ADOPTION OF COMPUTER TECHNOLOGY AND ITS IMPACT ON ORGANIZATIONAL PERFORMANCE AND LABOUR REQUIREMENTS: A CASE OF THREE ORGANIZATIONS IN KENYA

BY

JEMMIMA WANJA GATUMU - OGOLLA
C/50/7984/93

A Thesis submitted in partial fulfilment of the requirements for The degree of (Masters of Arts-Sociology), Faculty of Arts, Kenyatta University.

1999

DECLARATION

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

Jemmima Wanja Gatumu - Ogolla

Date 15/6/99

This thesis has been submitted with our approval as University Supervisors.

Dr. H.K. Rono

Date 18/6/99

Dr. S. Ahmed

Date 21/6/99

DEDICATION

In loving memory of my late Father **Mr. Lawrence Gatumu Ngoroi** whose demise came shortly before he saw me enjoy the fruits of my labour despite his support and the confidence he had in me.

TABLE OF CONTENTS

CHAPTER THREE

CHAPTER FOUR:

LIST OF TABLES

ACKNOWLEGEMENTS

I wish to acknowledge with great appreciation the help of those without whom the completion of this work would have been a mere dream.

A special word of thanks goes to my Supervisors, Dr. H.K. Rono and Dr. S. Ahmed. Their continued guidance, suggestions, encouragements and constructive criticisms led to the writing of this thesis.

I appreciate greatly the assistance rendered by the staff in Barclays Bank of Kenya Limited, National Social Security Fund and the Ministry of Finance. In particular, Mr. Kasimu and Mr. Ndetei of Barclays Bank who showed tremendous interest in this study.

My gratitude also goes to the staff at Computer Centre Kenyatta University for making computer facilities available to me. Special mention of Dr. H.K. Rono, Mrs. Monica Odera and Stephen Kisuvi for their immeasurable support and co-operation.

My heartfelt gratitude to my beloved mother Peris Gatumu for her continued prayers, encouragement and support during the period of my study. Sincere thanks to my very special brother Mwaniki and his entire family for the great sacrifice of financing my course. Special thanks to my family members and friends for their immeasurable

co-operation, encouragement and financial and moral support. I owe them deep gratitudes.

Sincere thanks to my dear husband James Ogolla for being understanding and for his continued sacrifice and timely support in ensuring that I complete, submit this work and eventually graduate.

Finally, to God be all the glory and honour for faithfully bringing this work to a good completion.

"To all of you, I say – Thanks and God bless you".

ABSTRACT

This study was carried out to examine the nature of adoption of computer technology among Kenyan organisations with different ownership and management practices, and to identify the impact of computerisation on the performance and on labour requirements. Existing literature with observations made in other countries have argued that while there are fundamentally positive aspects on adoption and use of computer technology some of the impact have to be negative, particularly with respect to displacement of labour and centralisation of operations.

The principal hypothesis was that organizations with different ownership and management practices will influence the nature of computerization, through adopted policies and strategies, which in turn will influence the impact on performance and labour requirements. To examine this hypothesis, three organizations were selected, namely the Ministry of Finance, National Social Security Fund, and Barclays Bank on the basis of their computerization initiatives since 1970s and varied ownership and management practices.

The impact of performance was examined in terms of duration in processing critical tasks and the extent to which computerization has enhanced realisation of the missions and objectives in these organizations. The impact on labour was examined in terms of changes that have occurred in various staff categories: i.e. senior management, supervisory cadre and operational cadre.

The study found that in the Ministry, computerization was in response to expanded public service and the need to process salaries and development expenditure efficiently. In the Fund, the aim was to develop systems for efficient registration of members (employers and their employees) as well as to process and reconcile their contributions. While the Bank had undertaken gradual computerization since 1970s, intensified and expanded computerization was carried-out in 1990s in response to increased competition in the financial sector particularly in terms of efficiency in customer services and to allow management to make prompt decisions.

The data indicated that while the Ministry was the first to carryout computerization, both the Bank and the Fund have carried-out more intensive and extensive computerization in the last five years. Between 1990 and 1995, the computing capacity of the Bank increased from a total to 197 Gigabytes (GB) to 6045 (GB), the Fund 2.6 GB to 19.7 GB, and the Ministry remained relatively stagnant form 5.28 GB to 5.34GB. During the same period the Bank increased its expenditure on computerization by a factor of 43.3, the Fund 2.5 and the Ministry 15.11. Further the data indicated that the Bank and the Fund have achieved substantial computerization involving network and real-time processing respectively while the Ministry still carried out substantial batch processing. Furthermore the Bank has computerized and integrated 70% of its functions, the Fund 50% and the Ministry 40%.

The computerization efforts were found to have had an impact on the nature and duration of processing critical missions, data entry and reconciliations. In the

Ministry, duration of processing accounts data was reduced from 30 to 7 days; at the Fund, registration of members from 120 to 20 days; at the Bank, banking transactions from one day delay to on-line.

Furthermore, the computerization efforts had impact on labour structure in the Bank and at the Fund. In the case of the Bank, operational cadre decreased from 83% to 79% and the supervisory cadre increased from 8% to 14%. Interestingly in the case of Fund, operational cadre tended to remain the same at 44% but supervisory cadre increased from22% to 26%. In both organizations the recruitment of operational cadre also decreased as supervisory cadre increased. The decrease of operational cadre and the increase of the supervisory cadre indicated that computerization at least in the two organizations has had an impact on enhancement of administrative capacity. The situation in the Ministry remained the same.

Further, computerization in the three firms led to increased training among senior management, middle and supervisory cadres. In the Ministry, the percentage of senior staff trained rose from 24% in 1990 to 27% in 1995, the Fund from 10% to 14% and the Bank from 47% to 54%. While it was not expected in the case of the Ministry, the negative impact in-terms of displacement of staff was found to be negligible in both the Fund and the Bank because of adopted policies and strategies, including retaining, and redeployment.

The study concludes that computerization in private sector is substantially intensive and tends to have greater impact as compared to computerization in the public sector. Further, the study concludes that computerization in private sector, and to some extent state corporations, has increased efficiency and also enhanced administrative capacity. In addition, the study concludes further that the anticipated negative impact of computerization was minimised by adopted strategies and policies that encourage re-training and re-deployment of the staff.

CHAPTER 1

1.0 BACKGROUND TO THE PROBLEM

This study was carried out to identify the nature of computer adoption and the impact of computerization in selected organizations in Kenya. More specifically, the study was concerned with the impact of computerization on organizational performance and labour requirements.

The use of Information Technology (IT) in management is experiencing rapid expansion in the East African region and particularly in Kenya. However adoption and utilization of the technology requires new and more effective organizational strategies and approaches.

According to Cerere (1993) organizations have always sought and adopted technologies that enhance efforts of their manpower in production and management. Indeed Cerere noted that although it has evolved over a considerable period of time, computer technology has emerged as an important tool in management of organizational operations.

In the 1980s and 1990s, there has been intensified efforts to introduce and adopt computer technology in Kenya (Oyomno 1991). Intensified adoption of computer systems and applications is being experienced in various sectors of education,

business management, organizational management and military among others. According to Cerere (1993) and Rono (1995) computer technology continues to be adopted for purposes of supporting managerial functions, improving performance, increasing efficiency, and for improved management of information.

Scott (1982) and Cerere (1993) reported that although computer systems were first introduced in Kenya in 1961, adoption was slow with only four mainframes installed by 1965 and thirty mainframes installed by 1975. These authors observed further that by 1981 there were 127 mainframes, and estimated to about 2000 computers in 1985.

According to Cerere, introduction of minicomputers in the 1970s and microcomputers in the 1980s contributed considerably to increased rate of adoption. Cerere pointed out that microcomputers had fundamental impact on organizations and management of work. Some of the anticipated impact on adoption and use of computer technology are considered to be desirable while others are considered to be undesirable.

Some of the desirable effects include increase in productivity and efficiency of operations. The less desirable effects include changes in labour patterns and requirements. Indeed, considerable attention has been directed to the less desirable effects. To be specific the primary concern has been the anticipated or potential

displacement of labour and the tendency to increase centralization in the decision-making process.

Kaplinsky (1984) observed that the concern over these less desirable effects was relatively high in the late 1950s and early 1960s. He argued that the intervening period attracted less concern because the first and the second generation of computers were associated with an increase in employment rather than displacement of labour. Unlike the first and the second generations of computers the third and fourth generations are considered to have potential to substantially displace labour and/or introduce modifications in labour requirements. At present there is remarkable anticipation of the fifth generation of computers, which are assumed, will have more impact on a wide range of management and operational aspects including labour structure. There is therefore renewed interest in the relationship between computerization and labour structure.

Predictions about specific ways that computer systems will affect labour requirements have been made (Erman and Gutierez 1990). One of the predictions is that computer systems will demand increased skills required to perform jobs. This upskilling implies that workers and prospective employees will be unable to qualify for available jobs unless they acquire additional training.

The other prediction is that computer systems will substantially increase the mismatches between the skills that jobs require and those available in workforce, implying therefore that skills which workers posses will become largely obsolete.

Erman and Gutierez (1990) also argued that these two predictions call for creation of necessary technological capacities. They argued further that availability of competent personnel in an organization is essential for sustained economic use of a technology. They therefore pointed out that generally, when a new technology is introduced into an organization, there is need to develop skills and competencies required to use and maintain the technology.

In addition, these authors see eventual elimination of manual and repetitive tasks leading to the need to upgrade lower level staff to administrative or decision-making positions. According to Cerere (1993) what has to be given serious attention in this respect is the contribution of each of the cadres to the entire organizational performance.

Either arising from these predictions or other perceptions in adoption of computer systems has been characterized by the fear that these systems will displace substantial labour force or change job requirements.

The above predictions call for studies at various levels that will provide an understanding of the process of adoption of computer systems and their eventual impact on organizational performance and labour requirements. This would also facilitate formulation and adoption of strategies that ensure the realization of the greatest benefits in adoption of computers while at the same time ensuring generation of employment opportunities and appropriate utilization of labour.

Indeed, incidents have been reported of industrial action or unrest in organizations that are either in the process of adoption or intensifying computer systems. A recent case in Kenya involved modernization programme at Standard Bank launched in 1993. However, experiences on the effects of adoptions and use of computer technology in Kenya have not been documented. Assuming a job is initially performed by 15 people, but with the use of computers the job now requires only 5 people, does it mean that the 10 have lost jobs or the organizations have retrained them? This is the problem that was addressed in this study.

1.1 STATEMENT OF THE PROBLEM

As stated above rapid adoption and intensifying use of computer systems in Kenya in the late 1980s and early 1990s has been accompanied by changes in operations of organizations, performance and labour requirements and which have however remained largely speculative.

Anticipated changes in organizational performance involve reduction in duration taken in processing critical tasks and elimination of repetitive tasks resulting in higher productivity and efficiency. Expected changes in labour requirements involve reduction of labour force in operational cadres and increase in supervisory and middle management cadres.

The aim of this study therefore was to identify ways in which computer technology has been adopted and the nature of organizational performance and labour requirements before and after adoption of computer systems. The principal concern was to identify the nature and extent of the impact of these systems on governmental, parastatal and private organizations.

In order to carry out this assessment three organizations were selected namely, Accountant Generals' Office in the Ministry of Finance, National Social Security Fund, and Barclays Bank of Kenya Limited. These institutions were selected because of their computerization efforts over the last 10 years and also because they represented different ownership and management practices and policies.

It is anticipated that adoption and use of computer systems reduce stages and duration in documentation processing of tasks target for computerization. This study therefore

examined stages and duration taken in carrying out critical missions in the three organizations.

Labour patterns have been represented in terms of the demand for employment in specific job categories and/or internal redeployment (Uthoff and Pernia 1986). These demands are expected at various levels of the organizations, notably senior management, middle management, supervisory and operational cadre (Meyer 1985; Mintzberg 1979; Newman 1973; Blunt 1983).

It has been argued (Oborne 1985; Kraemer 1986) that adoption of management technology tends to have different impact on each of the above categories. These authors also predict that such adoption will lead to the reduction in demand for labour in different job categories. This study therefore sought to identify the overall impact on labour and specifically labour demand in specific job categories.

The other prediction concerns the effects of computer systems on labour requirements. It is expected that the adoption of computer systems will lead to changes in the nature of skills required. This study sought to investigate on the training requirements arising in each of the job categories as a result of computerization. In addition, the study was aimed at identifying the nature and levels of skill development particularly through training in response to computerization.

1.2 RESEARCH QUESTIONS

In order to identify the nature of adoption of computer technology and its impact on organizational performance and labour requirements, the study was guided by the following questions:

First, what have been computerization objectives in the three organizations? Secondly, what capacities of computerization have these organizations realised? Thirdly, what was the nature of computerization carried out by these organizations? Fourthly, and what was the nature of the impact of computerization carried out in terms of organizational performance and labour requirements structure in the three organizations.

To answer these questions, the following hypotheses were examined:

1.3 HYPOTHESES

1. The three organizations will vary in terms of critical missions and objectives for adoption and use of computer technology.

2. In the three organizations, the missions and objectives of computerization will determine the capacity of equipment to be adopted and the level of capital investment.

3. In the three organizations, policies and management practices adopted will influence the nature and process of computerization. More specifically, it is predicted that:

3.1 The three organizations will be associated with different levels of expenditure on computer systems and applications.

3.2 The three organizations will be characterized by different levels of capacity utilization and computer application.

3.3 Different levels of integration will characterize the three organizations.

4. The nature and extent of computerization and attendant policies will determine the level of performance in the target critical missions and tasks.

5. The nature and extent of computerization and attendant policies will determine the impact on labour requirements.

1.4 OBJECTIVES OF THE STUDY

This study was undertaken to examine the above hypotheses with the following objectives. First, was to explore the underlying objectives and process of adoption of computer technology in the three organizations.

Second was to identify changes experienced by the three organizations as a result of computerization and to assess how such changes have affected organizational performance and labour requirements.

Third was to identify and recommend ways in which less desirable effects in adoption and use of computer technology can be minimized.

1.5 SCOPE AND LIMITATIONS OF THE STUDY

The study was designed to identify the nature of changes and extent of the impact of computer technology on organizational performance and labour requirements in governmental organizations, parastatals and in private organizations. For this purpose three organizations were selected within Nairobi namely, (1) The Ministry of Finance (MOF) which represented governmental organizations, (2) National Social Security Fund (NSSF) which represented parastatal organizations, and (3) Barclays Bank (BBK) which represented private organizations.

In this respect, one of the limitations of the study was the scope in coverage of the organizations (both the number and location) which was necessitated by the need for in-depth assessment of the process and management practices.

The second limitation arose from the fact that the design used is quasi-experimental in which other factors that can contribute to changes in organizational performance and labour requirements may not be ruled out adequately. These factors include labour laws, welfare policies, trade union agreements and inflationary trends. However, this design was the most appropriate for this study with respect to identifying the impact of the previous computerization efforts.

The third limitation might have arisen from ways in which computers have been adopted. For instance, computers could have been adopted without full institutionalization. In such a case they may not show the expected impact.

1.6 SIGNIFICANACE OF THE STUDY

This study was important for three reasons. First, in the last decade, considerable adoption of computer systems has been witnessed in this county. Secondly, the rate of adoption of computer systems is expected to increase substantially in the coming decades. Thirdly, little attention has been given to implications of this rapidly increasing adoption of computer systems, particularly in terms of less desirable effects. Studies that are available have focused on limited aspects of the number of installations and levels of computer utilization.

