belief, namely, that, once the computer system was installed and working, benefits would automatically materialize. What these benefits would be used was seldom thought through. The possibility that anyone
would have to work to realize the benefits, as a separate exercise from getting the computer system going, was apparently never considered. For the majority of banks, the situation seems to have fallen into the following four stages:

1. A decision to use computers based on an act of faith that the cost would be justified; this decision was made easier to take by the feeling, in many banks, that it was important to be leaders or at least to keep up with regards to automation.

2. The delegation of the job of installing the new system almost entirely to computer experts; this led in most cases to the creation of a new and large department in the bank, with responsibility for developing and running computer systems, but with no power to achieve real commercial benefit.

3. The confusion of objectives; after a while it becomes clear that three different sets of objectives for the computer were led. Top management retained their original hopes that it would save costs in some way. Middle management maintained a fairly neutral attitude to the new system, hoping that if they ignored it, it would go away. The computer department personnel were highly motivated to solve the exciting and absorbing technical challenges presented by automation.

4. The escalation of costs; costs at this stage inevitably exceeded the original estimates for three reasons:

   (a) The computer equipment did not perform as expected.

   (b) The maintenance of customer accounts was a far bigger
job than was realized. Faced with demand for more equipment by the computer department, senior management felt trapped. They were too deeply committed both financially and psychologically to withdraw.

(c) Nobody wanted to probe these factors too far in the early stages.

The reason for computerization was mainly the volume of work and rarely managerial needs. Applications covered the functional level with the highest number of computations, that is accounting; add to this, that accounting is formed of structured tasks that can be easily computerized. The centralized organizational nature of the banks and the structured nature of the common applications dictated highly centralized computer systems.

Comparison of Computerized and Manual Accounting Systems

The principal difference between computerized and manual accounting systems lies in the means of performance of arithmetic operations and in the storage of data. Exhibit 1 depicts the most significant similarities and differences between the two types of system.

Professional accounting judgement in analyzing transactions, and in creating source documents to capture the important information about routine transactions, is required regardless of the degree of computerization in the record keeping process.
<table>
<thead>
<tr>
<th>Step 1</th>
<th>Transaction Analysis</th>
<th>Computerized</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[H] Source data</td>
<td>(not necessarily a tangible document)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Recording Data</th>
<th>[H] Entering data</th>
<th>[H] Journalizing</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Data Storage for steps 2 and 3</th>
<th># Punched cards</th>
<th># Disk</th>
<th># Tape</th>
<th># Other media</th>
<th># Journals</th>
<th># Subsidiary ledgers</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th>Data Processing</th>
<th>[C] Update account balances</th>
<th>[H] Summarize journals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[C] Trial balance</td>
<td>[H] Post summaries to ledger(s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[C] Worksheets</td>
<td>[H] Trial balance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[C] Adjusting entries</td>
<td>[H] Worksheets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[C] Final trial balance</td>
<td>[H] Adjusting entries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[C] Reports</td>
<td>[H] Final trial bal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[H] Reports</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4</th>
<th>Reports</th>
<th>[C] Financial statements</th>
<th>[H] Finan. statements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[C] Numerous specialized management reports</td>
<td>[H] Few general purpose managt. reports</td>
<td></td>
</tr>
</tbody>
</table>

[C] = Computer program operation

[H] = Human operation
In computerized systems, a single human task is required which involves entering the data into a device that transforms it into a computer readable form; thus, it replaces a series of human tasks in a manual system such as journalizing entries, posting in general and subsidiary ledgers, taking a trial balance, and reports preparation. The computer program, rather than humans, performs these book keeping tasks much easily and more accurately, but in some cases accountants still have to analyze the trial balance and initiate the proper adjusting entries.

Two main differences between computerized and manual systems should be noted. The first difference relates to audit trail. The ability in a manual system to trace every entry in the ledger to its components in journals and eventually to the source document establishes the integrity to the audit trail. In computerized systems, because the data storage and arithmetic manipulation are hidden from view, creating an acceptable audit trail becomes more difficult. The integrity of accounting data within computerized data bases is an important concern of internal accounting control.

The second major difference involves the number of reports generated by computerized systems as compared to manual systems. Since with a manual system the cost of preparing reports other than the basic financial statements is high, most reports are of a broad, general purpose nature, and identical reports are distributed to many different managers in the bank. On the other hand, the cost of preparing specialized management reports in
computerized systems is usually quite low. This often leads to a large number of different reports oriented toward specific managers and their responsibilities.

Such customized reports are potentially advantageous if they are carefully designed to meet their recipients' informational needs. However, in some banks managers suffer from information overload as a result of having too many detailed, only partially relevant, reports sent to them every week. In such instances, managers may cease to use any of the reports, making the reports of no value, despite the low cost of preparing them.

An on-line real-time working will improve the accounting information system in the following ways:

Speed: Information will be provided more quickly than under a manual system. It is possible, for example, to monitor the cash flow into and out of the branches as the movement occurs.

Reliability: The information provided by computer systems is more accurate and reliable than that produced under a manual system. Subjective judgements and human inaccuracies are, to a great extent, eliminated. It could be argued, however, that middle management is being by-passed and the responsibility of the branch manager role is being diminished. The interpretation of branch statistics and the resultant decisions can be made centrally and they will not be subject to personal considerations.
Variety: Computer systems allow a great variety of management information to be produced. Furthermore, this information is of greater quality and quantity than can be envisaged under a manual system.

So in manual systems, special journals, subsidiary ledgers, and other devices facilitate the process of recording accounting data, while a computer based system performs the same functions and provides additional reports more rapidly, more accurately, and at a lower cost.
Chapter III

COMPUTER APPLICATION IN BANKS

In this chapter, the newly released banking computer programs are presented, and a thorough regression analysis is applied using the computer on the data of a bank operating in Lebanon to form an analytical forecasting model and to test this model empirically. In addition, a typical organization for a bank computer department is presented.

Newly Released Banking Computer-Programs

Since in the banking industry it is essential to have up-to-date information instantaneously in order to be able to take immediate decisions, and since the performance of the computer system as a whole is completely dependent on the software provided to achieve this objective, I will describe the features and benefits of the newly released banking computer-programs that were designed to meet this need.

Forextrdeng

Forextrdeng is a currency forecasting software package designed specially for foreign exchange managers. It does a lot more than just producing diagrams and in fact it is regarded by its users as the premier aid to currency movement prediction. It helps bank managers make the right foreign exchange exposure decisions.
Forextrend gives instant access to all the data needed for profitable decision making in the form of line charts, point and figure charts, and histograms. Also, it provides the exchange rates and cross rates of the needed currencies, trade weighted indices for each currency, inflation rates, real interest rates, trend lines, alert signals, selectable period moving averages, centered moving averages to facilitate regressional analysis, weighted moving averages providing exponential importance to recent data, a designed formula displayed at the chart base giving a clear buy and sell signal when appropriate, and volatility and relative strength indicators.

Forextrend is a unique computer software package designed to enable bankers manage foreign currency exposure for profit. This invaluable tool enables users to capitalize on the vast profit potential offered by the ability to forecast accurately and to analyze foreign currency market trends.

Furthermore, it provides the user with access to information which draws upon accumulated data on market trends related to currency forecasting. This software is an economical and indispensable aid in the decision making process for all those concerned with foreign currency exposure which is a difficult and often volatile market.

10
Bankos

The bankos package is an international banking system operational in banks of various types and sizes; it is designed to respond to management information needs and yet easy to use by the bank existing staff. It can handle a single or multiple branch operations, local or worldwide operations.

Bankos is an on-line system that provides the right information to the right time; it is a management information system that provides the bank with the means of controlling the overall business activities. Its data base, not only maintains the latest positions regarding customers, accounts, and foreign exchange dealings, but also enables, with the inquiry utilities, to gain immediate access to these positions using visual display terminals and printers. Data, from all branches, is entered via terminals and updated instantaneously; thus enabling the bank manager, in negotiation with a correspondent bank, who wishes to review the total commitments in U.S. dollars for example, to have by means of a simple command to his terminal, immediate access to the bank dollars position.

This on-line system offers a range of screen inquiries and batch reports that provide timely and accurate information for the bank management such as balance sheet reporting, profit and loss analysis, customers risk exposure statement, and daily cash flow, detailed branch analysis and irregular transaction reports; for the bank operations such as interest computations, and newly opened and closed accounts on a daily basis; for the bank
customers such as statement of accounts and advices, foreign exchange dealing confirmation, and interest rate changes; for the central bank such as statistical and risk reports; and for others such as shareholders advices, and audit capabilities. All the specified reports can be produced on a daily, weekly, monthly, quarterly, or yearly basis.

Its database maintains the latest customers position. In addition, all kinds of inquiries can be either displayed on a screen or printed such as the total assets and liabilities pertaining to any customer with their counter value in local currency, customer dealings in each category of the services offered by the bank, the over draft limits and credit lines on any individual account, and customer utilization in each of the areas in which he is active. Thus, providing the bank management with consolidated information of the overall customer activities. So these database management capabilities allow the bank to have the latest position of any customer or a group of customers and to control effectively the bank exposure to interrelated customers who have several accounts of different types.

This system offers complete security; data is checked upon input, and access to it is controlled by the use of passwords not displayed on the screen. Error messages are displayed in case of inaccuracy. Default values can be assigned in order to make the input operation easy and error free. Daily procedures are in automatic sequence. Each terminal can access only its assigned programs and files. Backup copies for
transactions files are generated automatically. And it can perform twenty four hours a day, even in case of power failure with the use of a UPS.

Its accounting subsystem comprises all the programs of internal and general ledger accounts as well as the periodical accounting reports and centralized balances of the bank. Its customers accounts subsystem processes the current applications in relation with the customers including the interest calculation, the statements of accounts, the end-of-month listings and statistics. Its bills management system handles the processing of bills remitted for discount, in guarantee and for collection, interfacing the general accounting module through generated transactions. And the payroll module manages the personnel records and the monthly payment of their salaries including income tax and social security charges calculation.
Forecasting with the use of Regression Analysis

Since only few banks are using their computers for forecasting and planning purposes, an analytical regression analysis model has been tested empirically, with the use of computer, on the data of a bank operating in Lebanon, for the purpose of forecasting the loans for this bank.

Data Presentation

In order to have a model with a high explanatory and predictive power, the dependent variable should be identified and relations among the independent variables and the dependent variable have to be analyzed for the purpose of identifying the most significant factors that have an effect on the dependent variable.

The dependent variable is going to be Bank A Loans. The relation among Bank A total assets, loans, and deposits for the last ten years is represented in Table II.

Table III represents the factors that might affect the amount of loans in the stated bank and can be quantified; refer to the accompanying notes for information about the notations used in this table.

* The name of the bank is misguided in order not to disclose any information.

Information related to nominal GDP, consumer price index, and population was extracted from Banque du Liban, Bulletin Trimestriel, issues related to the years 1977 - 1986.
Table II

Percentage Increase (Decrease) in Total Assets, Loans, and Deposits of Bank A (LL Million)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% chg</td>
<td>(5.7)</td>
<td>8.8</td>
<td>(6.9)</td>
<td>(2.4)</td>
<td>30</td>
<td>(5.2)</td>
<td>4.4</td>
<td>8.1</td>
<td>11.7</td>
<td></td>
</tr>
<tr>
<td>Loans</td>
<td>623!</td>
<td>528!</td>
<td>601!</td>
<td>562!</td>
<td>508!</td>
<td>603!</td>
<td>590!</td>
<td>650!</td>
<td>739!</td>
<td>797!</td>
</tr>
<tr>
<td>% chg</td>
<td>(15)</td>
<td>13.8</td>
<td>(6.5)</td>
<td>(9.6)</td>
<td>18.7</td>
<td>(2.2)</td>
<td>10.2</td>
<td>13.7</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td>Deposits</td>
<td>1058!</td>
<td>985!</td>
<td>1180!</td>
<td>1149!</td>
<td>1029!</td>
<td>1351!</td>
<td>1210!</td>
<td>1340!</td>
<td>1473!</td>
<td>1516!</td>
</tr>
<tr>
<td>% chg</td>
<td>(6.9)</td>
<td>19.8</td>
<td>(2.6)</td>
<td>(10.4)</td>
<td>31</td>
<td>(10.4)</td>
<td>10.7</td>
<td>9.9</td>
<td>2.9</td>
<td></td>
</tr>
</tbody>
</table>
Table III
Factors that Might Affect the Amount of Loans in Bank A

<table>
<thead>
<tr>
<th>n</th>
<th>Y</th>
<th>N</th>
<th>C</th>
<th>R</th>
<th>P</th>
<th>I</th>
<th>D</th>
<th>Di</th>
<th>L</th>
<th>Li</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1977</td>
<td>10181</td>
<td>168.93</td>
<td>6026</td>
<td>2940</td>
<td>2050</td>
<td>1058</td>
<td>8.5</td>
<td>623</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>1978</td>
<td>11410</td>
<td>186.09</td>
<td>6131</td>
<td>3010</td>
<td>2037</td>
<td>985</td>
<td>8.0</td>
<td>528</td>
<td>11.5</td>
</tr>
<tr>
<td>3</td>
<td>1979</td>
<td>14581</td>
<td>230.33</td>
<td>6331</td>
<td>3090</td>
<td>2049</td>
<td>1180</td>
<td>9.5</td>
<td>601</td>
<td>12.8</td>
</tr>
<tr>
<td>4</td>
<td>1980</td>
<td>18979</td>
<td>284.99</td>
<td>6659</td>
<td>3170</td>
<td>2101</td>
<td>1149</td>
<td>10</td>
<td>562</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>1981</td>
<td>22577</td>
<td>340.16</td>
<td>6637</td>
<td>3250</td>
<td>2042</td>
<td>1029</td>
<td>10.5</td>
<td>508</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>1982</td>
<td>24286</td>
<td>403.55</td>
<td>6018</td>
<td>3330</td>
<td>1807</td>
<td>1351</td>
<td>12</td>
<td>603</td>
<td>16.7</td>
</tr>
<tr>
<td>7</td>
<td>1983</td>
<td>25675</td>
<td>465.24</td>
<td>5518</td>
<td>3410</td>
<td>1618</td>
<td>1210</td>
<td>11</td>
<td>590</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>1984</td>
<td>27386</td>
<td>531.37</td>
<td>5153</td>
<td>3490</td>
<td>1477</td>
<td>1340</td>
<td>13.5</td>
<td>650</td>
<td>17.1</td>
</tr>
<tr>
<td>9</td>
<td>1985</td>
<td>30458</td>
<td>845.94</td>
<td>3600</td>
<td>3560</td>
<td>1011</td>
<td>1473</td>
<td>14</td>
<td>739</td>
<td>17.7</td>
</tr>
<tr>
<td>10</td>
<td>1986</td>
<td>32903</td>
<td>1885.60</td>
<td>1745</td>
<td>3950</td>
<td>442</td>
<td>1516</td>
<td>20.2</td>
<td>797</td>
<td>24.5</td>
</tr>
</tbody>
</table>

n stands for observation number
Y stands for the year
N stands for Nominal Gross National Product (LL Million)
C stands for Consumer Price Index (base 1974 = 100)
R stands for Real Gross National Product (LL Million)
P stands for Population (000 omitted)
I stands for Real Income per Capita
D stands for Bank A Deposits (LL Million)
Di stands for average Interest paid on Deposits ( % )
L stands for Bank A Loans (LL Million)
Li stands for average Interest charged on Loans ( % )
The effects of real GDP, nominal GDP, consumer price index and population are reflected in income per capita since:

Real Gross National Product =
(Nominal Gross National Product / Consumer Price Index) * 100

Real Income per Capita =
Real Gross National Product / Population

Bank A assets were excluded because the dependent variable constitutes almost 40% of these assets.