This study was also aimed at contributing towards understanding of the effects of computer systems on organizational performance and labour structure. Results of this study will be of significance in terms of its expected future applicability in organizations. As it is now, it is unlikely that organizations have captured the full range of changes that computers have already brought and will bring about in future.

1.7 DEFINITIONS OF TERMS AS USED IN THIS STUDY

1. **Organizational performance** can be defined in terms of time taken to carry out particular tasks, or in terms of the number of people required to effectively carry out a particular operation within a given period of time. It can also be defined in terms of realized output. For the purposes of this study, organizational performance was taken to mean the duration of time taken and the number of processes involved in carrying out critical missions in the three organizations.

2. **A Labour pattern is** the observable trend in the number of employees in various job categories.

3. **Labour requirements** are the demand for specific skills for different job categories.

4. **Computer technology** refers to a set of techniques that have capability for faster processing, storage and retrieving of large information. In this study it was used synonymously with IT.

5. **Mainframe** is a big computer in size supporting a number of peripherals; for example, several printers, several disk drives, several magnetic tape drives. It can also support almost up to 50 terminals for users.

6. **Minicomputer** is smaller than the mainframe and would support fewer peripherals.

7. **Micro/personal computer** these are intended for only one person's use; however, with advancement in technology they can be shared.

8. **Entrepreneur** is a person who is inventive, searches for new technologies and markets and continually combines resources to start an organization especially involving risks. In this study it is used sysnomously with ownership of the firms.

9. **A byte** is a unit for measuring computer storage or memory capacity. It is equal to eight binary digit, which is the space in a computer storage or memory required to hold a single character, digit, punctuation mark, arithmetic or relational symbol. Practical computer storage is measured in kilobytes (KB), Megabytes (MB) and Gigabytes (GB).

10. **Floppy disk,** also called a diskette, is a computer data storage medium. The most commonly used floppy disks have diameters of 5.25 inches and 3.5 inches. Standard floppy disks have storage capacities ranging from 360 to 1.4 MB.

CHAPTER 2

2.0 LITERATURE REVIEW

In this chapter literature related to the study was reviewed and attention was given to different categories of literature. First, literature that provides a general and historical perspective of the development in IT is reviewed. Second is adoption of computer technology in Kenya. The importance of this is to enhance understanding because the more sophisticated computer systems become the greater is the impact on organizational and labour structure. Also, given that there is rapid expansion experienced in the technology it was found necessary to review the development of IT and its adoption in Kenya because this has important bearing on its impact on organizational performance and labour structures.

Third, is literature related to impact of management technology on labour in general and more specifically the impact of computer technology on organizations and labour. Fourth, is literature on utilization of computer systems and also strategies adopted by both the public and the private sector in computerization process. Fifth, is theoretical framework and a review of the hypotheses.

2.1 TRENDS IN COMPUTER TECHNOLOGY

Mitcham (1986) and Huning (1986) consider advancement in computer technology to be evolutionary. Evidence of this view has been cited as its gradual or continuous advancement from the slide rule in 1622 to modern high speed processor in the 1990s.

Available literature indicates that the use of computer technology in management has expanded enormously since the 1940s. Oborne (1985) notes that this expansion is expected to continue as the technology advances with substantial impact in a number of dimensions. Toffler (1980) and Endmondson (1985) state that the impact of computer technology from its initial stages, i.e. slide rule, to the present high speed processors have been considered as revolutionary. It has therefore been predicted by Toffler (1980) and Erman et al (1990) that rapid adoption of computer and information technology is as revolutional as that of agricultural and industrial revolution.

Capron et al (1982) and Reiss (1984) are of the view that the initial development of computer technology was precipitated by the need for devices that could bring about reliable and efficient calculations in physics, mathematics and social statistics. While the history of computer technology can be traced to over 400 years ago, consolidation of both development in hardware and software led to the emergence of the first generation of modern computers in 1951.

It has been reported consistently by Capron et al (1982), Reiss (1984) and Shelly et al (1984) that the first generation of computer systems were installed at US Bureau for use in tabulation of census and were also used to predict presidential elections. There is also a consensus in the view that in the 1950s there was a remarkable increase in the manufacturing of computers, developing software and related components. Input media were still punch cards and vacuum tubes used for memory. These computers

were huge and generated substantial heat. However, Capron et al (1982) Reiss (1984) note that language used to programme the computer was unique to each machine.

Reiss (1984), Erman et al (1990) tend to agree that the second generation of computer systems prevailed between 1952-1960. These computers were characterized by transistors, which replaced vacuum tubes. Among other aspects, the transistor technology made computers smaller, more reliable and faster in operation. In addition, this new technological innovation reduced substantially the need for air conditioners.

At this stage of technological advancement, substantial impact was realized. Indeed, paper tapes and punch cards were replaced by faster magnetic tapes necessitating adjustment in organizational and labour structure. With paper tapes, more people were needed as compared to magnetic tapes. Flexibility and efficiency that was introduced made the technology widely adopted to military, academic and business endeavours.

Capron et al (1982) and Shelly (1984) have noted that the invention of integrated circuits (ICs) in the 1960s led to the emergence of the third generation computers. These computers were characterized by upward compatibility, eliminating the need for extensive revision of programs. This compatibility was restricted to a "family of computers", i.e. IBM, COMPAQ, HONEYWELL etc. More significant, these computers were characterized further by reduction in size as a result of the integrated

circuits (ICs) which replaced transistors. ICs featured small silicon chips and increased reliability and processing speed.

In addition, invention of visual display terminal (monitors/screen) facilitated easier access to data. This led to enhanced easy and faster editing capabilities. Enhanced speed, input and output devices like keyboard, mouse and printers facilitated multi-programming, i.e. the computer could serve more than one user at a time. Up to this period, computers were essentially "mainframe systems" costly and requiring relatively large space.

Capron et al (1982) further notes that more advanced innovation on ICs and software led to the emergence of the fourth generation computers in the 1970s. These computers were characterized by microprocessor, a processing unit that contained on a single silicon chip capable of performing logical and arithmetic functions.

ICs were replaced by large-scale integration (LSI) with over 100 ICs on a chip, which facilitated further reliability, efficiency and reduction in size. Further development in this direction was enhanced by the invention of very large scale integration (VLSI) with over 1,000 ICs per chip. This development led to a considerable reduction in size and cost of computers, which in turn led to remarkable adoption and widespread use of computer systems.

Essentially between 1930 and the 1960s, the operation of computers was through programming languages, i.e. Pascal, Fortran, Cobal, e.t.c. These languages required extensive training that usually took a long period of time. Consequently, Capron et al (1982) and Reiss (1984) note that the fourth generation computers were characterized by the emergence of relatively user-friendly application programs.

Convergence of development in computer systems and in telecommunications facilitated integration leading to emphasis on information technology. This convergence has also led to potential and actual network systems between local and distant units.

Invention and adoption of ICs, LSI and VLSI led to considerable reduction in size of computer systems and subsequent emergence of microcomputers (sometimes called personal computers, PCs). These have expanded enormously. Indeed, modern microcomputers perform comparatively with older mainframes.

Application software, evolving from programming languages, facilitated use of computers by programmers as well as non-programmers. The role of programmers became restricted to development of the systems and databases while non-programmers became end-users.

Floyd (1987) indicates that at present, there is remarkable anticipation of the fifth generation computers largely still under research and development. This generation

of computers is aimed towards further humanization of computer systems through the development of programs that imitate human thinking. This development is expected to have greater impact on a number of dimensions, including organizational structure labour patters and requirements. He also notes that what has been call "Artificial Intelligence" (AI) involves programming Computer systems to imitate human qualities of creativity, judgement and intuition. Aspects of this development, which was initiated in Japan in 1981, have been witnessed in some developed nations.

As a result of these developments, computer technology has therefore grown over the years. Computer technology has been used for military support, as an academic and research tool, in business sector and also in the medical field. Computer technology will continue to be integrated into the working environment in nearly all areas and organizations. Overall computer integration could yield significant benefits. However, this will lead to ever increasing complexity resulting from increased need for coordination in design, implementation, and management of the technology and the new applications supported by the technology.

2.2 ADOPTION OF COMPUTERS IN KENYA

Scott (1983) and Cerere (1993) report that computers were adopted in Kenya between 1950s and 1960s, first in the public sector notably railway and Government. It is important to note however, adoption of computers in this sector has been relatively slow until the 1980s. According to Peterson (1990) adoption of computer systems in this sector has been constrained by bureaucratic tendencies and lack of dynamic

policies. Cerere (1993) explicitly notes that although the private sector did not participate actively in adoption of computer systems until 1970s and 80s, the adoption rate in this sector has been and continues to be remarkably high and dynamic in the 1990s.

Scott (1983) shows that the first Computer was introduced in Kenya in 1961. Nevertheless, development in computer adoption was slow with only four mainframes having been installed by 1965 and only thirty by 1975. However, Cerere (1993) shows that computer technology continued to grow such that by 1981 there were 127 mainframes. Thus, by 1985, it was estimated that there were about 2,000 computers in East Africa with Kenya dominating the scene with a share of 90% while Uganda and Tanzania shared the balance of 10%.

Cerere makes it clear that the development in the software and hardware contributed to rapid growth of minicomputer installation in the late 1970s and microcomputers in the 1980s. The microcomputers have had a significant impact on the economy mainly due to their reduction in size, decreasing cost, increased power and versatility, their portability and user-friendliness making them available to a wide range of users and uses.

In the 1980s there has been increased recognition of the importance of information technology for purpose of national development and competitive operations at organizational level. Although lacking in coordination and effective implementation,

this increased recognition has led to development of infrastructure for adoption of the computer and related information technologies. Indeed because of this recognition the government gave considerable attention to computer and information technology in the 1989 Development Plan.

2.3 TECHNOLOGICAL ADVANCEMENT AND LABOUR REQUIREMENTS

The need to accomplish more, to improve upon the existing level of performance, and to make lighter tasks which are otherwise burdensome are the driving forces behind the development, acquisition and use of technology by an individual, a group or an organization (Oyomno 1991).

Increasing and rapid adoption of computer systems is driven by organizational requirements and also by technological advancement, i.e. new inventions and adaptations. One of the persistent contention and prediction is that technological advancement in general and also in the case of computer systems has effects on both organizational and labour structure.

Adaptive organizational changes refer to the adjustments that an organization must undergo in order to accommodate the new technology. Adaptive changes following the introduction of a new technology are unavoidable (Blunt 1983). The changes may affect the structure of the organization or the functional relationship that exists between various components and positions in the organization.

Fransman (1980) and Bhalla (1981) demonstrate that conventionally labour and capital have been used to distinguish between the different levels of technology. The ratio of capital to labour indicates the degree of capital intensity.

Advancement in computer systems, as in the case of modern technologies, is substantially capital intensive. In this respect, it is predicted that advancement in computer systems will be accompanied by relatively high application of capital and less absorption of labour. Schumacher (1973), and Fransman (1986) consider this trend as presenting a dilemma in developing countries between the need to use relatively efficient technologies vis-à-vis those that enhance labour requirements.

With respect to selection and adoption of technology, three perspectives have been emphasized. One is the need for modern efficient technology, the second is the need for intermediate technology and the third is the need for relatively labor intensive technology. Modern and efficient technologies, however, have been developed and adopted in developed countries (Schumacher 1973; Stewart 1977; Fransman 1984). This is also the case with computer technology.

While these technological advancements were continuing, computer systems were imported to Kenya as early as 1960s. Importation of computer technology to Kenya and also to other developing countries has been characterized by similar problems as those of the transfer of technology in general. Issues that have been argued

persistently concern ways in which they are adapted to local conditions and circumstances (Ranis 1970; Stewart 1979; Yearley 1988; Oyomno 1991).

For example, Ian (1981) argued that while the need in developed nations is to device and to adopt entirely new ways of doing things, i.e. producing existing products by better methods or producing goods hitherto unknown, the need in an undeveloped economy is to choose from methods already existing in the advanced economies, those which suit its local circumstances.

The nature of the technology that is selected, the ways in which it is imported and the ways in which they are adopted to local conditions depends on decision-makers of the firms. In this respect, Stewart (1977:22) stated that,

> the choice actually made depends on the nature of the decision makers and their objectives, economic circumstances and characteristics associated with techniques as well as the way in which the economy operates.

Stewart (1977) and Coughlin (1988) argue that one of the problems that has been reported with regard to the technologies in use in developing countries involve the dichotomy of capital-intensive and labour-intensive techniques. Capital-intensive techniques have been found to be a common tendency in most firms in developing countries. Stewart (1977) and Fransman (1986) show how this tendency has been attributed to distortion of the factor prices, with which firms consider the cost of

labour in terms of both the wages and training to be relatively high as compared to utilization of capital.

These authors have argued that substitution of labour with capital has led to adoption of "inappropriate technologies". Other factors include limited market, demand for large capital, which are scarce, and limited management skills. As a result of such conclusions, efforts have been directed, since the 1970s, to adopt policies in the developing countries, which would promote utilization of appropriate technologies.

Stewart (1977), Mikkelsen (1987), and Oyomno (1991) identify one area, which has been considered to be crucial with regard to enhancement of the local technological capability. They argue that this involves development of skills and knowledge of the adaptation of technologies.

Langdon (1984) observes that the way techniques are adopted depend on accumulation of skills, pointing out that firms tended to acquire technological capability through a sequence that starts with simple tools, then moves to second hand machinery and finally to adoption of modern equipment. Such a process, according to Langdon involves "gradual accumulation of technological knowledge as enterprises expand and entrepreneurial experience deepens.

The tendencies of the firms to adopt capital intensive technologies have been considered as constituting a conflict with the national objectives. For instance the

need to adapt competitive technologies tend to conflict with what has been called enhancement of social dimensions. Schumacher (1973) and Oborne (1985) signify that such conflicts are presented first in terms of profitable operations and secondly in terms of expansion of employment opportunities.

Specific effects of computer technology on organizational structure and labour requirements have been reported by Sanders (1980), Oborne (1985), Zubboff (1985) and Kraemer (1986). These authors have reported that computers compel organizations to reorganize and restructure their operations, thereby changing the jobs and labour requirements. Timner et al (1975) contends that the managers' choice of technology appears to be influenced by two objectives, which in low wage countries are generally conflicting:

1. Economic man to minimize costs. This leads to a relatively labour intensive production process.
2. Engineering tends to lead to a more sophisticated automated technology.

Timner (1975) further presents data indicating different ratios of labour at various levels of technological adaptation. His study shows that to manufacture one million cigarettes per month, the capital-intensive method would need three men, intermediate method six men, while labour intensive method would need forty men. This illustration demonstrates the vast potentials available in Kenya if appropriate measures are taken to vary factor proportions in favour of labour intensity.

The best use of any technology is realized when the ratio of benefits to their cost is maximum. Computers are most valuable when they complement scarce resources, i.e. managerial capabilities, skilled labour and financial resources. As Hirschman (1958) and Simon (1977) indicate, societies with significant levels of unemployment, low clerical salary scales and shortage of capital equipment should rapidly exploit the ability of computers to enhance their productivity. Simon stresses that a cost reduction in any part of the system releases resources that can be redeployed towards other operations with a view of increasing overall productivity and efficiency.

Peterson (1990) illustrates how adoption of computer technology is relatively advanced and institutionalized in the developed countries, essentially because of their management styles and costly labour. In those countries computer technology is being used to complement and supplement scarce and expensive labour.

In the developing countries (Kenya included), a need has been identified for a more intensive and extensive adoption and utilization of computer systems (Scott 1984; Peterson 1990; Muema 1990). At the same time, a concern has been expressed by Laver (1980) and Oborne (1985) on the potential of such capital-intensive use changing labour requirements and thereby leading to generation of less opportunities.