The correlation coefficients among loans and income per capita, deposits, interest paid on deposits, and interest charged on loans are represented in Table IV.

Actually, all the stated variables have a significant correlation with loans. However, since the correlation between loans and interest paid on deposits is 0.63 and in order to prevent having a multicollinearity problem because interest paid on deposits affects directly the amount of deposits which is an independent variable, for that, interest paid on deposits can be eliminated.

Data fed to the regression analysis computer-program relates to the variables n, Y, I, D, L, and Li.

* A multicollinearity problem arises whenever there are two independent variables that are highly correlated with each other and they are included both as independent variables. In this case they will have a double effect on the dependent variable. Thus, the one which is less correlated with the dependent variable should be eliminated.
Table IV

Correlation Coefficients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans / Income</td>
<td>+ 0.62</td>
</tr>
<tr>
<td>Loans / deposits</td>
<td>+ 0.87</td>
</tr>
<tr>
<td>Loans / Int. Dep.</td>
<td>+ 0.63</td>
</tr>
<tr>
<td>Loans / Int. Loa.</td>
<td>+ 0.68</td>
</tr>
</tbody>
</table>
### Table V
Regression Analysis Results

**DEPENDENT VARIABLE:** LOANS

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFF</th>
<th>STD ERR</th>
<th>T-STAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT. TERM</td>
<td>1871132.000</td>
<td>26347.410</td>
<td>5.128</td>
</tr>
<tr>
<td>REAL INCOME/CAPITA</td>
<td>142.160</td>
<td>42.950</td>
<td>4.046</td>
</tr>
<tr>
<td>DEPOSITS</td>
<td>.940</td>
<td>.120</td>
<td>3.892</td>
</tr>
<tr>
<td>INT. CHG. ON LOANS</td>
<td>683.000</td>
<td>231.000</td>
<td>4.058</td>
</tr>
</tbody>
</table>

**R-SD:** .853  
**CORR R-SD:** .837  
**SER:** 28165.500  
**SSR:** >>>>>>>>  
**F (3,10):** 9.109  
**D.W.:** 1.704
Analysis of Results

From the regression analysis output provided by the computer, the loans regression equation can be derived:

\[ L = a + b(I) + c(D) + d(Li) + u \]

The coefficients are the following:

1871132 for the constant (a) in the equation
142.16 for real income per capita; (b) in the equation
0.94 for deposits; (c) in the equation
683 for interest charged on loans; (d) in the equation
(u) is all other factors that may affect the amount of loans

The t tests are:

5.128 for the constant (a) in the equation
4.046 for real income per capita; (b) in the equation
3.892 for deposits; (c) in the equation
4.058 for interest charged on loans; (d) in the equation

Thus, the equation becomes:

\[ L = 1871132 + 142.16 (I) + 0.94 (D) + 683 (Li) + u \]

\[
\begin{align*}
(5.128) & & (4.046) & & (3.892) & & (4.058)
\end{align*}
\]

The coefficient of determination \((R^2)\) indicates that 85.3% of the change in the amount of loans is related to changes in real income per capita, the amount of deposits, and the interest
charged on loans. Since this coefficient is 0.853, therefore the
derived equation has a high predictive power. It also has a high
explanatory power because the T values (found in parenthesis
under each coefficient) are greater than the tabulated T values.
Thus, the relationship between each independent variable and the
amount of loans is significant.

It is needed to detect the presence or absence of the
three essential problems associated with regression analysis
equations: Autocorrelation, Multicollinearity, and
Hetroscedasticity.

Usually, an autocorrelation problem may arise when data is
taken for short periods. However, here we are taking data for
each year, and for ten years; moreover, the D.W (Durbin-Watson)
value of this equation is greater than the tabulated D.W high
value corresponding to ten observations versus three independent
variables; therefore, there is no autocorrelation.

Since the correlation coefficients among the three
independent variables (r(I,D) = + 0.54, r(I,Li) = - 0.47,
and r(D,Li) = + 0.52) are considered low, therefore, there is
no multicollinearity.

The other factors that affect the derived function have
a minor effect on the dependent variable and are normally
** distributed; thus, there is no hetroscedasticity.

* Tabulated T values as well as Durbin-Watson values are
found in books of Statistics.
The Durbin-Watson values are used to test for serial correlation.

** Hetroscedasticity occurs whenever the error term is not
normally distributed.
Loans Forecasting

Since the derived equation has both a predictive and an explanatory power so we can rely on it in order to forecast Bank A loans for the coming five years.

For doing so, the real income per capita (the variable (I) in the equation), the amount of deposits (the variable (D) in the equation), and the interest charged on loans (the variable (Li) in the equation) have to be determined. Thus, we will end up with the results represented in Table VI.

Every year, the bank will have to compare the actual with the forecasted figures in order to analyze the effect of any variance and based on this analysis, any deviation from plans can be controlled. After establishing this model, the bank will be aware of the factors that actually affect the amount of loans; so if there is any deviation, corrective actions will be possible. Thus, the desired objectives will be achieved and resources will be utilized in the most efficient way.
Table VI

Forecasted Loans

<table>
<thead>
<tr>
<th>Year</th>
<th>I</th>
<th>D</th>
<th>Li</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>113</td>
<td>1705</td>
<td>34.1</td>
<td>054</td>
</tr>
<tr>
<td>1988</td>
<td>438</td>
<td>1910</td>
<td>32.4</td>
<td>1018</td>
</tr>
<tr>
<td>1989</td>
<td>1552</td>
<td>2241</td>
<td>29</td>
<td>1237</td>
</tr>
<tr>
<td>1990</td>
<td>2126</td>
<td>2663</td>
<td>30.2</td>
<td>1362</td>
</tr>
<tr>
<td>1991</td>
<td>3047</td>
<td>2787</td>
<td>28.6</td>
<td>1415</td>
</tr>
</tbody>
</table>

*Refer to the accompanying notes to Table III for information about the notations used in this table.*
Typical Organization for a Bank Computer Department

The computer department has an important role to play in supplying accurate and on-time information, and in being a support tool for management future planning. So, it should have defined jobs responsibilities, and a managerial structure which allow it achieve these objectives. Figure 2 presents a proposed organizational structure for a bank computer department.

Once a bank decides to start using a computer, the organizational structure and the chain of authority for computer operations and related activities must be determined. The complexity of the organizational structure depends on the size of the computer and the number of computer personnel to be hired. A small computer does not require a complex organization. The computer center manager may direct the work of programmers and systems analysts as well as computer operators.

It is hardly recommended to have a uninterruptible power system, air conditioner units, and a fire alarm extinguisher in order to prevent loss of data in case of power failure or in case of a fire. For large data centers, a raised floor should be established under which all electric and data wires and cables would circulate.
Proposed Organizational Structure for a Bank Computer Department

- Computer Department -
  - Manager -

- Software Division -
- Hardware Division -

- Computer Operations Division -
  - Run-operation Group -
  - Data-entry Group -

- Maintenance of Existing Programs -
- Preparation of New Application Programs -
Software Division

This division main functions are to maintain standard running programs at the bank, debug and correct any software failure, and develop new application programs when needed.

In this division, all newly released programs must be fully documented by the programmer. This documentation should include the following:

- A description of the program, specifying its purpose and functions, and its relation with other programs.

- Detailed flowcharts showing the internal decisions and data manipulation in the program.

- Description of all files and variables, and the layouts of output reports.

- Operating instructions which include the messages on how to run the program, data preparation methods, e.g. special forms, previous reports or others, input/output specifications, e.g. terminals, printers or others, output and how to dispose it, halts and the action required, and the maximum runtime which tells the operator when to call the run to the attention of the system administrator.

Unless a newly released program is completely documented, it should not be accepted as a production run. Inadequate or unclear documentation virtually always leads to errors during operation and control.
Hardware Division

The main functions of this division are to maintain and repair the computer equipment available in the bank, advise management on the need for expansion when necessary, plan and organize any new EDP installation.

In order for this division to achieve its tasks successfully, a large amount of accessory parts including back-up media should be available in order to have a quick service and short downtimes at all levels.

Computer Operations Division

This division should be consisted of two groups. The first group is called the data-entry group; its task is to enter the contents of the filled-in paper forms through the formatted screens, and control the batches and output transaction reports. The second group is the run-operation group whose task is to conduct the daily processing at all levels, assume the information update for all departments after the daily run, collate the reports, and prepare them to be sent to their final destinations.

Input Preparation

The largest resource usage function in the input preparation is filling-in the paper transaction form. This area needs to be supervised effectively and work standards have to be set for it. The responsible staff must check the order and information of the filled-in forms received for processing.
Data Processing

The main functions of a computerized data processing center are data-entry, computer processing, and printing output reports.

Data-entry is the process of entering information from the transaction forms to the processor through the computer terminals used. Under computer processing, the daily run should take place using the formal agreed-on procedures. Updates for daily, weekly, bi-monthly, monthly, quarterly, semi-annually and annually should be made on time. This function includes the setup of machines, monitoring work in progress and maintaining required information on machine utilization. The setup may involve mounting tapes and disks and loading paper into printers. After finishing the run, output reports should be produced according to the policies set by the computer department manager, and no additional reports should be extracted for any purpose.

Scheduling

Scheduling in this department should focus on forecasting the workload expected in the future. This involves estimating the manpower requirements and equipment load. It is evident that in the case of a computer department, some jobs are not predictable and others take longer time to run than expected. Yet, even with the information available, management can plan a schedule and provide means for modifying it if the need arises.
Performance Measures

Although the end-user is more interested in the turn around time of his job, the computer department manager has to make sure that his center is being utilized in the most efficient way. Following are certain measures that can be used to evaluate the performance of a bank computer department.

Meter hours: This is the actual time spent by the computer in performing work as defined by the hardware manufacturer.

Utilization of resources: There are several indices used to determine what resources are being used and at what capacity. Some of these indices are:

1. Percentage productive time of equipment; this is calculated as \((\text{meter hours / available operating hours}) \times 100\).

2. Percentage of time spent on reruns.

3. Percentage of time spent on machine maintenance and downtimes.

4. Percentage idle time; this is calculated as \(100 - \text{percentage productive time}\).

Costs: An important performance measure for the computer department is the cost of the service it provides to other departments and customers. Indirectly, inefficient controlling leads to higher costs in more equipment and delays. The two categories of costs that may incur are tangible costs which results from salaries and overtime work, and intangible costs which occur in terms of delayed jobs; often this leads to overtime costs within the department.
System Description

The resources available within the computer department should be documented. These resources include the manpower, computers and peripherals.

Personnel and equipment available should be described. The hours when personnel are available should be specified; thus, time tables should be filled and revised weekly to allocate equal manpower at all levels during the working hours.

As the processing procedures include availability of operators as well as the computers and peripherals, a complete list describing the processors, auxiliary storage devices, printers, and tape drives should be made. The size of memory available and the number of input/output channels should be described also.

In case where more than one computer system is involved in a bank, the peripherals that are permanently dedicated to each system and those that can be allocated to any one of the systems should be specified. In addition, the mode of operation should be specified for each system, and the backup equipment must be in a standby running state in order to decrease the downtime in case of a sudden equipment failure.
Chapter IV

RESEARCH DESIGN AND METHODOLOGY

Since one of the main objectives of this study is to examine and evaluate the existing computer systems in Lebanese banks and to determine their needs, a detailed questionnaire has been prepared and distributed to the banks that were chosen to form our sample. This procedure has been followed because information concerning these banks, their environment, their existing computer systems, and their respective plans is not readily available or published.

Population and Sample Selection

The population of this study is comprised of the commercial banks operating in Lebanon. An important question as far as sample design is concerned is the determination of an appropriate sample size. If the sample is larger than necessary, resources are wasted; if the sample is smaller than required, the objectives of the analysis may not be achieved.

The number of banks selected as a sample is twenty, because it is expected that the variations among the dependent and independent variables will be narrow. These banks were selected from the five categories by which the commercial
banks in Lebanon are officially classified. These categories are:

Category 1: Foreign banks (non Arab)
Category 2: Foreign banks (Arab)
Category 3: Lebanese banks with majority participation of foreign non Arab banks
Category 4: Lebanese banks with majority participation of foreign Arab banks
Category 5: Lebanese banks with Lebanese control

From the first four categories, two banks from each were selected, and from the fifth category, twelve banks were chosen (See Table VII). The sample was chosen on a stratified basis according to the above stated classification. Weights were given according to the number of banks in each category; also the size and age of the selected banks were taken into consideration.

The Questionnaire

The questionnaire used in the study was developed in several steps (a copy is included in the Appendix). It has been directed to chief executive and EDP managers since our main concern was to survey the existing computer facilities, their applications and limitations.

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Table VII

Categories Versus Number of Banks

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

---
A revised draft of the questionnaire was pre-tested in personal interviews at several banks. During the testing, the interviewer briefly explained the purpose of the research and then asked for the completion of the questionnaire. The interviewees were encouraged to ask for clarification when needed. Recommendations and observations obtained from this pre-test were considered in preparing the final version of the questionnaire.

To facilitate the achievement of the goals and objectives stated previously, the questionnaire was organized in the following sections:

A. Assurance of confidentiality
B. Instructions to respondents
C. Demographical data (questions 1 - 7)
D. General environment (questions 8 - 15)
E. Internal environment (questions 16 - 26)
F. Organizational structure (questions 27 - 29)
G. Computer system
   1. History and structure (questions 30 - 33)
   2. Scope (question 34)
   3. Application (questions 35 - 44)
   4. Configuration (questions 45 - 59)
H. Computer department organization (questions 60 - 68)
In an effort to achieve an adequate rate of response to the questionnaire since this factor is considered one of the important conditions affecting the success and validity of a research project which depends on a survey, the following steps were taken:

A. Guarantee confidentiality of data and anonymity of respondents. The review of literature, and the many discussions that took place with bankers during the development stages of the questionnaire revealed that potential participants in the research project would be very much concerned about the confidentiality of any data they might supply. To put these concerns to rest, respondents were assured of the confidentiality of any data and their responses at the beginning of the questionnaire. Respondents were also informed that no bank would be singled out in the analysis and that all data would be used in aggregation only.

B. Promise the sharing of results of the research to compensate respondents for their investment in time.

C. Hold required completion time to a minimum.

D. Use commonly understood terminology.

E. Make answers as simple as possible, e.g., use check-marks rather than verbal answers. So open questions have been used only when it has seemed necessary, but provide the opportunity for airing of strong convictions and suggestions. This allows feedback to confirm validity of questions.
F. Organize questionnaire through format adopted and typing style selected in such a way as to hold the number of pages to a minimum.