Indeed, while reduction in demand for labour is anticipated at various organizational categories, other observers (Woodward 1970; Kraemer 1986; Zubboff 1988) have predicted a substantial impact on the middle management cadre. Albus (1983) has

also made claims that some of the impact of computer technology results to substantially downgraded jobs. For example, he points to the case of doctors who feel that a large proportion of their work has been taken over by paramedical personnel using the computer in areas such as mass health testing.

Peterson (1989) and Rono (1993) observe that a default strategy has been adopted in this country and most of the developing countries. In this strategy computer systems have been adopted and used extensively on tasks, which are performed by clerical workers. This suggests that there is a high probability of substantial impact of computer systems on this cadre of workers.

However, it has been reported that computers create jobs in other areas. Some studies have presented new areas of employment that have been created and will continue to expand due to computers and related technologies (Ogang 1974; Ogunde 1984). These include information system managers, system analysts, database administrators, computer operators and computer engineers among others.

Albus (1983) argued that there has been no historical evidence that productivity has led to loss of jobs. He argued that quite to the contrary, in general, industries that use the most efficient production techniques grow and prosper and hire more workers. Markets for their products expand and they diversify into new product lines.

It has been observed that adoption of computers has effects on decision-making. More specifically is the decentralization and centralization of organizational functions and responsibilities. As Danziger (1986) and Kraemer (1986) show, managers, for instance are people being paid to make decisions, but the computer can supply information to managers to aid them in their decision-making.

In the case of Kenya, Ogunde (1984) reported lack of much evidence of actual redundancy due to computerization. The same study argues that if there are any cases, they tend to be very isolated. The study reports that one incident in which there has been evidence of redundancy was Kenya Airways. This incident which involved the Federation of Kenya Employers (F.K.E) occurred when one airline computerized its reservations and took advantage of the satellite communication system in Kenya for the purpose of international air travel reservations.

Although its not clear how many people lost jobs, there are claims that at least two people lost their jobs. In point of fact, redundancies were declared recently in the restructuring of the same organization. Ogunde (1984) shows that in the majority of cases adoptions has resulted in new jobs in different sections of the same organization. However, it is important to investigate the impact that computerization has had on labour and organizations now that Kenya Airways has become a private entity.

Ogunde also reports that most of the Kenyan firms that were interviewed ten years ago could not be able to predict the effects of computerization on employment during the next 10 years. A projection of expected trends in employment was attempted. Due to computerization, general employment expectancy was estimated to be 25% between the year 1984 and 1994. It would be important to find out whether these predictions are true.

2.4 UTILIZATION OF COMPUTER SYSTEMS

It has been argued persuasively by Meyer (1985), Munasinghe (1989) and Rono (1993) that computers are adopted with the aims of achieving technical efficiency and enhancement of organizational goals. Andere (1990), Peterson (1991) and Cerere (1993) state that in order to achieve the required technical efficiency and organizational goals, extensive computing capabilities are required.

Furthermore, Peterson (1990) and Rono (1993) have pointed that adoption of computing technology is an investment with which organizations should pursue maximum returns or benefits. Consequently, to achieve required technical efficiency and expected returns necessitate high utilization of the existing capabilities.

However, Peterson (1991) has pointed out that while these capabilities are substantially utilized, i.e. over 70%, in developed countries, their utilization in developing countries is considerably low. Computers in most developing countries

are used at less than 50% of capacity. Although, the economy does not expect a 100% utilization of computers Scott (1984) questions how close it is in East Africa.

A 1988 survey by Peterson (1991) in Kenya public sector on the use of computer systems indicated that 7% to 15% of the computer capacity was being utilized. The implication is that over 85% of the capacity still remained idle. Most of the systems were mainly use for processing rather than for analysis. Hence Scott (1984) and Peterson (1991) argue that computers remained some sort of sophisticated typewriters, as word processing tended to become the major application.

Peterson argued further that intensified and analytical applications are less compatible with the administrative cultures, personnel skill levels and organizational structures of developing bureaucracies hence require a level of training and motivation uncommon in developing bureaucracies. In order to shift from simple processing to intensified and analytical application these aspects must be taken into account, including the need for re-training and enhancement of motivation. Peterson (1991), reported lack of demand for analysis by decision-makers and cautions on the possibility of processing applications dominating the foreseeable future.

Indeed, while word processing applications are argued to have enhanced productivity and performance in management related aspects, they do not exploit the full capabilities of the presently existing computer systems. The prediction in this respect is that such low level utilization of computer technology may have less impact on

overall technical efficiency of organizations and on labour requirements. Because of this low level utilization of investment and subsequent realization of negligible impact, a number of studies, notably Peterson (1990) and Peterson (1991), have been directed towards intensification of the use of computers.

In this respect Peterson (1991) presents a model characterizing adoption of computer technology from relatively low level utilization to more intensive utilization. In this model applications such as word processing are categorized as low level utilization, spreadsheets and databases as nearly middle level utilization and database systems as high utilization. One interesting observation that has been highlighted by Peterson (1991) is that the level of capacity utilization is related to the extent to which computing technology has been institutionalized i.e. used routinely in all organizational levels.

The reasons for low levels of utilization in developing countries that have been identified include inadequate computer policies, inadequate skills, i.e. technical and end using skills as well as organizational resistance to change. Moreover, few managers in developing countries understand how to use the computer to aid decision-making. Peterson (1989) and Cerere (1993) recognize that there is also shortage of system analysts who can design and implement decisions supporting information systems.

Education and training especially of senior managers and systems analysts could also be considered a major obstacle to more effective computer utilization. Limited attention has been given to planning for education and training of skilled data processing staff and knowledgeable users. In the absence of national training policies, the two common sources of training are computer vendors and the private business colleges. Computer manufacturers offer training and education to aid market what they are in business for.

Ogunde (1984) points on areas where emphasis on utilization of computers should be put in. For example commercial industrial control, planning and management and computerized traffic control.

2.5 ADOPTION STRATEGY

It has been documented by Peterson (1990) that in order to achieve desired effects while minimizing unintended consequences of technology there should be a set of policies outlining the objectives and strategies of adoption. Indeed two levels of policy have been identified: the government policy, and the organizational policy. In the case of the former, it is argued by Ogunde (1984) and Rono (1995) that it should provide some guidance on the long-term and short-term adoption of computer systems.

It is further argued by Makau (1988) and Were in Huttemann (1990) that the government policy should provide guidance and support on necessary infrastructural

arrangement. For example providing an effective telecommunication environment in which computers can be networked locally, countrywide and at the regional level, should be seen as important in this infrastructural arrangements.

Between 1960s and 1970s, the government issued a statement vesting the responsibilities of computerization to the Government Computer Services (GCS). The computer system at GCS then was a mainframe. This policy, which is still in existence, is no longer adequate to guide the present widespread adoption of mainframes, minicomputers and microcomputers in this country and region. More so is the fact that the government's policy on informatics has not been consolidated and harmonized to meet current challenges.

Other policy initiatives that have been undertaken during the intervening period include a directive in 1979 and 1985 from the Office of the President to establish coordination of information services and technology through "National Information Services". However, this initiative was implemented partially.

The 1985 initiative resulted into an Act of Parliament establishing the National Archives for preservation of information. Indeed, this act gave the National Archives responsibilities nearly as the same as those of the Government Computer Services. However, the National Archives have restricted its role only to historical records.

Establishment of the Ministry of Research, Technical Training, Science and Technology included a mandate for coordination of developments in computer and information systems. Indeed, this ministry has shown greater interest in the development of computer skills. Through its Directorate of Industrial Training (DIT), the ministry has undertaken cost sharing with other organizations in the training of the required manpower.

The Ministry has also undertaken initiatives to regulate training provided by both private and public institutions. For instance, the Permanent Secretary (Mutahi 1995) emphasized the need to have an uniform syllabus and examination board for all computer training colleges in Kenya. It was envisaged that this would standardize the quality of computer training in the country. Alongside these initiatives are efforts towards review of policies for computer and information technology through the National Council for Science and Technology established in 1977.

Provision of machinery for collection and dissemination of technological information is one of the main objectives of the National Council for Science and Technology. The Council's report No. 4 of 1980 on science and technology stressed the importance of planned utilization of scientific and technological information as tools for promoting development.

In addition to these national efforts, the African member states established Pan African Development Information System in 1980 with a mandate to provide

harmonization and coordination of computer and information systems at regional level.

Similarly, it has been argued that the organizational policy, while taking into account the overall government policy, should outline the organizational objectives, scope and strategies (Ogunde 1984; Mikkelsen 1987; Rono 1993). The prevailing argument therefore, is that at both levels of policies, there should be some guidance on importation of computer technology, development of infrastructure, capacity utilization and the ability to supply the skills required by the economy (Oyomno 1991).

Muema (1990) argues that lack of coordination has been extended to the new information technology. This extension has brought into the country a free-for-all fashion without consideration of specification for overall national development and intended information goal. He further argues that as a result of this, decision-makers, both in the public and private sector, have procured information technology without taking cognizance of the requisite human resource development.

One of the persistent arguments regarding infrastructure is creation and enhancement of skilled human resources. From one point of view, as stated in (Sessional Paper No. 10 of 1965), it is argued that it is the responsibility of the government to create those resources. This is because the private sector does not have capacity and resources. The Sessional Paper, therefore, made provision for three things: first was the

promotion and protection of foreign investment, second was the condition that the companies were to make use of local labour as much as possible, and third, both foreign and local firms were encouraged to train their labour force.

It is the third provision stated above which led to the creation of Directorate of Industrial Training (DIT) by the government. Through DIT, organizations were encouraged to train workers and the government would reimburse some of the training expenditure to the firms. However, it is not clear whether private firms are making use of the DIT facility or not in their policies on adoption of computer technology and creation of required computer skills.

Besides the role of the government, it is also expected that the private sector would take the responsibility of developing the required skills. It is also the responsibility of the individual to develop their own skills.

Ogunde (1984), and Rono (1995) observe that the government should come up with a policy on computers so that we are not caught unawares by the wind of the 3rd wave of technological revolution. We should be prepared to meet and exploit the capabilities.

Given that computer technology is adopted in pursuit of efficiency, productivity and competitiveness, the main issues emanating from this literature review hinge on how

policies should enhance these aims while at the same time ensuring that labour and technology co-exist.

Indeed one of the objectives of this study was to identify computerization policies that organizations have adopted with regards to institutionalization of computers and their effects on both capacity utilization and labour requirements.

2.6 THEORETICAL FRAMEWORK

Very little work has been reported that specifically relates to the impact of computers on organizational performance and labour structure. Consequently, the development of this theoretical model was based on assumptions arising from the literature that do not necessarily have direct relationship with the subject matter of the study.

The review of literature, has presented several perspectives that can explain ways in which management technologies are adopted and highlighted their operational impact. There are some major theoretical imperatives emanating from these.

First is the conventional economic perspective which emphasizes profit maximization. In this conventional economic perspective, it is argued that organizations would choose to adopt combination of technologies in relation to the price factor. According to this view, technologies are adopted in relation to expected input and output (Marx 1859; Rains 1970; Pack 1976; Stewart 1977; Fransman 1980).

The assumption in this perspective is that organizations choose a combination of technologies in ways that would maximize their profits. It is argued that they choose technologies that are comparatively cheaper or that would provide competitive advantage.

However, it has been pointed out that choices of technology in developing countries should not necessarily depend on their comparative prices (Schumacher 1973).

The second theoretical perspective emphasizes the process of imitation and diffusion. The argument is that firms adopt innovations that have been adopted by other firms as a process of acquiring similar competitiveness. In this perspective examples are given of the local firms adopting technology through imitation of multinational firms. According to Tarde (1890) invention is the basic pattern of the social processes. Timasheff reports:

> Invention involves some element of change; usually it is a creative association of already existing elements or a fruitful combination of repetitions (imitations of former invention).... The tempo of inventions in a society is affected by the relative difficulty of combining ideas, the levels of members' innate mental ability, and social conditions that may be favourable or unfavourable to inventions. Imitation then is a process through which an invention becomes socially adopted (1976:182).

Executives and managers make decisions regarding ways through which technological or organizational innovations can diffuse and be adopted to the wider society (Nevins 1954). However, as noted above, such imitation depends on the characteristics of the firms as well as those of the entrepreneurs.

The third perspective emphasizes the nature of investment. According to this perspective as espoused by Durkheim (1933) and Hirschman (1958), the way in which management technologies are adopted depends on the size of the firms and their institutional capacity. It is argued that large firms have capacity to absorb the overhead cost of new innovations. Durkheim further shows that technology leads to division of labour, which in turn creates efficiency, competence and productivity. However, in all the three perspectives the role of entrepreneurs in adoption and adaptation of technologies is given less emphasis.

The fourth perspective emphasizes the role of entrepreneurs in the ways in which management technologies are adopted. According to Schumpeter (1934) industrialization in the Western world was driven by entrepreneurs. Schumpeter argues that it is the entrepreneurs who put firms together and created the means of production where there had been none before. He argued further that the entrepreneurs collected resources and orgnanized the means of production to combine the resources into a new product and sold the product.

This theoretical perspective, advanced initially by Schumpeter, has been supported by other scholars (Habakkuk 1962; Kilby 1971). These scholars have argued that characteristics of entrepreneurs constitute a primary causal factor in adoption of technologies.

Kilby (1971) argued that entrepreneurs influence the ways in which technologies are adopted through their ability to make new combinations, creation of managerial skills, perception of opportunity, risk taking and inventiveness. He further emphasizes the importance of entrepreneurs in adoption of technology. He argues that the role of an entrepreneur includes acquisition and overseeing assembly of the factory, minimization of inputs with a given production process, upgrading process and product quality. Finally, it includes introduction of new production techniques and products. The entrepreneur can therefore decide on whether to adopt one form of technology or the other.

Further, Kilby still argued that entrepreneurs combine resources continually including labour and capital in new ways. Their functions also include recombination of economic factors, higher standards of labour, the search for new resources, technology, markets and a more disciplined management of money and time. More important is the basic premise that the characteristics of entrepreneurs influence management systems which in turn influence ways in which technologies are adopted and utilized (Schumpeter 1934; Kilby 1971).

The present study will apply this theoretical approach to identify ways in which computer systems have been adopted and assess their impact on organizatonal performance and labour requirements. The important aspect of this perspective borrowed into this study, is what policies are being put into place when entrepreneurs

adopt new technologies. More importantly is how the technology is put to work with manpower and the policies made to ensure that technology and labour co-exist.

In a model based on adoption and utilization of computer systems in developing bureaucracies, Peterson (1991) has argued that the effects of computerization on organizational structure and labour requirements depend on intensity or level of utilization. The effects will therefore vary in part because of the nature of the organization, the level of automation and adoption decisions made by management.

In the above paper (which examines the intensifying use of microcomputers in developing bureaucracies), Peterson (1991) shows that processing of data is simple compared to analyzing applications that are more complex and include data assembly, sensitivity, analysis and modelling. Hence as organizations move further from low levels of utilization, the use of computers become more intensified and the level of automation is higher. This in essence means moving from processing to analyzing and decision-making.

The conflict, however, is that as we move towards analysis and decision-making there is full utilization of technology, which implies more impact on labour. But if we do not move towards analysis then we are not using computers competitively thus reducing them to sophisticated typewriters.

Kilby (1971) argued however that there are a number of problems in adopting Western technologies in developing countries. These problems include lack of

infrastructure, lack of skills and cultural practices. Using the same argument, Hirschman (1984) recommended "machine-paced" operations to improve productivity and performance of organizations in developing countries. Machines facilitate higher performance, productivity and even innovations (Hirschman 1984). Computers as management tools provide capabilities for such "Machine-paced" operations.