Interviews

Interviews were conducted with banks representatives and software engineers in order to compile some additional data which was felt necessary for the subject. These interviews consisted of addressing a number of questions and remarks to the interviewee. The interviewer talked about the change introduced in the various operational levels after the introduction of the computer system. Some of these ideas are revealed below:

- The organization of the computer division.

- The extent to which the computer division cooperates with other departments requests, elaborates new ideas and brings solutions to certain managerial problems.

- The response achieved with the computer answering the customers' requests.

- Whether the output reports produced by the computer are the basis for a good information system or not.

- The present and future use of the computer as a support tool for planning.
The interviewees were given the liberty to express whatever comes to their minds about the computer system they use and all related matters.
Chapter V

PRESENTATION AND ANALYSIS OF RESULTS

This chapter presents analyses of empirical data gathered for the study. The findings of the questionnaire and interviews are analyzed and tabulated. Problems related to the use of computers in Lebanese banks are discussed coupled with proposed solutions for them; also benefits generated by this use are stated.

Evolution of Computer Systems

Although the Lebanese banking sector has been late in getting computerized, it is nevertheless doing so rapidly nowadays. At the beginning of 1974, only seven banks were computerized. This number doubled by the end of 1975. In January 1981, thirty six banks were using computers. By the end of 1986, only three out of the operating banks were still completely relying on their manual systems.

The banks, that installed a computer before 1974, viewed it as a super calculating machine. However, since that date and as the number of branches was increasing, it was felt that computer applications had to be expanded to include as much of the functions that are performed in banks. The existing centralized system in Lebanese banks, coupled with the
unreliable telecommunications network made it very difficult to have a centralized integrated system.

As the computerization of branches required changes in the traditional practice and management of banks, it was observed that approximately seventy banks refrained from computerizing their branches. With the political instability and economic recession, there is an increasing interest among banking executives in computers as a means to achieve better efficiency, and higher control over their banks operations.

Scope and Applications

Although one of the most essential characteristics of an effective computer system is the involvement of end-users, only fifteen percent of banking executives deemed the users' direct involvement as necessary. According to them, the user's involvement should be manifested at the implementation level.

In all banks that are using computers, the different tasks of accounting such as balance sheets, income statements, consolidation, interest calculation, and reconciliation are electronically processed. This is due to the fact that computers have been initially programmed for this purpose. It is noticed that banks that have established their computer department after 1982, emphasis, besides accounting, is on other operational and managerial functions. The second most automated functions are credits and deposits since they are computerized in eighty seven
percent of the banks. Various tasks such as generating documents, updating balances, maintaining files, reporting and checking clients' accounts are covered. In all banks where there is an on-line system, deposits are usually computerized because there is generally a large volume of transactions to be processed and a high degree of contact with customers.

Sixty-five percent of banks use the computer for the purpose of updating files and generating documents for their transfers, foreign exchange and bills. With respect to payroll operations, fifty-six percent of banks have them computerized. The majority of banks have not yet computerized their securities and investments; however, forty-two percent use them in order to check the bank investment portfolio, and to maintain and update files. Only ten percent of the banks use their computers for research and development, despite the importance attached to them and the role they play in decision making, projections, and planning.

It has been realized that only few banks have reached the stage of generated operations; in such a system the operator enters only the transaction code, the system asks for the amounts involved once and performs automatically the updating functions. This system, if used properly, eliminates redundancy, permits automatic accounts procedures, and generates comprehensive and analytical reports; thus, it helps in achieving the required efficiency and control. Table VIII summarizes the computerized functions and tasks in Lebanese Banks according to their category.
### Table VIII

**Computerized Functions and Tasks in Lebanese Banks**

<table>
<thead>
<tr>
<th>Function</th>
<th>Task</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>Tot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>Balance sheets</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Income statements</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Consolidation</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Interest calcul.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Reconciliation</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Credits and Deps</td>
<td>Generating docum.</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Updating balances</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Maintaining files</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Reporting</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Checking accounts</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Bills, Transfers and Foreign Exchange</td>
<td>Generating docum.</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Updating files</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Speculation</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Administration</td>
<td>Payroll</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Staff efficiency</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Maintaining files</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Securities and Investments</td>
<td>Chk bk inv. port.</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Maintaining files</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Research and Dev</td>
<td>Statistics</td>
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<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Analysis</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Projections</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>
Hardware Used

As the degree of computerization differs among the Lebanese banks, also the type of hardware used differs too. Mainframes, minicomputers, and microcomputers are invariably found in Lebanese banks; the criteria for choosing one type of hardware rather than the other are numerous. Size of deposits, number of daily transactions processed, and number of total accounts are the most important factors taken into consideration while undertaking the decision to acquire the computer system. Table IX shows the types of hardware used versus number of banks using them under each category.

There is no bank, with deposits less than five hundred million Lebanese pounds, that has a mainframe (Refer to Table X). The majority of banks having a mainframe process over five thousand transactions daily (Refer to Table XI). All banks having less than five thousand clients' accounts utilize either a minicomputer or a microcomputer. Some big banks have a microcomputer in addition to their mainframe system. The banks category does not seem to have any impact on the type of hardware used. Foreign banks have acquired computers which are compatible with their systems abroad.

The hardware used in Lebanese banks covers a range of brands: NCR, Wang, IBM, Data General, Burroughs, Apple, Plessey, Texas Instruments, and others (Refer to Table XII).
<table>
<thead>
<tr>
<th>Type of Hardware</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainframe</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Minicomputer</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Microcomputer</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>
Table X  
Type of Hardware Versus Size of Deposits (L. L Million)  

<table>
<thead>
<tr>
<th>Hardware \ Depos.</th>
<th>&gt; 1,500</th>
<th>1,500 - 800</th>
<th>800 - 500</th>
<th>&lt; 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainframe</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Minicomputer</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Microcomputer</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
### Table XI

**Type of Hardware Versus Number of Transactions**

<table>
<thead>
<tr>
<th>Hardware \ Trans.</th>
<th>&gt; 5,000</th>
<th>5,000-3,000</th>
<th>3,000-1,000</th>
<th>&lt; 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainframe</td>
<td>5</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minicomputer</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Microcomputer</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
# Table XII

## Brand Versus Number of Banks

<table>
<thead>
<tr>
<th>Brand</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCR</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Wang</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>IBM</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Data General</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Burroughs</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Apple</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Plessey</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Texas Instruments</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>
In some cases, a bank may have more than one brand, which is the case when the systems differ in size. On-line systems are widely used in Lebanese banks since they provide accurate and timely information. Many banks are realizing the need for upgrading their computer systems and many plans in this respect are being considered.

Since computer systems are considered expensive and quoted in foreign currency, banks should possess a high purchasing power to be able to satisfy their information needs. However, with the introduction of mainframes, minicomputers, and microcomputers, a bank should carefully define and analyze its needs and plans before the decision concerning the acquisition of a computer is made in order to choose the optimum system that would help in achieving the desired needs. Some of the banks, that have acquired computer systems, were partly motivated not by what the computer can do for them, but rather by prestige, modernity, and status considerations associated with the use of computers.

Computer Department Organization

The computer department is centralized in more than ninety percent of the banks, with its manager reporting directly to the general manager. This department is organized as a service center in the majority of banks.

The number of employees and their educational background vary from one bank to another. Forty percent of responding banks,
have more than ten computer personnel. Generally, their background is a combination of banking, computer, and information systems.

Sixty two percent of the banks offer initial training programs, and in some banks continuous training is required; however, the interval between these training sessions varies from two months to two years. The training of computer center personnel tends to be on computer hardware, programming, and in general the technical aspects of computing, while it should include some aspects of operations management and planning which would help in controlling the day-to-day operations.