Computers as used in developing countries are most often applied to tasks with the objective of replacing and/or handling with ease repetitive jobs. Since developing countries typically have employment problems, transfer of computer technology to developing countries is a problem if workers are replaced. If adoption of computers is not accompanied by increased productivity and competitiveness, then organizations in developing countries are not getting their money's worth for available computer power. The organization will not install computers and remain at the same level of productivity. Hence if they have computerised for whatsoever number of years and remained the same, then it is not worth adopting the technology. As such changes must have taken place either within the organization or on labour. These are changes that need investigation.

The decision to adopt computer technology is an investment aimed at realisation of expected benefits. Such benefits are realised when computers are adapted and fully utilised. However, the higher the level of automation the greater is the level of organizational performance but the greater is the impact on labour patterns and requirements.

From the literature review and the above theoretical perspective, the following hypotheses were re-examined:

Organisations will vary in terms of critical missions and objectives for computerization. This is expected because of the functions that they carry out, existing infrastructural capacity, and policies that have been adopted in the past.

The missions and objectives of computerization will determine the nature and capacity of equipment to be adopted. This is because the mission outlines the scope of functions to be computerized and the targets to be achieved. It is the scope of the work to be computerized that determines the nature and the capacity of the equipment required. Further, the nature of the equipment that is required will determine the level of expenditure.

CHAPTER 3

3.0 METHODOLOGY

This chapter focuses on research design, the sample and sampling procedure, instruments used in the research design, methods used in data collection and data analysis.

3.1 RESEARCH DESIGN

The design of the study aimed at identifying the nature of organizational performance, labour patterns and requirements before and after adoption as well as adaptation of computer systems. More specifically, adoption of computers and subsequent adaptation into intensive utilization, were treated as the independent variables anticipated to have considerable influence on organizational performance and labour structure which in essence were treated as dependent variables.

In order to assess this, three research design were applicable, one of experimental design in which the researcher introduces the independent variables. However, in this case the researcher had no control on the introduction of computers.

The second applicable design would have been longitudinal design. In this case the researcher would have observed the impact of computerization on organizational performance and labour requirements over a prolonged period of time. Although this would have been the most ideal research design, both finances and time limited the researcher. This therefore justified the use of a quasi-experimental design, which was

used to assess the impact of computerization on the selected organizations for over a period of 10 years.

In order to assess the impact of adoption of computers on organizational performance and labour structure, quasi-experiment design covering over a period of ten years was used. Such a design does not allow manipulation of the independent variable because the researcher had no control over the adoption and/or adaptation of computers. This design was therefore used in this study to facilitate assessment of impact following the introduction or enhanced use of computers.

The period between 1985 and 1995 was considered as the most appropriate. This is because 1985 was really the beginning of rapid computerization in this country. 1990 was characterised by both intensive computerization and other organizational reforms such as retrenchment. 1995 was a year of further initiative in consolidating and intensifying the use of computers. Therefore, the period between 1985 and 1995 presents sufficient cases for the study.

3.2 SAMPLE DESCRIPTION

It is generally recognised that a substantial number of organizations of various ownership and size have adopted and utilized services of computer systems at various levels in Kenya. While some organizations are at the stage of adoption of basic computers, others such as Financial Institutions, Oil companies and Banks have had substantial adaptation for far more intensive and extensive utilization. Most of the

organizations that have adopted and adapted extensive use of computers are based in Nairobi. The study therefore, limited itself to computerized organizations within Nairobi.

Based on the main argument of the study that organizations of different ownership and management practices will influence the nature of computerization, which in turn will influence organizational performance and labour structure, representative organizations selected across ownership were used. One of the organizations was a government department, one was parastatal and the other private and which were examined in greater details from 1985-1995.

For that purpose Accountant General's Office in the Ministry of Finance represented governmental organizations, National Social Security Fund (NSSF) represented parastatal organizations and Barclays Bank represented private organizations. These organizations were selected for two major reasons. One was because they have had substantial use of computer systems and were carrying out reforms aimed at intensifying their computerization.

Second was the fact that they were all financial institutions and in the service sector therefore carrying out almost similar operations. As such they are expected to manage finances and provide balances and statements based on their day to day transactions whenever these are required. This therefore allows for examination of

the process in which such computerization affects organizational performance and labour structure.

From each organization the researcher targeted at the staff in different departments. This study required that data be collected from the senior management and middle management staff of the selected departments. The senior management cadre was selected because they are the decision-makers in these organizations. In addition, middle management cadre was selected because they are in charge of supervising the implementation of changes and reforms in these organizations.

3.3 SELECTED DEPARTMENTS

The researcher selected a sample most representative by the use of stratified technique. From each organization, the researcher focused on four departments. In all the three organizations, computer department and personnel department were used.

The computer department was considered important because it supports other departments within the organization. In addition, this department would help give more insight on the nature of computerization in their respective firms. The reason for selecting personnel department was to get insights into labour demands and skills requirements before and after adoption of computers. This was also in an attempt to examine observed trends in labour intakes and in the overall number of employees.

For this reason the following departments were used in the Ministry: Government Computer Services to represent the computer department, the Paymaster General (reimbursement) and the Banking section which were handling the most crucial operations at Accountant Generals' office (headquarters).

In the case of NSSF, the most crucial operations include payment of benefits to contributors when they are due and registration of both employees and employers. As such, this study focused on benefits department and registration departments alongside computer and personnel department.

In the case of Barclays Bank, its mission is to offer good customer services while at the same time maintaining its highly competitive market. As such one of the most computerized department is the Card Centre. This study therefore focused on the operations in the Card Centre and in the branches alongside the computer department and personnel department.

3.4 RESEARCH INSTRUMENTS

This study utilized two instruments, namely document analysis and interview schedule. The document analysis was used to obtain information on the nature of computerization and trends in labour patterns and requirements before and after adoption and/or adaptation of computers.

Secondly, an interview schedule for discussions with managers in the selected departments and computer specialists was used to enable the researcher to solicit for more information on the policies governing adoption and the process of computerization and changes that have been experienced in the overall performance of the organization as a result of computerization in the selected organizations.

3.5 DATA COLLECTION PROCEDURE

The researcher obtained clearance from the Office of the President, and then visited the management of the selected organizations and their heads of departments. This was in an attempt to arrange for specific date and time for discussions with them.

After discussions with the managers and heads of selected departments, the researcher then visited the organizations in order to get information from office records. The information required for use in the document analysis was gathered from registers, files and any other relevant sources as directed by the management.

3.6 ANALYSIS OF DATA

Data obtained was analysed using two approaches. First approach was qualitative description which involved documentation of policies, objectives of computerization, and levels of computerization achieved in the selected organizations and ways in which computer systems have affected organizational performance and labour structure.

The second approach was analysis of quantitative data in order to obtain statistical patterns that would be necessary for generalisation purposes. In this respect, analyses were aimed at obtaining percentages and figures indicating specific changes and trends that have been observed in and labour structures.

CHAPTER 4

3.0 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter presents analysis of data obtained principally from records and documentation in the three organizations namely, Department of Accountant General in the Ministry of Finance, National Social Security Fund and Barclays Bank of Kenya Limited. In addition, discussions were held with employees and managers from these organizations. It will be recalled that the intention was to identify the extent to which these organizations have computerized their operations and to examine the hypothesis that computerization process will have different effects in each of the organizations because of different policies and strategies.

4.1 COMPUTERIZATION OBJECTIVES AND PROCESS

Different organizations have adopted technology at different levels and for various purposes, namely effective management and decision-making, efficiency in operations and competition. On the basis of this argument, this study sought to investigate on computerization objectives in the Ministry, the Fund and the Bank, and to test the hypothesis that different organizations will carry out computerization for different objectives depending on the nature of their critical operations and their management practices.

4.1.1 ACCOUNTANT GENERAL'S DEPARTMENT

The Ministry of Finance has the responsibility of efficiently monitoring, managing and accounting for financial transactions in all the Government Ministries. The

Department of Accountant General in the Ministry of Finance is charged with the responsibility of payment and control of government expenditure as well as maintenance of accounts data for all the ministries and departments, including all the district treasuries countrywide.

The objective of computerization in the Ministry of Finance was to improve on the time of financial and accounting transactions and to improve on the quality of information required for appropriate response. In addition, adoption of computer systems was aimed at enhancing capacity for national allocation and utilisation of resources with the government.

The adoption of computer use in the Ministry of Finance started as early as 1970s with the objective of easing budgeting and processing of salaries for civil servants and employees in the parastatals and it involved creation of Government Computer Services (GCS) which use a mainframe and a centralised government accounts system.

In 1974, the accounting system was improved to incorporate budgeting of government expenditure and production of accounts in addition to processing of salaries. During that time computerization was extended to operations in the Accountant General's office. The objective was to develop, expand and integrate the budget information systems within the Ministry of Finance and the Government ministries.

In addition to salaries and routine government expenditure that involved district budget allocation and disbursement, accounting operations were expanded in 1983 when the District Focus Programme for Rural Development was introduced. This had the effect of increasing the volume of work necessitating the use of improved technology as a matter of urgency. Besides budgetary planning, disbursement and accounting, district cash float was enforced as a process of disbursing funds and accounting expenditure to and from the districts. These demanded expanded use of computers both at the headquarters and at the districts.

Due to large volume of work and diminishing capacity of the ageing mainframe in GCS, microcomputers were introduced as a pilot in 1985, essentially for planning, processing and production of the budget. This project was funded by USAID with technical support from Harvard Development Institute and Thunder and Associates. Later, the services of Harvard Institute were re-deployed and restricted to the Ministry of Planning and National Development.

During this period budgeting, reconciliation and control was carried out using spreadsheet type of software such as Vis-calc and Super calc. Indeed, computer systems were used only to produce monthly, quarterly and annual reports. As pointed out by Petterson (1991), computers were used for processing and not for carrying out analysis. For example, they were not used to analyse various taxation policies, a function that was deemed necessary to identify taxes that could be increased or decreased and the effect of such measures, as well as how to allocate funds.

In 1987, computerization was expanded through a microcomputer project with the objective of extending its adoption from budgeting to other related sections mainly accounts (presently Accountant General (AG). Because of technological limitation in sharing and accessing common database, several databases were developed in 1989 including Banking and Reconciliation System and a reconciliation section was created. The aim was to clear and to process promptly the backlog of suspense accounts. However, this problem was not solved because available microcomputers were used principally for data entry and much less for reconciliation.

Since there was no direct linkage between GCS, PMG and Central Bank of Kenya, it became increasingly difficult to control government expenditure with some ministries spending far more than their respective float. Therefore, a tailor made program known as District Expenditure Control System was developed in 1991 in order to control the revolving district cash float and to facilitate the reimbursement process.

At the time of this study, computerisation was being expanded to monitor and facilitate collection of government revenue while at the same time controlling the expenditure. This expansion involved updating and modernising of Government Accounts System, efforts to acquire more effective mainframe as well as increasing capacity and capabilities of the microcomputers.

Despite this computerization, data are still captured at the district levels with IBM systems and forwarded to the headquarters through 8 ¼ " diskettes. Computer print

outs and the diskettes are transported physically to the Headquarters for translating and processing of data. The accounts data are received at GCS and used to prepare ledgers for use by the government ministries and forwarded to PMG with clearance for issuing of cheques. The district Cash Float which ranges from Ksh 12 to 25 Million must be reconciled with accounting vouchers and the vote book before reimbursements are carried out. The cheques are then passed on to Central Bank for clearance where PMG maintains its account. Through this procedure, accounting and reimbursement of District Cash Float is carried out on a weekly basis and the process has become more efficient.

4.1.2 NATIONAL SOCIAL SECURITY FUND

The corporate mission of the Fund is to provide financial security and social welfare support to workers upon retirement and against social contingencies such as old age, death, accident at work, etc. This is achieved through a statutory joint contribution to the Fund by employer and individual employee. The level of contributions has been set depending on the salary structure and are legally enforced. The individual beneficiary draws from the Fund upon attaining the age of 55 years.

The Fund was started in 1966 as a department under the Ministry of Labour and it became a parastal in 1988 under the same Ministry. It covers all the employers and employees in the country, with exception of employees with equivalent pension scheme. The headquarters is in Nairobi with regional offices countrywide, particularly at the provincial headquaters namely Embu, Kakamega, Kisumu,

Mombasa, Nakuru and Nyeri. In addition, offices continue to be opened in the municipalities and/or areas with high density of employers and employees.

During the 1970s, operations of the Fund were computerised with the use of the facilities at the Government Computer Services (GCS). Specifically, computerisation involved remittance and reconciliation of the contributions (or remittances) as required and also to ensure that employers would get their benefits upon attaining the age of 55 and/or as may be required.

Indeed, in 1960s and 1970s the number of employers and employees expanded substantially, making it difficult to update and reconcile their records at appropriate time. Expanded employers and employees also meant expansion in the volume of financial transaction resulting to the need for the use of computer technology.

With respect to contributions, three main transactions were involved: first, the Fund receiving and demanding outstanding remittances from employers; secondly, posting remittance to the account of each individual employee (member of beneficiary); and thirdly, disbursing the funds to those that have become legible. Under the manual systems, delays and backlog were experienced in each of these transactions resulting in considerable loses and/or creation of suspense accounts.

Computerisation in 1970s was therefore aimed at reducing delays and backlog in each of these transactions. When the Fund was established as a parastatal in 1988, it

acquired its own computer and transferred processing of members' contribution from GCS to its own computer. In addition, it expanded its own data capture within the headquarters and the provincial offices. The machine acquired was a mini-computer with characteristics of a mainframe.

During the 1980s receiving and demanding outstanding remittances continued to be cumbersome and slow. It involved annual returns from the employers through printed dockets which were sent to them at the beginning of the year, usually January. The employers were supposed to stay with the dockets up to the end of the year when they would fill them and return to the Fund. The Fund would use clerical staff to verify entries and pass to the computer department to be translated into computer dockets accounts (CDA). In the Computer Department the data were then captured using paper tapes which in turn were used to update the master file.

During the same period 1980s, posting of remittance (contributions) to individual members account continued to be cumbersome and sometimes ineffective resulting in the creation of suspense accounts. The problem was the inability to match remittances with the individual member (beneficiary) mainly because of difficulties in identifying the number of the employee and/or because of employees changing employers.

Largely because of the delays arising from demanding and receiving remittances and from posting to individual accounts, disbursement to beneficiaries was being delayed substantially, i.e. for a period ranging from six (6) months to five (5) years.

With expanded computerisation in 1990, the system of receiving and posting remittances was changed from annual to monthly in order to accelerate production of individual reports at regular intervals, to ease updating of members' accounts and to ensure prompt payments of benefits. Remittance schedules were there sent to employees to be filled and returned to the Fund at the end of every month with an accompanying payment cheque.

In 1994, data capture on registration of employers and employees became mandatory and was extended to regional offices with the objective of facilitating collection of returns and updating of members' accounts at regional offices.

At the time of this study registration was being carried out at the area stations. Data was captured at the area offices/stations and transmitted to the headquarters through electronic transfer for processing. This process was facilitated by file transfer facility protocol and the post office through KENPAC. The relative success that has been achieved with provincial data capture has encouraged efforts towards registration and cash receipting at district level. This has increased efficiency as well as reducing time taken in processing of benefits.

4.1.3 BARCLAYS BANK OF KENYA

Barclays Bank of Kenya is a multinational firm operating in Kenya, East Africa region and other countries in the world. The Bank's mission is to provide better customer service through management of lending facilities and various accounts such as Current, Deposit, Fixed, e.t.c. Through these services the Bank aims at obtaining profits in return and indeed in the last 5 years Barclays Bank has led banks operating in Kenya in profit levels declared.

The Bank was established in Kenya prior to independence in 1963. Another close multinational rival is Standard Chartered Bank, which was also established in Kenya prior to independence. In addition there are local institutions that were established after independence including Kenya Commercial Bank (KCB), and National Bank of Kenya (NBK). These financial institutions adopted computer technology and carried out computerisation with varying intensity during the 1970s and 1980s.

Towards the end of 1980s three of these institutions Barclays, Standard and KCB embarked on extensive modernisation and computerisation as one of the critical components in restructuring. Indeed, during this period, Barclays Bank used isolated microcomputers in their branches.

Barclays Bank initiated enhanced computerization of its operations in 1982, starting with branches within Nairobi. The objective was to improve its already existing competitive capability including the need to cater for changing customer requirements

by improving services. While management wanted to monitor their transactions, customers needed to know their records and balances on time. The enhanced computerization was initially concentrated largely on current, savings and fixed deposit accounts.

The restructuring process resulted in substantial increase of customers and also demand for customer services, which in turn increased the demand for further and enhanced computerised systems. It is against this background that a conversion team, consisting of 6 members, was set up to facilitate computerisation.

By 1985 all the branches within Nairobi and its periphery were computerised with a computer centre at Enterprise Road being used as a server and also for backup. Later a different Data Base Centre was established at NIC to serve as the backup centre for branches out of Nairobi. Operations were mainly carried-out using Barclays International Savings System (BISS) for savings accounts.

A further expansion involved establishing other centres, notably Nyeri in 1989, to cater for branches within Mt. Kenya region, and Kisumu centre in 1990 to cater for western region. Prior to 1993, transmission of the data to the headquarters was relatively manual in which transactions were posted at branch level manually and transmitted through batch processing at night with data being physically transferred in diskettes from the branch to the respective computer centres for processing and printing. Subsequently, customers' statements and balances would be physically

taken back to the branches where individual accounts would be updated and customers would be given their balances the following day.

A further innovation involved introduction of data communication in 1983 in which branches were linked to respective computer centres via special data communication line leased from K.P.T.&C. for example branches within Mt Kenya region were linked to Nyeri computer. However, this automated data communication operated only-one way, transmitting transactions to the centres but the branches would get back the output physically.

This innovation of data communication was improved in 1993 with the introduction of a remote control device to transmit data to and from the branches and computer centres, in effect facilitating printing of statement at branch level.

Due to centralisation of main operations and decentralisation of transactions, it was found necessary to consolidate computer centres resulting in the closure of regional computer centres, Nyeri and Kisumu in 1994 and 1995 respectively. Operations of these two centres were moved to NIC, which at the time of this study served 42 branches.

In 1994 and 1995 the Bank introduced two more innovations with far-reaching implications: Front Office System and Automated Tele-Machine. The Front Office System allowed the cashiers to receive and disburse finances promptly with the

assistance of a computer system. The Automated Tele-Machine enabled customers to withdraw money directly through the machine without going through the cashiers. These machines were installed within the branches and at the time of this study a total of 52 machines had been installed countrywide.

With respect to objectives of computerisation in the three firms, a number of issues can be identified. One is the fact that in the three organisations, the objective of computerisation was aimed at enabling manpower to cope with large volume of work, produce reports in good time and to ensure prompt payments whenever required.

Secondly, computerization in the Ministry (in 1974) was initially precipitated by urgency and the need for accuracy, in processing salaries for staff in public service. Enhancement of computer systems in the 1980s was in response to expanded public service and adoption of District Focus Programme for Rural Development. This was critical since a specific schedule had to be followed throughout the calendar year in annual budgetary planning, disbursement of expenditure, and project implementation.

In the case of the Fund, the initial adoption of computer systems was more of imitation of computerised systems at the Treasury. Later computer systems were enhanced as a tool to manage processing registration of employers and employees, receiving and monitoring remittances from employers, reconciling and posting remittances to individual accounts and disbursing them to the beneficiaries, and increasing efficiency.

With the Bank, the aim was to respond effectively to increasing competition, to allow management to monitor and make prompt decisions as well as to increase efficiency in customer services.

Adoption of computer technology in the Ministry has been gradual from 1967 to 1990s and was supported extensively by expatriates through a series of projects in which the Ministry participated extensively through lower level operational staff. At the time of this study, the Ministry was at that stage of computerization that had been achieved by the Fund in 1991 and by the Bank in 1982, while the Fund is at the stage that the Bank had achieved in 1993.

Whereas the Ministry is at the stage of physical transmission of data by use of diskettes from districts to headquarters, the Fund is at the phase of electronically transmitting data from districts to headquarters through data communication line. The Bank on the other hand is directly transmitting data to and from the branches and computer centres by use of both data communication and remote control facilities.

It can be concluded therefore that in the private sector, adoption of computer technology was driven more by competition and market forces, while in the parastatals it was driven by imitation and prevailing challenges. With the Ministry, expatriates played a substantial role.

It can also be concluded that although the Ministry and the Fund computerized some of their operations earlier, at the time of this study, the Bank had reached a more advanced level of computerization, within a shorter period of time than both the Fund and the Ministry, driven by competition, intensively planned and substantially institutionalised.

4.2 CAPACITY OF COMPUTER SYSTEMS IN USE

The second hypothesis was that the missions and the objectives of computerization will determine the nature and capacity of equipment to be adopted. The purpose of the mainframe is to provide capability for the processing of large data, minicomputers to provide capability to handle processing of relatively smaller data and microcomputer to provide capability for diverse operations. Each of the categories has been characterised by advancement of chips that have a considerably high speed and substantially large memory as well as storage capacity.

Adoption of mainframes have been appropriate for processing large information and characterised by centralisation in processing and utilisation of information. Microcomputers while substantially cheaper compared to both mainframe and minicomputer have been directed to processing relatively limited information and characterised by decentralisation in operations and use of information.

Alternative strategy has been the adoption of minicomputers for processing of modest information with efforts to enhance their capacity with the microcomputers resulting

to some degree of centralization and decentralizaion in operations and use of information.

At the time of this study, the operations of the three organizations were based on the mainframes, minicomputers and microcomputers. Although the Ministry and the Fund had two mainframes each, they used only one. In the case of the Ministry, the new mainframe (Tandem) was awaiting installation. Although it was expected to be relatively advanced in technology it has not been installed over the last three years because of lack of technical expertise. Similarly, the new computer (series ME 39) at the Fund was relatively advanced in technology compared to the old one (series ME 29). The new system was not in use because of incompatibility with ME 29, which has delayed substantially the transfer of data and/or information to the new system.

While the Ministry and the Fund consolidated the use of microcomputers in the 1990s, the computers were operated independently from the mainframes. On the other hand the Bank integrated both mainframes and microcomputers to achieve both centralised and decentralised data processing.

Although mainframes were adopted later, the Bank installed greater number (9) between 1990 and 1995, while both the Ministry and the Fund maintained two (2), to support substantially large and centralised data processing and services to the customers.

While the Ministry and the Bank had not used minicomputers over the last 10 years, the Fund had used a substantial number of minicomputers reflecting a strategy to adopt intermediate technology at the Fund and efforts to deal with inefficiency arising from the use of their mainframe. Indeed, the mainframe at the Fund was deployed to registration of contributing members, their returns as well as subsequent inquiry and payment. The software in use was a non-relational database, rather a file, characterized by inability to match registered members and their returns.

Increasingly, operations in the three organizations were supported by minicomputers in which the Bank had consistently the largest number, followed by the Fund and then the Ministry. Microcomputers with attendant network enhanced simultaneous centralization and decentralization of operations and facilitated, considerably, institutionalization of computer systems due to their relatively low investment costs.

With its oldest IBM 370 Model, the Ministry had computing capacity of 4.5 Gigabytes throughout the 1970s and 1980s. The new computer, Tandem, acquired after 1990s, had three times capacity, i.e. 13.5 GB bringing to a total of 18 GB of capacity in which only 25% was utilized. In the case of the Fund, its oldest mainframe (ICL ME 29) had a computing capacity of 1.4 GB and the new computer (ICL M series 39) had a capacity of 4.6 GB for a total of 6.00 GB of capacity in which 30% was utlized. In the case of the Bank each of the mainframe computer had the capacity of 5 GB which provided a total capacity of (5x9) 45 GB in which 65%

was utilized. Table 4.2(a) and 4.2(b) below present capacity of the computers in use in the three organizations.

Table 4.2 (a) Mainframe storage capacity, in Gigabytes

	1985		1990		1995	
Organisation	Capacity	No.	Capacity	No.	Capacity	No.
Ministry	4.5	1	4.5	1	4.5	1
Fund	1.4	1	1.4	1	4.6	2
Bank	0	0	1.0	7	5.0	9

Source: Document extracts 1995.

While the Bank and the Ministry did not utilize minicomputers, the Fund considerably utilized them with their capacity ranging from 0.027 GB in 1985 to 0.045 GB in 1990 and 1.00 GB in 1995.

Table 4.2(b) Microcomputers storage capacity, in GB

	1985		1990		1995	
Organisation	Capacity	No.	Capacity	No.	Capacity	No.
Ministry	-	0	0.030	26	0.030	28
Fund	-	0	0.030	39	0.270	39
Bank	0.01	500	0.120	1300	2.000	3000

Source: Document extracts 1995.

Both the Ministry and the Fund had not acquired microcomputers by 1985. In the Ministry, the capacity of microcomputers remained the same in 1990 and 1995. In the Fund the capacity increased from 0.030 GB in 1990 to 0.270 GB in 1995. In the Bank the capacity of microcomputers increased consistently from 0.010 GB in 1985 to 0.120 in 1990 and 2 GB in 1995.

While it is noted that the capacity of equipment may in a way reflect the nature of business, principally, the data supports the prediction that the missions and objectives of computerization will determine the nature and capacity of equipment to be adopted. The Ministry's strategy was in a form of reaction to management requirements for financial management. The Fund adopted more of imitation strategy thus introducing limited changes to the systems that were initiated at the Treasury. The Bank purposely responded to requirements for competitive operations and planned strategy.

4.3 NATURE OF COMPUTERIZATION

The third prediction in this study was that policies and management practices adopted by different organizations will influence the nature of computerization. This prediction was examined using three sub-hypotheses (or indicators), namely the level of investment, the level of integration and the level of capacity utilization.

4.3.1 INVESTMENT LEVEL

The first indicator with respect to the influence of organization on the nature of computerization was the level of investment with the prediction that different types of

organization will be associated with different levels of investment. The data in Table 4.3.1 reflect the levels of investment in the three organizations over the 10 years under study.

Table 4.3.1 Level of investment (KShs) in the three organizations 1985 to 1995.

Organization	1985	1990	1995
Ministry	147,000	180,000	2,720,000
Fund	6,110,660	5,586,060	14,210,800
Bank	100,000,000	300,000,000	13,000,000,000

Source: Document extracts, 1995.

First, it can be noted that the data supports the prediction. Over the last 10 years, 1985-1995, the level of investment was different in the three organizations. The level of investment in the Ministry was consistently lower than in the Fund and the Bank. Conversely, the level of investment in the Bank remained consistently higher compared to the other two organizations. Indeed, the data indicate that the ratio of the Ministry to the Bank was 1:680, in 1985, 1:1,667, in 1990, and 1:4,780 in 1995 indicating that the Bank invested consistently higher than the Ministry.

Secondly, it can be noted that the level of investment has been increasing in all the three firms. There was a remarkable increase in the level of investment in the Ministry from Kshs 180,000 in 1990 to 2,720,000 1995 by a factor of 15.1 reflecting

intensified and expanded use of computer technology and also efforts to institutionalize the use of computer systems.

Thirdly, in the case of the Fund, the level of investment reduced from Kshs 6,110,000 in 1985 to Ksh 5,586,060 or by a factor of 0.91 in 1990 attributed to initial acquisition of computer systems followed by low levels of maintenance and upgrading. The investment in 1995 is substantially higher compared to the previous years because of expanded use of the computer technology at the headquarters and the regional offices aimed at strengthening the use of computer for registration of members and inquiries.

Fourthly, with respect to the Bank, the level of investment increased substantially between 1990 and 1995, i.e. from Ksh 300,000,000 to Ksh 13,000,000,000 or by a factor of 43.3, reflecting intensified and expanded use of computer technology during its overall modernisation programme. It involved equipping the Computer Centres and acquisition of integrated software for enhanced customer services notably deposits and withdrawal services.

4.3.2 LEVEL OF INTEGRATION

The second indicator (sub-hypothesis) with respect to the influence of organizations on the nature of computerization concerned the level in which software application and data processing have been integrated.

As already noted integration of software application and information processing reflects higher level of computer use (Petterson 1990, 1991) and that single user systems reflect absence of integration, while network and inquiry usage reflect intermediate integration, and real-time reflects fully integrated systems. Subsequently, the prediction was that the nature and objectives of computerization will determine the level of integration in the use of computer systems. The level of integration in the Ministry over the 10 years under study is summarised in Table 4.3.2(a)

Table 4.3.2(a) Nature of system in use in the Ministry of Finance, 1985 – 1995

Nature of system	1985	1990	1995
Single user	x	x	x
Batch processing	x	x	x
Inquiry	-	x	x
Network batch	-	-	-
Network inquiry	-	-	-
Real time	-	-	-

Source: Document extract AG, 1995.

Key: x present - Not present

The data in Table 4.3.2(a) indicate that in 1985, the Ministry had single user operated essentially on batch processing, while inquiry capabilities were introduced in 1990. These data indicate that until 1995 the Ministry was operating at low levels of integration.

The level of integration at the Fund in the last 10 years is summarised in Table 4.3.2(b).

Table 4.3.2(b) Nature of system in use in NSSF, 1985 – 1995

Nature of system	1985	1990	1995
Single user	x	x	x
Batch processing	x	x	x
Inquiry	x	x	x
Network batch	-	x	x
Network inquiry	-	x	x
Real time	-	-	-

Source: Document extracts NSSF, 1995.

As reflected in Table 4.3.2(b), while it was still performing a wide range of tasks with single-users and batch processing systems, in 1990 the Fund adopted a network system for processing of data and inquiry of information thereby achieving a considerable level of integration. Indeed, during this study the Fund had completed its experimentation with Oracle based accounting system as a relational database aimed at enhancing integration.

The level of integration at the Bank in the last 10 years is summarised in Table 4.3.2(c) below.

Table 4.3.2 (C) Nature of systems in use in Barclays Bank, 1985-1995

Nature of system	1985	1990	1995
Single user	x	x	x
Batch processing	x	x	x
Inquiry	-	x	x
Network batch	-	x	x
Network inquiry	-	x	x
Real-time	-	-	x

Source: Document extract BBK, 1995.

As indicated in Table 4.3.2(c), the Bank over the last ten years shifted from using single user and batch processing to using network and real-time systems, a level of advanced integration of the computer system in information processing.

In summary, the data supports the hypothesis that the three organizations will be characterised by different levels of integration. The Ministry was characterized by relatively lower levels of integration while the Fund was characterized by intermediate level and the Bank by advanced level.

The level of integration was also examined using the type of application in use. The argument, as advanced by Petterson (1989), was that the type of applications in use reflect the level of integration and use of computer technology. According to this

argument, common applications, such as word processors and spreadsheets, reflect lower levels of integration as compared to the use of database systems. Integrated database systems reflect a relatively higher level of integration and computer use.