A factor that contributes towards the lack of control on performance is the attitude of managers who view the data processing center as a service center, whose main objective is to provide services to users at any cost. In addition, the banks' computer plans lacked the necessary implementation and growth programs. Future developments are expected to build on existing systems with little consideration on new technological advances, hardware and software compatibility, organizational structure requirements, and user's responsiveness. In general, the stated plans are loose, focusing on the immediate problems, mainly software, and de-emphasizing the more important long-term needs.
Skilled Personnel

Seventy two percent of the banks have considered the availability of skilled personnel as a critical condition for the success of the computer department. Today, a serious shortage exists in this respect. A partial solution for this would be by keeping an updated filing system on personnel records which can be constantly reviewed and evaluated; this filing system should include the level of education, years of experience, training, and all related information since they may direct the manager to the type of action needed in case of skill deficiency. Such actions may include either recruitment of new employees, or internal development through training programs or redistribution of job assignments.

It was noticed that the Lebanese banks lack the proper expertise in computers; i.e. system planners, designers, analysts, and programmers. Many banks have had to hire foreign employees, mostly from the United Kingdom, India, and United States, to develop and maintain their software systems. Such actions have inflated the personnel costs, while the existing employees needed intensive training to enable them operate the computer properly.

Training is essential for computer personnel. The amount of time programmers and systems analysts require will depend on their previous experience. Systems analysts and programmers should also be given an overall orientation to the jobs that
will be completed on the computer. On the other hand, operators training must include actual hands-on experience with the computer.

Benefits

From the information collected, it was realized that most of the Lebanese banks have perceived benefits from the use of computers. Eighty four percent have stated that the computer has provided quicker and more accurate information than ever before; in addition, it has enabled them to respond more quickly to customers' needs and requests, such as providing them with their computerized statement of account whenever needed.

Seventy six percent pointed out that the reports produced by the computer are easier to understand, more comprehensive, and more informative than those prepared manually; in addition, reports demanded by the central bank and the year-end financial statements are much improved and are prepared easily on time. Also, duplication of work for controlling purposes is being eliminated.

Impact

The organizational structure of Lebanese banks has not changed drastically as a result of using computers; banks organizations are still mostly functional and centralized as
before. The major change was the introduction of a new functional area, the computer department.

The flow of information still follows the classical organizational framework. Even the type of information reaching the various managerial and decision making levels have not changed. The only difference is that some functions reports are generated now by the computer. However, sharing of information was limited where every manager wanted to prove himself.

In the great majority of banks there exists a feeling that the control of the computer department should be improved. Such feelings, whether justified or not, are based on the following factors: in general, many computer systems have cost considerably more than was originally budgeted; the projects have also taken longer than estimated. Also, a new expertise was required to design computer systems and to run the department; this expertise was unknown to most of the bank. And the computer department, although ostensibly a service department, has acquired a large day-to-day responsibility for running certain operations at the bank previously performed by the line departments.

On the other hand, and in some banks, once the decision to computerize was made, only limited information was supplied to middle management and clerical employees; so they tended to resist these alien changes. Loan officers were afraid to lose their authority, since the EDP officer, who is a new manager, might by-pass them and deal directly with top management.
In this respect, banks management must overcome the resistance of its own personnel by implementing a well planned orientation program. The facts about the computer installation should be presented to all employees. Since a computer is usually installed because of increased data volume and a corresponding expansion of the bank, increased job opportunities should be emphasized. The computer should be propagandized as a tool to aid data processing personnel in performing there tasks and as a means of relieving them of menial activities. The cooperation of all bank employees should be enlisted to ensure the success of the computer center.

Data Manipulation

Data manipulation is performed under the supervision of computer operators. This operation consists of running a scheduled set of programs in a certain order of processing, updating, and sorting the customer and all other data files. It is not affected by any external factor when working under standard and normal conditions.

In the morning, the power-up sequence, answering the needs of department request for customers' detailed statement of account, and synchronizing the data-entry job are being handled. In the afternoon, scheduling of run programs is taking place; in addition, final processing is being done; and after that, output reports are produced.
Output reports are vital because they are the primary tools used to supply information to all departments. They are produced on two levels of operations, managerial and executive. Top executives are best served with information that summarizes trends and indicates variances with respect to what was expected, whereas lower level managers need detailed information relating to daily operations.

Future

It is expected that in the next few years, there will be a tremendous proliferation of computers in branches. Systems will tend to be decentralized, unless a major improvement occurs to the telecommunications network permitting to have an integrated centralized system that fits the actual organizational needs and structure. However, the bank's emphasis on software applications is not sufficiently consistent with their objective to decentralize, which entails careful planning for a computer network and a well formulated communication strategy.

A recognized need exists to properly evaluate computer systems performance. This evaluation is the first prerequisite for a productive computer center. Techniques must be available to determine the effects of the change in computer scheduling on both external and internal levels. On the external level, the EDP manager will be concerned about the work load and turn around time of jobs through his department; on the internal level, he will be concerned about the hardware and software
performance and utilization of his system. Performance evaluation will have many uses, but the scheduling activity will be primarily concerned with the performance level.

The scheduling decisions will be quite complex in general; in the near future, no optimal answers will be achieved in the majority of cases without spending a great deal of time and effort. However, by following logical and analytical methods, and by time, these decisions will become easier to take and the results will be improved drastically.

On the other hand, the introduction of sophisticated computer systems will affect the management structure of banks. In this sector where traditionally promotion has been the result of banking expertise and the understanding of manual systems, the change to fully computerized systems could be traumatic and possibly result in frustration at the senior management level. So if the full benefits of computer systems are to be achieved, it is essential that senior management has an awareness of these benefits and some, at least, have an expert knowledge of the computer system itself. In addition, it is important to establish a good communication system between the computer center and management at all levels.
Chapter VI

CONCLUSIONS, RECOMMENDATIONS AND SUMMARY

The stated description of the existing computer systems in Lebanese banks as well as their applications, and the presentation of data and its analysis permit to draw a number of conclusions and recommendations.

Conclusions

All bank managers acknowledge the importance of having access to accurate and timely information; but, it seems that some of them do not have full access to computers which is still considered as a new sophisticated field. On the other hand, many banks have not yet computerized their branches which means that these branches are not utilizing from the existing technology. In this respect, decentralization may be the proper action to be taken in order to facilitate the development and implementation of effective computer systems under the prevailing conditions.

It was emphasised that costs have exceeded expectations; this was due to the fact of underestimating the operating costs. But, it should be noted that in the early implementation stage, costs may appear to exceed benefits, while in the long-run, more benefits can be realized. Comparison of actual versus budgeted costs and auditing reports are possible measures of operating expenses; by the use of computers, this comparison can be done.
easily, and variances can be well defined and analyzed. Also, planning the new strategy of the bank, and establishing a new policy concerning the determination of interest rates can be performed more efficiently because such planning needs a fully organized economic study under which many variables have to be manipulated and analyzed. Moreover, the bank position with all its correspondents can be reflected daily; thus, allowing the bank to have a better use of its deposits, and control over its reserve requirements which by its term allows the bank to manage its money position more efficiently.

The main reason for low productivity is that no performance measures are available with which to compare the computer center performance. And on the other hand, there is a constant turnover of equipment in the EDP field; faster and more efficient equipment is being brought into the market at a rapid pace, and at the same time, there are no industry wide standards on resource utilization to guide the managers of computing facilities.

Banks have grown and achieved growth and success in previous years without emphasis on research; however, the end of the boom period which has prevailed during the last decade, and the increasing competitiveness of the market, necessitate now careful planning and more research. Proper planning, including a number of alternatives and establishing sensitivity analysis for different economical situations and regular follow-up on objectives, permit better and faster adaptation to changing conditions. For these purposes, computer applications
covering research form a decision support system; analytical models such as econometrics, financial analysis, forecasting techniques, and data processing applications would prove to be very helpful for bank managers.