The types of software in use at the Ministry during the 10 years under study are presented in table 4.3.2.1. It will be noted that most of the operations in the Ministry were based on single-user software.

Table 4.3.2.1. Percentage coverage of functions in the Ministry, 1985-1995

Type of application	1985	1990	1995
Application software	10	20	20
Data bases	10	10	20
Integrated systems	0	0	0
Total Percentage	20	30	40

Source: Document extracts, MOF 1995.

In 1985, 20% of the operations at the Ministry were computerized, of which 10% were based on database systems and 10% on relatively simple software. In 1990, computerization had covered 30% of the operations in which 20% were based on simple applications. In 1995, computerization had expanded to cover 40% of the operations and in which 20% were based on the database system. More importantly, the Ministry had not installed an integrated system, although plans for such a system had been made.

The types of software in use at the Fund in the last 10 years are presented in Table 4.3.2.2. It will be noted that 10% of the Fund operations were based on integrated software in 1990 and 1995.

Table 4.3.2.2. Percentage coverage of functions in NSSF, 1985-1995

Type of application	1985	1990	1995
Applications software	5	20	20
Database	10	10	20
Integrated systems	0	10	10
Total percentage	15	40	50

Source: Document extracts, NSSF 1995

In 1985, 15% of the operations at the Fund were computerized and most of them (10%) were based on database system. In 1990, 40% of the operations had been computerized with 20% based on an application software. Indeed during this period stand-alone PCs had been increased substantially. However, 10% of the operations were based on integrated systems arising from enhanced compterization of the members' registration returns and payments. In 1995, 50% of operations had been computerized in which 20% were on database, actually a masterfile for remittances of the contribution and subsequent posting and inquiries.

The type of software in use at the Bank during the 10 years under study is presented in table 4.3.2.3. It will be noted that 40% of the Bank operations were on integrated systems in 1995, largely on customer deposits and withdrawals.

Table 4.3.2.3. Percentage coverage of functions in Barclays, 1985-1995

Type of application	1985	1990	1995
Applications software	20	20	20
Databases	10	20	10
Integrated systems	0	10	40
Total percentage	30	50	70

Source: Document extracts BBK, 1995.

In 1985, 30% of the Bank's operations were computerized in which 20% were based on application software and 10% on database system. In 1990, 50% of the operations at the bank had been computerized with notable increase (20%) based on databases. By 1995, 70% of the Bank's operations had been computerized, most (40%) based on integrated systems.

With respect to the foregoing observations, the data supports the hypothesis that different organizations will be characterized by different levels of computer use and/or integration. Once again the Ministry is characterized by the lowest level of integration while the Bank is characterized by the highest level of integration.

4.3.3 LEVEL OF CAPACITY UTILIZATION

The fourth indicator (sub-hypothesis) on the influence of the policies of different organizations on the nature of computerization concerned capacity utilization.

As noted by Petterson (1990, 1991) adoption of computers in developing countries has been accompanied by low levels of utilization. Accordingly, it was hypothesised in this study that different organizations will be characterized by different levels of capacity utilization because of their policies and their management practices. More specifically, it was predicted that the Bank will have relatively higher use of computing capacity as compared to the Fund and the Ministry because of differences in institutional arrangements. Table 4.3.4(a) below presents the summary on capacity utilization while Table 4.3.4(b) presents the average number of hours of computer use in the three firms over the 10 years under study.

Table 4.3.4(a) Summary of percentage capacity utilization

Organization	1985	1990	1995
Ministry	20	30	40
Fund	15	40	50
Bank	30	50	70

Source: Survey data

Table 4.3.4(b) Average hours of computer use per day

Organization	1995	1990	1995
MOF	2	5	8
NSSF	5	8	16
BBK	10	16	20

Source: Document extracts

Although table 4.3.4(b) shows that the hours in which computer systems are used has been increasing in the three organizations, it was low in the Ministry compared to the Fund and the Bank. This is because whereas in the Ministry data capture is done at the district level and diskettes brought physically to the Headquarters on a weekly basis, in the case of the Fund, registration and receipting is carried out daily at the area offices and data are transmitted to the headquarters for processing the same day. The same case applies to the Bank where transactions are carried out at the branches and transmitted to the computer centre for processing and updating the same day.

Another arrangement that enhanced use of computers at the Bank involved diversification of operations and services offered. This contributed to the high level of capacity utilization in the Bank. For instance, in computer centres, computer systems are in use for an average of 24 hours compared to 14 hours in branches and 24 hours in card centres. ATMs are also in use 24 hours daily.

It can therefore be concluded that the average hours of computer use in the three organizations support the hypothesis that the three organizations will be characterized by different levels of computer use because of different strategies towards institutionalization of computer use.

4.4 IMPACT OF COMPUTERIZATION

The fourth hypothesis was that the nature and extent of computerization will determine the level of performance in the target critical missions and tasks. Specifically, the study was concerned with impact of organizational performance on two areas namely; impact on processing and impact on the processing duration.

4.4.1 IMPACT ON PROCESSING

It was expected that with computerization, efficiency will be improved leading to a remarkable reduction in both the processes involved in carrying out particular target tasks as well as the duration taken.

Steps that were carried out in district cash flow at the Ministry before and after enhanced computerization are presented in table 4.4.1(a). Before computerization, processing of payments involved six steps as compared to three after computerization.

Table 4.4.1(a) Processes in carrying out operations at the Ministry

Before computerization	After computerization
1. Arranging three class accounts	1. Reading of diskette
2. Posting in three forms	2. Reconciliation
3. Adding of figures manually	3. Payment
4. Counter checking with summary	
5. Checking of vote book	
6. Voucher writing/Payment	

Source: Survey data AG, 1995.

Before computerization, processing of District Cash Float involved arranging of accounts and expenditure in three categories labelled as classes. In each of the categories the following was done. Arranging 3 classes of accounts, posting in forms, verifying figures with adding machines, checking if they tally with the summary from the districts, checking of the vote book and finally payment. With computerized system most of the information were retrieved and stored in a diskette in which figures were checked against the districts' summary and the vote book and then payments were made.

Also in the Ministry, reimbursement of district cash float used to be carried out on a monthly basis and because of computerization these transactions were carried out on a weekly basis. In this respect reduction occurred on two aspects: on steps involved, and on the time spent on the carrying out these operations.

In the case of the Bank one of the critical mission was to offer better customer services to individual and corporate customers. Adoption of Front Office Services in 1994 through computerization made the operations faster as presented in the table below.

Table 4.4.1(b) Processes involved in paying customers in the branches (Barclays)

Before introduction of FOS	After introduction of FOS
1. Client queues	1. Cashier verifies details and pays
2. Cashier stamps	
3. Authorization	
4. Cashier pays	

Source: Survey data BBK, 1995.

It can be noted that 4.4.1(b) that before computerization payment to customers would begin with the cashier who stamped and forwarded cheques or withdrawal slips to authorizing officer and then back to the cashier for payments. With computerized systems the cashier verifies the balances and relevant details on the terminal and payments are made right away. Besides reducing the processes, this also reduced the queues, which had been substantially long. It is however important to note that during initial stages of enhanced substantially long. It is however important to note that during initial stages of enhanced computerization, queuing tended to cause delay as tellers learnt how to use the system. Queues were reduced further at the branches through combination of FOS, ATMs and use of integrated systems.

At the Card Centre, adoption of Electronic Transfer at Point of Sale (ETPOS) which entailed instant validation of cards eliminated physical movement of cash. Before adoption of ETPOS, postings were carried out manually and records would be mailed to USA or London through DHL. With computerization these processes were eliminated making the system more efficient. Manual printing and posting were eliminated. With Point Of Sale (POS) the records are copied and accessed electronically by use of visa net access point which reduced the processes remarkably as summarized in the Table 4.4.1(c) below.

Table 4.4.1(c) Processes in carrying out operations in Card Centre (Barclays)

Before computerization	After computerization
1. Manual posting	1. All transactions are done electronically then payment
2. Printing	
3. Mailing of records	
4. Authorization	
5. Payment	

Source: Survey data BBK, 1995.

With introduction of the Automated Tele-Machines (ATMs) at the Bank, referral of clients withdrawals to their account branches were eliminated such that clients could withdraw from any branch at anytime. Computerized systems involve automatic debiting and crediting of accounts.

4.4.2 PROCESSING DURATION

As will be recalled, the other component of impact of computerization on organizational performance was on the reduction of time taken to carry out critical missions in the three organizations. The summary is presented in Table 4.4.2

Table 4.4.2 Duration of processing critical operations (days)

Organization	Nature of operation	Before	After
AG	District Cash Float	30	7
NSSF	Payment of Benefits	120	20
BBK	Production of balances	1	mins

Source: Survey data, 1995.

With respect to the Ministry, it can be noted from Table 4.4.2 above that the time spent in processing reimbursement of District Cash Float was reduced remarkably from batch processing of 30 days to batch processing of 7 days. At the headquarters also when all the records were correct, districts could be reimbursed on the same day of presentation of claims.

In the case of the Fund, contributors received their benefits within a maximum of 20 days as compared to 120 days before computerization. Also when all the records were correct, this process would take 7 days. With enhanced computerization also they were able to inquire and be provided with the status of members contributions instantly.

Also due to computerization, data capture in registration has reduced the process from 120 days to 5 days. In member registration, companies that have computerized their systems send their returns in print outs form and also through floppy diskettes. In case of a member changing an employer it became faster to effect the changes from previously 60 days to 5 days.

In case of the Bank, after computerization, customers were provided with their balances promptly as compared to before when they would wait for a day for their accounts to be updated in order to be provided with balances.

From the foregoing it is clear that the number of processes involved in carrying out particular operations were reduced. Due to computerization also time taken reduced remarkably therefore increasing efficiency and timeliness. It can therefore be concluded that enhanced computerisation led to increased efficiency and organizational performance in carrying out critical missions of the three organizations.

It is however interesting to note that although computerization led to reduction of processes involved in carrying out particular operations in all the firms, elimination of positions occurred only in the Bank.

The findings of this study also revealed that besides the impact of computers on organizational performance and labour structure, aspects of change in organizational structure were experienced.

In the Ministry, computerization led to creation of other sections. For example, in the late 1960s Government Computer Services was created to support computerization within the Ministry and overall government computerization. Creation of GCS however led to establishment of divisional head, programmers, systems analysts, operators and technicians. Indeed, the scheme of service for computer professionals adoption in 1970s was precipitated by GCS.

In addition, in 1985 Microcomputer Information Systems Division (MISD) was established. The purpose was essentially to support computerization of operations in the Ministry and particularly in the AGs department. The need to support computerization led to creation of a new establishment (MISD) consisting of systems analysts, programmers and technicians.

In the case of the Fund, computerization was supported initially by a small section under the Finance Department. In order to support intensified and expanded computerization, the section was upgraded to a full department, which led to establishments of new positions for system analysts, programmers, technicians and a computer manager.

In 1988, the department had only 3 main sections, namely programming, maintenance and systems analysis. With the expansion of computerization, two more sections were added, namely administration system and software operation sections to make a total of 5 sections. It is however important to note that the changes were within the computer department. It was enhancement of computing capacity that resulted in the creation of various sections within the Computer department.

Decentralization of activities in the Fund also led to the introduction of cash and receipting in regional offices. As a result of this, more positions were created. These included data machine operators, area officers and station inspectors in which about a staff of 30 was recruited to fill the new positions.

In the case of the Bank, computerization affected organizational structure in a number of ways. First was through growth in related departments, notably the Card Centre; establishment of the Card Centre led to recruitment of staff to facilitate better customer service for card users.

Secondly, due to adoption of Front Office System (FOS) in 1994 officers who used to authorize the payments of cheques were redeployed to the back office. Each of the major branches had 5 authorization officers while the medium and small branches had 3 each.

Besides the changes occurring within the branches, computer centres were established to support computerized functions in the branches. This led to creation of new posts including computer centres co-ordinators,, shift leaders, site controllers, a conversion team and data communication managers.

However, it should be noted that although computerization led to creation of new positions in all the three organizations over the last 10 years, centralization of operations at the Bank led to elimination of some posts. This involved closing up of Nyeri and Kisumu computer centres and subsequent re-deployment of the site controllers and shift co-ordinators who were in these centres.

It is important to note that although there was physical centralization of processing, there was also actual decentralization in use of information. Transmission of information was carried out through electronic transfer for use and decision-making at the branches.

4.5 IMPACT ON LABOUR

The second component of the impact of computerization was on labour requirements. The hypothesis was that the nature and extent of computerization and attendant policies will determine the impact on labour structure. In this respect, impact of computerization on labour was examined on two dimensions: labour patterns and labour requirements.

Labour patterns was considered in terms of the trends observed in the number of staff in various job categories with the aim of assessing changes in recruitment and/or displacement of staff as a result of computerization in the three organizations.

In order to understand trends in labour patterns, the overall number of employees in the three organizations was examined. Tables 4.5(a) to 4.5(c) present employees by various categories in the 10 years under study. In the case of the Ministry, the overall number of employees at the headquarters has remained static in the 10 years under study.

Table 4.5(a) Employment at the Ministry

Category	1985	1990	1995
Senior management	16	16	16
Middle management	27	27	27
Supervisory cadre	21	21	21
Operational cadre	36	36	36
Total Percentage Total Number	100% (N=67)	100% (N=67)	100% (N=67)

Source: Document extract AG, 1995.

Furthermore, it can be noted from the Table 4.5(a) that the proportion of employees remained static in all job categories over the 10 years. Operational cadre constituted the highest percentage of staff (36%) while senior management had the least (16%). Given that intensified and expanded computerization was carried out during this

period, it can be concluded that the technology had negligible effects on overall recruitment as well as deployment of staff. However, because responsibilities and operations expanded during this period, it can be argued that computerization may have constrained expansion in the recruitment.

With respect to the Fund, there was remarkable increase in the total number of employees over the 10 years, showing an increase of 60% (678 to 1084) between 1985 and 1990 and an increase of 56% (1084 to 1690) between 1990 and 1995.

Table 4.5(b) Employment at NSSF

Category	1985	1990	1995
Senior Management	6	5	4
Middle Management	37	28	26
Supervisory Cadre	17	22	26
Operational cadre	40	45	44
Total	100% (N=678)	100% (N=1084)	100% (N=1690)

Source: Document extracts NSSF, 1995.

It can be noted from Table 4.5(b) that in the Fund, the operational and middle management cadre constituted the highest proportion of staff over the 10 years under study. Whereas the proportion of senior management and middle management tended to decrease over the period that of supervisory cadre and operational cadre increased from 17% to 26% and 40% to 44% respectively.

In the case of the Bank, overall number of staff increased between 1985 and 1990 and remained nearly constant between 1990 and 1995. The increase in the overall number was basically due to expanded operations and use of technology to cover limited aspects of the operations. It can be concluded, therefore, that after advanced computerization, the rate of labour recruitment was negligible.

Table 4.5(c) Employment at Barclays

Category	1985	1990	1995
Senior Management	3	3	2
Middle Management	6	6	5
Supervisory Cadre	8	8	14
Operational cadre	83	84	79
Total	100% (N=2955)	100% (N=3268)	100% (N=3513)

Source: Document extracts BBK, 1995.

It can be noted from Table 4.5(c) that there was no change in the proportion of staff in all job categories in the Bank between 1985 and 1990.

It is interesting, however, to note that the proportion decreased in each job categories between 1990 and 1995. The notable exception was with the supervisory cadre, which increased from 8% in 1990 to 14% in 1995. These changes reflect the impact of computer technology, which eliminated repetitive jobs and those in operations, were promoted to the level of supervisors.