All in all, computers are facilitating the operations of Lebanese banks and providing bank managers with accurate, fast, timely, and up-to-date information.

Recommendations

By the proper use of computers, Lebanese banks will be able to analyze the economic information attainable to them more effectively. Also, they will be in a better position for allocating their investments among the different economic sectors since the provision of statistics is extremely useful where changes in investment portfolios are required rapidly, and here the financial information provided by the immediate response is contemporary rather than of historical value. This allows an optimization of the bank investment policy. So, bank managers should use these information for better analysis, and they should depend more heavily on computer decision support systems in the coming years.

It is recommended to have a computer network linking all Lebanese banks. Thus, all operations among them will be facilitated, especially the check clearing process which will become much easier and faster.
The computer system should be monitored to develop information on job profiles and system utilization; the effect of different procedures on job mix should be evaluated. In general, the objective of any computer system should not only be to process the desired jobs but to produce information that can help in running the system efficiently. To be noted that the software system is simply a set of programs modelled after the application desired; thus, any software design which is not preceded by a careful understanding and analysis of the user's functional needs is doomed to failure. So, the information system must be designed in such a way as to supply as possible internal information and the external information must be consciously collected from the proper sources.

Banks, like other organizations, are primarily interested in profits; with the economic depression and the stagnating market conditions, banks have to closely monitor their profit performance vis-a-vis their set objectives, and to compete for market share. Such factors as cost of funds, operating expenses, growth in deposits, return on investment, and market share have to be measured and evaluated constantly. It is in such respects where computers may be supportive in establishing an information reporting system, and improving efficiency since they would help to have better planning, especially when a new policy is required, where fast and accurate economic analysis is needed. Thus, contributing to the overall profitability of the bank.
Management tends to underestimate both the time and money necessary to set up a successful computer center; an outside consulting firm may aid by reviewing the plans and supplying a more realistic schedule for the computer project. Management must review its own planning and implementation to ensure that realistic schedules have been established and after that to check on the fulfillment of these schedules.

Since the failure rate for new computer installations is high, and since a delay in the use of the computer because programs are not ready is common, proper planning should precede the installation of computer systems. Thus it will enhance management control and coordination, and it will improve efficiency. On the other hand, compatibility and upgradability should be considered when installing computers in order to facilitate future integration.

Bank managers have to recognize the fact that the computer department is just like any other department; it can be mismanaged, however, to efficiently manage this department, it is imperative to have policies that will encourage the desired behavior among other departments. Management itself has to recognize that the computer center serves organizational boundaries that may have conflicting demands. These demands may create complex computer operations problems which can only be resolved either by having over-capacity or by the establishment of tighter controls on the use of facilities available in this department.
To successfully implement any operating procedure, the computer department personnel and the users need to be aware of the complexity of the problem and the need for adherence to the defined procedure. Also, they must be educated on the issue and need of having team-work and coordination rather than working independently. No computer procedure can be implemented successfully unless there are operating standards used to compare with. The data center manager has to insure that all procedures are kept updated and are indeed followed. Standard operating procedures in areas that directly influence the success of operations include clear job description, work rules for operating personnel, procedures for handling errors, maintenance of computer logs, and proper storage and retrieval procedures for tapes, disks and/or any other means used for this purpose.

The operations personnel should be familiar with all the procedures that take place during the daily, weekly, monthly, and yearly runs, and all associated tasks. The programming personnel should be educated on the portion of the computer aspects where they lack knowledge. These two groups must coalesce into a homogeneous mixture dedicated to process the work smoothly through the center. Their manager must have an overall knowledge of both aspects in order to resolve the inevitable day-to-day conflicts that may arise. And an attempt should also be made to determine what is the attitude of staff to the new computer system.

On the other hand, user’s education programs must be established in order to inform him about the nature of operations
in the center such as, how easy and how much time consuming it is to extract a statement of account for the current month and to extend the inquiry period back to one year. This education should include procedures by which the user can get a better service through the data processing center.

Summary

The purpose of this study was to expose the extent to which a computer system can help in managing the current information in Lebanese banks. The first chapter presented an introduction to the subject. The second described the Lebanese banking sector. The third presented the newly released banking systems, the application of computers in banks, and a typical organization for a bank computer department. The fourth revealed the methodology used in the study; the field work involved consisted of gathering general and technical data and conducting personal interviews with key planners and EDP personnel. The fifth presented the findings concerning the existing computer systems used in Lebanese banks and evaluated the current computerized information systems and exposed all related benefits and problems. And the chapter in hand, states the conclusions, recommendations and summary.

It was shown that decision making within the banking industry is a semi-structured task where managerial judgement alone will not be adequate because of the size of problems or the computational complexity needed to solve it. Under these conditions, and keeping in mind, the continuous changes in the economic and financial conditions, managers with the utilization
of available computer systems, which assist and support them in their decision making process, can provide more effective solutions to the arising problems.

To be noted that, the motivation for Lebanese banks to install a computer system should come from their needs to bring their operations into an automated data information flow, to provide timely and detailed information for financial planning and control, and to reduce costs and clerical expenses through the intensive use of the computer. However, cost savings have not been always attained through this use, but time savings and other advantages have outweighed this issue.

Finally, it has been proven that computers can process information faster than any other known means for the purpose of better and more rapid decisions by management, integrate the data from many banking operations and variables, and mechanize practically all routine procedures. These possibilities are giving bank managers the opportunity to consider more departmental relationships in an integrated report and hence to study more alternatives.
BIBLIOGRAPHY


BIBLIOGRAPHY (Cont’d)


APPENDIX

Sample Questionnaire

All information furnished will be kept strictly confidential and will be used only in aggregation in our analysis. We will share the results of our study with you.

Instructions: Please check the appropriate box(es) for Yes-answers, leave blank for No-answers or when not applicable, and fill in the blank space where required. For additional comments or information use the space provided on the last page of this questionnaire.

1. When has your bank been established?
   
   [] a. Before 1967  
   [] b. 1967 – 1974  
   [] c. 1975 – 1982  
   [] d. After 1982

2. Under which of the following categories does your bank fall?
   
   [] a. Lebanese bank with Lebanese control  
   [] b. Lebanese bank with majority participation of foreign Arab banks  
   [] c. Lebanese bank with majority participation of foreign non Arab banks  
   [] d. Foreign bank (Arab)  
   [] e. Foreign bank (non Arab)

3. What is the size of your bank deposits?
   
   [] a. Less than L.L. 500 m.  
   [] b. L.L. 500 – 800 m.  
   [] c. L.L. 801 – 1,500 m.  
   [] d. Greater than L.L. 1,500 m.