In summary the number of employees in the Ministry did not show notable changes in all job categories over the 10 years under study. In the case of the Fund there was remarkable increase in the number of employees at all cadres except middle management. Principally, this increase was attributed to two factors: first, the change in organizational structure that was brought about by change of ownership from governmental to parastatal institution in 1988, and second, the general expansion in responsibilities, functions and operations.

Besides the increase in the entire number of employees, the trend observed in various categories of the Bank remained the same between 1985 and 1990. There was however a notable decrease between 1990 and 1995 that can be attributed to computerization as well as other structural adjustment measures.

From the foregoing observations it can be concluded that adoption of computer technology seems to have no negative impact on governmental and parastatal institutions while indeed there is substantial effect on the private organizations. This is because of different policies and different level of utilization of computer system in the three organizations.

4.6 CHANGES IN LABOUR INTAKE

For more insight into the trends in labour pattern in the three organizations, the numbers of labour intake in 1985, 1990 and 1995 were examined. As can be observed in Table 4.5(a) the overall number of personnel and the number of personnel

in various categories at AG remained stable. Indeed, the Department reported that no substantial recruitment was carried out during the period under consideration.

In the case of the Fund, staff increased by 38% (407) in 1990 and also by 36% (606) in 1995 as shown in Table 4.6(a). The increase that occurred prior to 1990 reflected expansion of operations whereas decline in 1995 reflected on the impact of computerization.

Table 4.6(a) Percentage labour intake for NSSF

Category	1990	1995
Senior Management	3	2
Middle Management	13	22
Supervisory Cadre	30	33
Operational Cadre	53	42
Total	100 (N=407)	100 (N=606)

Sources: Document extracts NSSF, 1995.

In terms of various job categories, the highest increase in 1990 occurred among operational and supervisory cadres, 53% and 30% respectively (Table 4.6(a)). Similar patterns were observed in 1995 with notable increase in the middle management. More important, operational cadre was characterized by a decline from 53% in 1990 to 42% in 1995, while both supervisory and middle management increased. The increase in both supervisory and middle management cadres can be attributed to intensified and expanded computerization.

With respect to the Bank, notable increase in labour intake was experienced between 1990 and 1995 with an exception of operational cadre.

Table 4.6(b) Percentage labour intake for Barclays

Category	1990	1995
Senior Management	1	5
Middle Management	2	6
Supervisory cadre	1	3
Operational cadre	96	85
Total	100% (N=351)	100% (N=116)

Source: Document extracts BBK, 1995.

In terms of categories the highest proportion of staff intake occurred among operational cadre in 1990 and among the middle management in the year 1995. However, there was notable decrease among the staff in the operational cadre. It is in the early 1990s that the Bank introduced the use of integrated systems notably data communication and FOS. This decline therefore is an indication of the impact of enhanced computer systems on labour.

From the foregoing it is to be noted that the pattern of staff observed in Table 4.6(a) and 4.6(b) indicates that there was an increase in the middle and supervisory cadre in both the Fund and the Bank. In the case of the senior management cadre an increase occurred in the Bank while in the Fund there was a decrease. This is because the

Bank is at an integrated level of computer use while the Fund is at the level of databases. This indicates that with advanced levels of computer use more jobs are created at higher posts, i.e. senior management and middle management.

There was a remarkable decline among the operational cadre in both the Fund and the Bank (Tables 4.6(a) and 4.6(b)). This remarkable reduction indicates that the operational cadre is the most vulnerable to computerization, this is essentially so because computerization absorbs most of repetitive tasks.

In addition, with respect to the Bank, there were incidents of direct impact of computerization that led to 33 members of staff loosing their jobs through voluntary resignations. This occurred in 1995 and involved 4 middle management staff, 9 supervisory staff and 20 operational staff.

From the above discussions it is clear that computerization has led to different changes in labour patterns in the three firms. Of importance is the negligible increase in overall number of staff coupled with decrease in intake at various job categories. Worth noting also is the fact that employment occurred in particular areas. Expansion was mostly in computer related areas, notably programming, engineering, systems support and machine operations.

4.7 IMPACT ON SKILLS REQUIREMENTS

The other anticipated impact of computerization was on skill requirements. It has been argued (Oyomno 1991) that new technology demands skills and competencies required to use and maintain it. Labour requirements was considered in terms of the training activities that organizations have carried out in response to various skills requirements.

In this respect, the number of staff who received general training in the three firms was examined and the findings are presented in Tables 4.7(a) to 4.7(c). In the case of the Ministry, the proportion of the staff trained increased consistently in all job categories between 1985 and 1990.

Table 4.7(a) Percentage of staff trained in various areas in the Ministry

Category	1985	1990	1995
Senior Management	18	12	14.3
Middle Management	29.4	32.7	28.6
Supervisory cadre	18	23.1	20.4
Operational cadre	35.2	32.7	36.7

Source: Document extracts AG, 1995.

The highest proportion of trained staff was among middle management cadres and operational staff. This is because the Ministry utilised to a great extent the services of operational staff during institutionalisation of computers.

In the case of the Fund, with the exception of the senior management cadre, the training has been much less consistent as can be seen in Table 4.7(b).

Table 4.7 (b) Percentage of staff trained in various areas in NSSF

Category	1985	1990	1995
Senior Management	25	24	32.2
Middle Management	25	20	48.3
Supervisory cadre	33.3	40	19.3
Operational cadre	16.6	16	0

Source: Document extracts NSSF, 1995.

Whereas there was an increase in the percentage of the staff trained among the senior management and middle management between 1990 and 1995, there was a remarkable decrease in the supervisory cadre. Indeed, no general training was carried out among the operational staff.

The general training was essentially orientation of new staff and also orientation to strategic planning for expanding operations of the Fund. Some of the training programmes were based at the institutions and others were organized internally aimed at achieving the corporate mission of the Fund. The senior management and middle management staff had training on managerial skills and human resource management. Emphasis of the training was on planning and execution of operations.

It can be concluded therefore that the Fund has given limited attention to the training of the supervisory and operational cadre. Indeed, available reports indicate that these cadres tend to organize their own training.

In the case of the Bank, the proportion of staff trained annually increased systematically over the last ten years in which over 50% and 40% were senior and middle management cadres respectively in 1995, (Table 4.7(c)).

Table 4.7(c) Percentage of staff trained in various areas in Barclays

Category	1985	1990	1995
Senior Management	32	47	54
Middle Management	38	42	45
Supervisory cadre	21	34	36
Operational cadre	13	18	27

Source: Document extracts BBK, 1995.

The increase in training of staff witnessed in the last five years, 1990-1995, was mainly as a response to extensive restructuring programme carried out by the Bank.

Although most of the training programmes in the Bank was institutional, in-house training alongside refresher courses were also conducted on banking and customer service. In addition, substantial number of supervisory and operational cadres went through various training programmes aimed at improving their skills and efficiency of operations.

It can be concluded, therefore, that the Bank trained a larger proportion of staff in various categories as compared to the Ministry and the Fund. It is however surprising that the proportion of trained personnel in the Ministry is considerably higher than those of the Fund.

4.7.1 COST OF TRAINING

This study also examined expenses towards training activities in the three organizations over the 10 years of study in order to identify the level of investment on institutionalization of new technologies or procedures of operations. Table 4.7.1 summarizes the expenditure for general training by the Ministry, the Fund and the Bank.

Table 4.7.1 Cost of general training (Kshs)

Organization	1985	1990	1995
Ministry	3,000,000	3,000,000	5,000,000
Fund	500,000	500,000	15,000,000
Bank	5,000,000	120,000,000	350,000,000

Source: Document extracts, AG, NSSF and BBK 1995.

It can be noted from Table 4.7.1 that the cost of training in the Ministry and the Fund remained the same between 1985 and 1990. For the Bank, the level of investment of training has been increasing throughout the 10 years. There was remarkable increase

in NSSF and BBK between 1990 and 1995 because reforms towards intensified computerization were being carried out.

We have examined trends in the three organizations with respect to general training. Our other concern was specifically with computer training in order to identify the extent to which these organizations have created necessary computing skills. One of the indicators for this aspect was training of staff on computer literacy, use and proficiency.

Available data indicate that the Ministry carried out training related to computer use and management in 1990 and 1995, Table 4.8(a).

Table 4.8(a) Percentage staff trained in computer at the Ministry

Category	1985	1990	1995
Senior Management	0	20.7	50
Middle Management	0	11.3	30
Supervisory cadre	0	22.6	20
Operational cadre	0	45.2	0

Source: Document extracts AG, 1995.

In 1990 the operational cadre and supervisory cadre constituted the highest proportion of personnel trained in computer technology, while the middle management cadre had the least. This was the case because in 1990 the staff in the operational cadre were the main computer operative unit and managers were essentially non-computer users.

Hence, the training emphasised operational cadre. The Ministry therefore, institutionalized adoption of computer technology essentially through operational cadre.

In 1995, there were efforts to involve senior management cadre in management and use of computers. This was particularly due to gradual withdrawal of expatriates. The professional cadre therefore, never participated actively in the adoption and use of computer technology.

In 1990, programmes on computer training were carried out involving 20.7% senior management staff, 11.3% of middle management cadre, and 22.6% of supervisory cadre. The operational cadre had the highest proportion of staff trained (45.2%). Indeed, these training programmes were carried out to enhance capacity at various levels for the use of computer systems. In 1995, training programmes continued involving 50% of senior management staff, 30% middle management and 20% of supervisory. There was notable decline in the proportion of operational cadre trained from 45.2% to 0% in 1990 and 1995 respectively.

Training in the Ministry was carried out at three levels and was organized through sponsorship to computer training institutions accompanied by in-house training. The first level of training involved basic operational skills such as introduction to micros, word processing and spreadsheets. The second level included training on database and its management. In the third phase computer training was conducted for

managers. This was basically on database management and analysis using spreadsheets.

In addition to general training on application packages, there was training for specific tasks. Those in PMG were trained on DECX1 (District Expenditure Control System 1). They intend to move to DECX2 for itemisation of different votes allocated for each ministry. Those in banking section of PMG were trained on banking reconciliation monitoring system and accounting systems. Those who were in GCS and working directly with staff in AGs office were trained on computer programming.

While substantial training was conducted during and after computerization, most of those trained by the government left the Ministry and joined private firms. Indeed one factor that has tended to slow development of capacity and institutionalisation of computer systems in the Ministry has been the exodus of computer staff from the Ministry to the private sector. Discussions with senior staff indicated the differences in terms of employment as the main cause of exodus. This exodus was most notable among the programmers in which 6 left out of the 8 programmers trained in 1988. In 1990, 6 out of 6 trained programmers left, and in 1994, 8 out of 10 trained programmers left.

This tendency has been reported in other studies (Oyomno 1991) which observed that the Ministry was loosing trained programmers to the private sector. Exodus leaves

the Ministry without capacity to develop and expand database systems required for intensified use of the technology and desired institutionalization.

These observations point to the absence of policy initiative and incentive required to be able to retain staff after training. As a result, the Ministry is compelled to hire highly expensive expertise for both system development and maintenance in the adoption of computer technology.

In the case of the Fund no substantial computer training was carried out in 1985 and 1990. However, in 1995, intensive computer training programmes were carried out for the senior management cadre and supervisory cadre, (Table 4.8(b)).

Table 4.8(b) Percentage of staff trained in computer in NSSF

Category	1985	1990	1995
Senior Management	14.2	0	33.5
Middle Management	42.8	66.6	7.6
Supervisory cadre	42.8	0	57.2
Operational cadre	0	33.3	1.52

Source: Document extracts NSSF, 1995.

In the Fund, a total of 7 and 6 staff received computer training in 1985 and 1990 respectively. There was however a remarkable increase in 1995 whereby the number rose to 131.

Table 4.8(b) above shows that in 1985 limited training programmes were carried out involving only 1 (14.2%) senior staff, 3 (42.8%) middle management staff and 3 (42.8%) supervisory staff. It will be noted that no operational staff were trained in NSSF that year. During this period the need for computer training was limited because the Fund was still part of the Ministry.

Minimal computer training was also carried out in 1990 in contrast to substantial training that was carried out in 1995. The training in 1995 involved 44 senior management staff i.e. (33.5%), 10 middle management staff i.e. (7.6%) and 75 supervisory staff i.e. (57.2%) of the trained staff.

These training programmes covered all managers and all secretaries with the aim of equipping the staff for effective use of systems especially after introduction of data capture on member registration and cash receipting in 1994.

Besides sponsorship to University of Nairobi, Institute of Computer Studies (ICS) and private sector training institutions, most of the training programmes involved workshops and seminars on information systems development, microcomputer database management systems, computer networks and structured systems development. The training for the secretaries concentrated on documentation services and application packages like Word Processing, Lotus and Dbase.

Table 4.8(c) Percentage of staff trained in computer in Barclays

Category	1985	1990	1995
Senior Management	2.7	2.9	2.7
Middle Management	5.6	6.3	5.3
Supervisory cadre	8.2	8.7	16
Operational cadre	83.4	82.1	76

Source: Document extracts BBK, 1995.

Table 4.8(c) indicates that the Bank carried out substantial training on computer courses within the 10 years under study. Indeed training on computer applications and use covered all senior and middle management cadre staff over time. A substantial percentage of supervisory cadres were also trained because staff were required for supervision of both manpower and systems as a result of enhanced computerization including adoption of FOS and integrated systems. For the operational cadre the number trained has been decreasing over the last 10 years. It will be noted that this is consistent with the decrease in percentage intake and the total number of employees in this cadre as seen earlier in the findings.

Training in the Bank starts at operational level and progresses to training for specific duties. After computerization, the Bank embarked on a thorough training programme. Aptitude tests were carried out involving the first three initial intakes in IT division and those who excelled well were trained and taken to computer centres.

The training programmes in BBK are mostly a continuous process and in areas such as Unix, Itx, DOS, Dbase and Oracle. Those at the Card Centre are trained on use of POS, use of IQ, Lotus and a special software for imposing cards as well as refresher courses on strategic planning and system implementation.

These observations point to the fact that training on computer has been an important component of computerization at the Bank. Although training was carried out in all the three firms, it was more specific in AG and BBK as compared to NSSF because after becoming a parastal in 1988, the Fund imitated computer systems adopted from GCS in which they did not introduce substantial changes.

Also, whereas most of computer training conducted in the AG was mainly on operations, application packages and programming, in NSSF computer training was mainly on database management and information systems. In the case of the Bank, it started at operational level and progressed to integrated systems. The Bank also embarked on a thorough training programme during and after enhanced computerization reflecting trends on level of integration and capacity utilization.

Also for more insight into capacity building through training, expenditure on computer training was examined for the three firms. It is assumed that the higher the amount spent on computer training, the higher the level of computer adoption and the higher the impact on skill requirements.

Table 4.9 Cost of computer training in the three organizations (Kshs)

Organization	1985	1990	1995
Ministry	All in house – 0	1,904,000	4,080,000
Fund	400,000	500,000	800,000
Bank	150,000	500,000	3,000,000

Source: Document extracts AG, NSSF and BBK, 1995.

Table 4.9 shows that in 1985 computer training in AG was in-house therefore no costs were incurred. In the case of the Fund it cost Kshs.400, 000, and in the Bank Kshs150,000. In 1990 AG spent considerable amounts of money compared to NSSF and BBK which spent Kshs.500, 000 each. This is because all senior and operational staff were trained and a substantial number of middle management and supervisory cadre were also trained. It should also be noted that during the year, focus had been diverted from installation of equipment to capacity building. In 1995, the cost of computer training increased from Kshs.1, 904,000 to Kshs.4, 080,000. In NSSF it increased from Kshs 500,000 to Kshs 800,000 while in the Bank it increased from Kshs 500,000 to Kshs.3, 000,000 in 1995.