4. What is the size of your bank assets?
   
   [] a. Less than L.L. 800 m.  
   [] b. L.L. 800 – 1,500 m.  
   [] c. L.L. 1,501 – 2,500 m.  
   [] d. Greater than L.L. 2,500 m.
5. The approximate number of clients’ accounts is:
   [ ] a. Less than 5,000  [ ] b. 5,000 - 25,000
   [ ] c. 25,001 - 50,000  [ ] d. More than 50,000

6. The approximate number of daily transactions is:
   [ ] a. Less than 1,000  [ ] b. 1,000 - 3,000
   [ ] c. 3,001 - 5,000  [ ] d. More than 5,000

7. The number of employees is:
   [ ] a. Less than 100  [ ] b. 100 - 250
   [ ] c. 251 - 400  [ ] d. More than 400

8. How do you see the banking sector in the coming few years?
   [ ] a. Declining  [ ] b. Stable  [ ] c. Growing

9. Do you think that the banking market is actually saturated?
   [ ] a. Yes  [ ] b. No

10. In your opinion, why did most banks increase their number of branches?
    [ ] a. Competition  [ ] b. Responsiveness to market demand
        [ ] c. Internal growth  [ ] d. Securing more deposits
        [ ] e. Other, please specify

11. To what extent are you worried about competition?
    [ ] a. Too much  [ ] b. Moderately
        [ ] c. Too little  [ ] d. Not at all

12. To what extent may new technologies help in the banking industry?
    [ ] a. Very much  [ ] b. Moderately  [ ] c. Too little

13. What types of technologies?
    [ ] a. Computer technology  [ ] b. Telecommunications
        [ ] c. Word processing  [ ] d. Other, please specify
14. How would they be helpful?
   /// a. Increase productivity
   /// b. Improve time responsiveness and quality of customers services
   /// c. Improve communications and integration of the bank operations and plans
   /// d. Other, please specify

15. How often are you informed of new technological opportunities available for the banking industry?
   /// a. Only when necessary
   /// b. Infrequently
   /// c. Regularly

16. Does your bank have specified objective(s) for the next years?
   /// a. Yes
   /// b. No

17. Briefly state this (these) objective(s):

18. What functional areas do you consider most important to your business?

19. What are the services that your bank offers?

20. What functional areas and/or services do you consider to be the strongest?

21. What functional areas and/or services need to be improved?

22. Briefly state what does a computer system mean to you?

23. What key functions should it focus on?

24. What level(s) of management should it involve?
   /// a. Executive
   /// b. Managerial
   /// c. Operational

25. Do you have plans for improving the existing computer system?
   /// a. Yes
   /// b. No
26. What are the major reasons for your interest in computers?

a. Increase productivity and efficiency  
b. Increase the management control process  
c. Time saving  
d. Labor cost saving  
e. Increase profitability  
f. Enhance competitiveness  
g. New technological opportunities  
h. Competitors have used it successfully  
i. Other, please specify

27. Is the organizational structure of your bank

a. Functional (e.g. accounting, operations, personnel, ...)  
b. Geographical (e.g. Beirut, Mount Lebanon, Bekaa, ...)  
c. Product/market (e.g. Industrial, commercial, ...)  
d. Other, please specify

28. What functions do you have at the divisional level reporting directly to the executive officer?

a. Current accounts  
b. Savings accounts  
c. Deposits  
d. Guarantees  
e. Dealings & foreign exchange  
f. Overdrafts  
g. Electronic data processing  
h. Internal auditing  
i. Accounting  
j. Personnel  
k. Marketing  
l. Payroll  
m. Planning  
n. Bills  
o. Administration  
p. Customers' files  
q. Check processing  
r. Treasury  
s. Facilities, credit  
t. Documentary credit  
u. Transfers  
v. Securities and investments  
w. Other, please specify
29. How control and communication are maintained with branches?
   a. Internal auditing by representative from headquarter
   b. Regular formal reports
   c. Telephone coordination with branch managers
   d. Regular telex internal memos
   e. Computer network linking branches to central files
   f. Other, please specify

30. Do you have a computer department?
   a. Yes
   b. No

31. If yes, when was it organized?
   a. Before 1967
   b. 1967 - 1974
   c. 1975 - 1982
   d. After 1982

32. The number of employees in this department is:
   a. 1 - 3
   b. 4 - 10
   c. More than 10

33. The computer department structure:
   a. Line authority
   b. Centralized control
   c. Decentralized control
   d. Corporate staff (task groups)
   e. Other, please specify

34. The computer department involves:
   a. MIS
   b. Accounting
   c. Operations
   d. Top management
   e. Administration
   f. Research and development
   g. Other, please specify
35. Are the following operations computerized in your bank?

<table>
<thead>
<tr>
<th>Operation</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Deposits</td>
<td></td>
<td></td>
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<tr>
<td>b. Accounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Research and development</td>
<td></td>
<td></td>
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<tr>
<td>d. Credit</td>
<td></td>
<td></td>
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<tr>
<td>e. Securities and investments</td>
<td></td>
<td></td>
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<tr>
<td>f. Transfers</td>
<td></td>
<td></td>
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<tr>
<td>g. Dealings and foreign exchange</td>
<td></td>
<td></td>
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<tr>
<td>h. Personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. Other, please specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

36. Which of the above operations is (are) not computerized and you think it (they) should be?

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What are the functions and tasks covered by your existing applications?

37. Accounting:

<table>
<thead>
<tr>
<th>Function</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Statement of account</td>
<td></td>
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<tr>
<td>b. Interest calculation</td>
<td></td>
</tr>
<tr>
<td>c. Balance sheets</td>
<td></td>
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<tr>
<td>d. Income statements</td>
<td></td>
</tr>
<tr>
<td>e. Consolidation</td>
<td></td>
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<tr>
<td>f. Reconciliation</td>
<td></td>
</tr>
<tr>
<td>g. Other, please specify</td>
<td></td>
</tr>
</tbody>
</table>

38. Deposits:

<table>
<thead>
<tr>
<th>Function</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Check clients' accounts</td>
<td></td>
</tr>
<tr>
<td>b. Generate documents</td>
<td></td>
</tr>
<tr>
<td>c. Update balances</td>
<td></td>
</tr>
<tr>
<td>d. Maintain files</td>
<td></td>
</tr>
<tr>
<td>e. Other, please specify</td>
<td></td>
</tr>
</tbody>
</table>
39. Bills and transfers:
   [] a. Generate documents    [] b. Update files
   [] c. Other, please specify

40. Credit and advances:
   [] a. Maintain files        [] b. Reporting
   [] c. Other, please specify

41. Securities and investments:
   [] a. Check clients’ stocks  [] b. Check bk. invest. portfo.
   [] c. Maintain files        [] d. Other, please specify

42. Research and development:
   [] a. Statistics            [] b. Projections
   [] c. Analysis              [] d. Reports
   [] e. Other, please specify

43. Administration:
   [] a. Maintain files        [] b. Payroll
   [] c. Staff efficiency and productivity
   [] d. Other, please specify

44. Foreign exchange:
   [] a. Speculation           [] b. Maintain files
   [] c. Other, please specify
Please give the specification for each of the following if applicable:

Mainframe    Minicomputer    Microcomputer

45. Location
46. Brand name
47. User's memory
48. Secondary storage
49. Backup media
50. Operating system
51. Number of terminals

52. Number of printers
53. Capacity utilization

Available (Yes or No)

54. UPS
55. Air conditioner units
56. Raised floor
57. Fire alarm system

58. What are the investments in

Hardware:

L.L.    US$

Software:

L.L.    US$

59. What are the yearly operational costs

Hardware:

L.L.    US$

Software:

L.L.    US$
60. The computer department is organized as a:
   
   [ ] a. Profit center                        [ ] b. Service center

61. Computer personnel have:

   [ ] a. Banking background
   [ ] b. Computer and information systems background
   [ ] c. Combination of both

62. To whom does the EDP manager report?

63. Who develop your software?

   [ ] a. Software houses                      [ ] b. Consultants
       [ ] c. Computer personnel

64. Does the computer department provide initial training to its personnel?

   [ ] a. Yes                                  [ ] b. No

65. Are the computer personnel subject to training sessions regularly?

   [ ] a. Yes                                  [ ] b. No

66. Do you consider that the actual capacity of the computer department will be sufficient for the needs of the bank in the near future?

   [ ] a. Yes                                  [ ] b. No

67. Is there any plan to expand and update the computer department?

   [ ] a. Yes                                  [ ] b. No

68. If yes, please state this (these) plan(s):

For additional comments:

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