From the ongoing discussions it is clear that capacity building is an important component in institutionalization of computers. These findings show that computerization led to demand for new skills as had been predicted earlier in this study. The organizations responded to demand for new skills requirement by way of training. It is however clear that training was more consistent in the Bank and in the

Ministry than in the Fund. This also explains the high levels of expenditure on both equipment and software in the Bank as compared to NSSF and the Ministry.

CHAPTER FIVE

5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This final chapter of the report has four sections. In the first section, the summaries of the findings of the study are discussed. This discussion is organized on the basis of the issues studied, namely computerization process and objectives, scope and level of computerization and impact of computerization and on organizational performance and labour structure. The conclusions drawn from the findings of the study and the ensuing recommendations are presented in the second and third sections respectively. Areas for further study are presented in the final section.

5.2 SUMMARY

This study set out to investigate the adoption of computer technology and its impact on organizational performance and labour structure. The intention was to investigate the extent to which the organizations have computerized their operations and identify changes arising as a result of computerization.

The objective was to examine the nature of adoption of computer technology and its impact on organisational performance and labour structure in organizations that have different ownership. The main argument in this study was that the type of organization will influence the nature of computerization which in turn will influence

the nature of utilization and hence impact on organizational performance and labour structure.

With respect to the nature of computerization, it was hypothesized that policies and management practices adopted by different organizations will influence the process and the nature of computerization. In order to examine this hypothesis, three sub-hypothesis were used. These included: level of investment, level of integration, and capacity utilization.

The findings of the study show that the Bank consistently had a higher level of investment compared to the Fund and the Ministry over the last ten years. As reflected in the findings, the ratio on investment of the Ministry to the Bank was 1:4,780 in 1995, while that of the Fund to the Bank was 1:915 in 1995.

With regards to the type and capacity of computers in use, all the organizations utilized both Mainframe and Microcomputers. Minicomputers were in use only in the Fund. However, the findings show that whereas microcomputers and mainframes were used independently by both the Ministry and the Fund, the Bank integrated the use of both to achieve both centralization and decentralization of data processing. Revealed in the findings also is the high capacity of equipment in the Bank compared to the Fund and the Ministry.

With respect to the level of integration, findings indicate that the Ministry was operating at low levels of integration with simple applications and data base system. While the Fund had achieved a relatively higher level of integration with 10% of its operations based on integrated system, the Bank on the other hand was at an advanced level of integration in which 40% of its operations were based on integrated systems.

According to the findings of this study, capacity utilization and the level of integration is low in public sector as compared to parastatals and the private sector. This is as evidenced by Petterson (1991). However, since this study considered only one governmental organization, it would therefore be interesting to explore on more government organizations.

With respect to capacity utilization, it was hypothesized that the Bank would have relatively higher use of computing capacity as compared to the Fund and the Ministry. The findings support the hypothesis in that the Bank exhibited higher capacity utilization followed by the Fund. The Ministry had the lowest level of capacity utilization.

From the foregoing, it can be concluded that data supports the hypothesis that different organizations will be characterized by different nature of computerization. The level of investment and level of integration were however the greatest indicators of this difference.

As mentioned earlier, this study also aimed at investigating on the impact of computerization on organizational performance and labour structure. With regards to the first component it was hypothesized that the nature and the extent of computerization will determine the level of organizational performance.

The indicator of the impact on organizational performance was on the processes involved in carrying out various operations and the duration taken. Findings indicate that computerization of the operations in the three organizations led to substantial reduction in both time taken as well as routine processes involved in carrying out particular operations. For instance, banking transactions in Barclays Bank were reduced from four counter stops to one counter stop. In the Fund, processing and payment of benefits was reduced from 120 days to 20 days while in the Ministry, processing of District Cash Float was reduced from 30 days to 7 days.

As noted earlier on, the second component of the impact of computerization was on labour requirements. It was hypothesized that the nature of cmputerization will determine the impact on labour structure and skills requirements. With regards to labour structure, findings of this study reveal that there were no notable changes on labour in the Ministry. In the case of the Fund, notable increase of 60% was experienced in the overall number of employees between the year 1985 and 1990 and an increase of 56% between the year 1990 and 1995. Although there was a notable decrease in labour among the operational cadre in the Bank, decreases in other job categories were negligible.

With respect to skills requirements substantial training was conducted at various levels in all the three organizations over the ten years. However, the bank trained a larger proportion of staff as compared to both the Fund and the Ministry. It was also noted that the cost of training was consistently higher in the Bank than in both the Fund and the Ministry. The level of investment on training in the Ministry, however, compared favourably with that of the Fund.

The training undertaken is an indication of efforts to institutionalize computers in the organizations. This in essence led to upgrading of most clerical staff to supervisory level, hence strengthening their administrative capacity.

5.3 CONCLUSIONS

Based on the findings of this study, the following conclusions were made:

Whereas computerization in the Ministry was precipitated by urgency and need for accuracy, in the Fund, it was through imitation of computerized systems already existing at Treasury, while in the case of the Bank, it was for effective management and competition.

Also, whereas the Ministry used expatriates and operational staff in a pilot project to initiate computerization, the Bank trained its own staff and formed a conversion team for a more thorough and intensive project on computerization. These findings point to the fact that the Ministry gives room for experimentation while in the private

organizations, a rigorous and conscious effort is made towards institutionalization of technology.

With regards to the level of computerization, the Ministry is at the lowest level of computerization while the Fund is at an intermediate level of computerization. The Bank on the other hand is at an advanced level of computerization. It can therefore be concluded that private and parastatal organizations are more computerized compared to governmental organizations. These findings concur with Petterson (1990, 1991) that there is a low level of institutionalization of computers in the public sector due to bureaucracies.

Although Kraemer and Zubboff (1986) predicted substantial decrease on labour, especially at middle management cadre, the findings of this study indicate that indeed increase in labour was experienced in this cadre in the three organizations. It can therefore be concluded that due to computerization, the middle and supervisory cadre increase. This is because some of the operational staff are upgraded to the level of supervisory. Whereas the senior management cadre remained nearly the same, the operational cadre decreased. The findings of this study indicate that the operational cadre is most vulnerable category of staff essentially because computerization handles with ease repetitive jobs.

It should however be noted that there is impact on organizational and labour structure through creation of new job titles. This creation is however during the initial stages of computerization. As the system becomes more sophisticated and computerization is enhanced, few staff are employed because there is more of specialization.

The findings of this study also reveal that with computerization, there is focus on information technology literacy and change of operations. It can therefore be concluded that computerization leads to demand for new skills and competencies. Training is therefore an important component of institutionalization of computers.

Also, private and state corporations have realised the need to train their senior staff in their efforts towards institutionalization of computers. This, coupled with redeployments, has essentially cut down on displacement of labour.

5.4 RECOMMENDATIONS

In the light of findings and the conclusions of this study, the following policy recommendations are made:

First, like Ogunde (1984) and Oyomno (1989), this study recommends that the Kenya government should come up with a definite policy on computerization.

This study also recommends that the Kenya Government should review and develop a scheme of service for its computer personnel. This will alleviate the current problem of mass exodus of computer personnel from the public sector to the private sector after training and subsequently cut on huge spending on expatriates.

It is also recommended that organizations should embark on thorough training programmes upon adoption of any form of technology to enable manpower to effectively co-exist with technology.

5.5 AREAS FOR FURTHER RESEARCH

Conclusions form this study are based on large organizations. There is therefore need to address the same problem focusing on smaller organizations. This might yield different results.

This study also investigated on adoption of computer technology and its impact on organizational performance and labour structure using financial institutions in the service sector. It would be interesting if the same study was carried out using organizations that are in a different sector.

BIBLIOGRAPHY

BOOKS

Blackburn, P., Coombs, R. and Green, K.
1985 Technology, Economic Growth and the Labour Process; The Macmillan Press Ltd, London.

Blunt P.
1973 Organizational Theory and Behaviour;
An African perspective; Longman, New York. Inc.

Bryant C:
1976 Sociology in Action; George Allen & Unwin Ltd, London.

Capron, H., William, B.
1982 Computers and Data Processing; The Benjamin/Cummings Publishing Company, New York.

Cody, J., Hellen, H. and Wall, D.
1980 Policies for Industrial Progress in Developing Countries; Oxford University Press, London.

Coughlin, P. and Ikiara, K.
1988 Industrialization in Kenya; In Search of a Strategy. Heinmann, Nairobi.

Coser, A.
1971 Masters of Sociological Thought;
Harcourt Brace Jovanovich Inc, New York.

Durkheim, E.
1933 The Division of Labour in Society; Free Press, Glencoe.

Edmondson, W. (ed)
1985 Information Technology and Social Revolution;
Croom Helm Ltd, New Hampshire.

Erman, M. Williams, B., and Gutierez, C.
1982 Computers Ethics and Society; Oxford University Press Inc, New York.

Etzion, A. and Gross,E.
1985 Organizations in Society; Prentice-Hall, Inc New Jersey.

Fletcher, R.
1972 The Making of Sociology vol I; Thomas Nelson and sons Ltd, Canada.

Meyer, J.
1985 Organizational Environments; Sage Publications Inc, California.

Mintzberg, H.
1979 The Structure of Organizations; Engle Wood Cliffs Prentice-Hall, New Jersey.

Munasinghe,M.,(ed)
1989 Computers and Informatics in Developing Countries; Third World Academy of Sciences, London.

Nachmias C and Nachmias D :
1981 Research Methods in the Social Sciences; St. Martins' Press Inc, London.

Newman, D.
1973 Organization Design; Edward Anold Ltd, London.

Oborne, D.
1985 Computers and Work; John Wiley and Sons, New York.

Parsons, T.
1960 Structure and Processing in Modern Societies The Free Press, New York.

Remmling, W.(ed).
1973 Towards the Sociology of Knowledge; Routeledge & Kegan Ltd, London.

Republic of Kenya
1979-1983 Ministry of Planning and National Development, Government Printers, Nairobi.

Republic of Kenya, Sessional paper No. 10.
1965 African Socialism and its Application to Kenya; Government Printers, Nairobi.

Sanders H. and Birkin J.
1980 Computer and Management in a Changing Society; 3rd edition, Mc Graw-Hill, Inc. New York.

Schumacher, C.F:
1973 Small is Beautiful; Heper & Ron, New York.

Schumpeter ,J.A:
1934 The Theory of Economic Development; Oxford University, London.

Scott R.J
1971 Computers for Developing Countries; East African Publishing House, Nairobi.

Scott R J:
1984 A Survey of Computers in East Africa; East African Publishing House, Nairobi
Shelly and Gary B.

1984 Computer Fundamentals for an Information Age; Anahem Publishing Company, Inc. California.

Toffler A:
1980 The Third Wave; William Collins Sons & Co. Ltd

Timasheff S and Theodorson A:
1976 Sociological Theory: Its Nature and Growth; 4th edition, Pennslylvie University, New York.

Uthoff A and Pernia M.
1986 Planning for Manpower in Developing Countries; International Labour Organization, Geneva.

Yearly, S:
1988 Science, Technology and Social Change; London, Broadwick.

PAPERS

Cerere S.J:
1993 Computer applications to office management; Kenya Institute of Administration.

Mikkelsen B:
1987 Formation of an industrial labour force in Kenya. Institute for Development Studies University of Nairobi Kenya Occasional paper No. 49.

Mutahi K:
1995 A speech presented during the official launching of the Computer Centre Kenyatta university.

Ogang M. et al:
1974 Computer policy in developing countries: The East African Experience, Kampala. A paper prepared for East African Universities social science conference.

Peterson S.B :
1988a Micro computers and institutional development, Emerging lessons from Kenya. A paper presented to the Harvard Institute for international development conference. Marrakech, Morocco.

Peterson S.B:
1989a Computer training for the government of Kenya. The case of Kenya Institute of Administration. Development Discussion Papers. Harvard Institute for the International Development , Harvard University.

Peterson S.B:
1990a Institutionalizing micro computers in developing bureaucracies; theory and practice from Kenya, Information Technology for Development.

Peterson S.B:
1991 From processing to analyzing: intensifying the use of micro computers in developing bureaucracies.

Rono H.K:
1993 Trends in management information systems; Kenya institute of management.

Rono H.K:
1995 Use of computers for competitive management; a paper presented to the DPM senior management workshop at KCTI Nairobi.

Scott R J:
1982 Computers Kenya. Nairobi. Report on I.D.R.C sponsored project.

Stewart F:
1979 International transfer issues and policy options. Washington World Bank Staff paper No.344.

Pepela C.N:
Daily Nation August 16th, 1983: Jobs are not in danger.

Editorial
Sunday Nation August 11,1984: Computers are no longer a luxury.

THESES

Ogunde Z:
1984 Effects of computers on employment. University of Nairobi. P.G.D project (unpublished).

Oyomno G:
1991 Sustainability of Governmental use of microcomputer based IT in developing countries. A Kenyan perspective. Msc. Thesis USIU Unpublished.

Rono H :
1992 Use of technology in the bakery industries in Kenya.
Mc Gill University. PhD Thesis (unpublished).

APPENDICES

APPENDIX A. INSTRUMENT FOR DOCUMENT ANALYSIS

	1985	1990	1995
1. No. of computer system in use			
1.1. P.C.	–	–	–
1.2. Mini	–	–	–
1.3. Mainframe	–	–	–
2. Capacity of computer system in use			
2.1. P.C.	–	–	–
2.2. Mini computers	–	–	–
2.3. Mainframe	–	–	–
3. Type of computer application			
3.1. Word processing	–	–	–
3.2. Spreadsheets	–	–	–
3.3. Database system	–	–	–
4. Type of system in use			
4.1. Single user	–	–	–
4.2. Batch processing	–	–	–
4.3. Inquiry	–	–	–
4.4. Network batch	–	–	–
4.5. Network inquiry	–	–	–
4.6. Network realtime	–	–	–
5. Level of investment on equipment and software	–	–	–
6. Hours of computer use per day	–	–	–
7. Percentage coverage of functions using computer systems.	–	–	–

9. Annual employment (new intake)	–	–	–
10.1. Senior management	–	–	–
10.2 Middle management	–	–	–
10.3. Supervisory cadre	–	–	–
10.4. Operational staff	–	–	–
11. General training			
No. of employees			
11.1. Senior management	–	–	–
11.2 Middle management	–	–	–
11.3. Supervisory cadre	–	–	–
11.4. Operational staff	–	–	–
12.Cost of general training	–	–	–
12.1 Nature of overall training			
13. Computer training			
Number of employees			
13.1. Senior management	–	–	–
13.2 Middle management	–	–	–
13.3 Supervisory cadre	–	–	–
13.4 Operational staff	–	–	–
14. Overall cost of Computer training	–	–	–
15. Nature of computer training			
16. Number of voluntary resignation			
16.1 Senior management	–	–	–
16.2. Middle management	–	–	–
16.3 Supervisory cadre	–	–	–
16.4. Operational staff	–	–	–
17. Overall number of retired persons			
17.1 Senior management	–	–	–
17.2 Middle management	–	–	–
17.3 Supervisory cadre	–	–	–
17.4 Operational staff	–	–	–

18 Overall number of redundant persons			
18.1 Senior management	–	–	–
18.2 Middle management	–	–	–
18.3 Supervisory cadre	–	–	–
18.4 Operational cadre	–	–	–

APPENDIX B

INTERVIEW SCHEDULE FOR SENIOR MANAGEMENT CADRE AND HEADS OF SELECTED DEPARTMENTS

1. Name of the organization _____
2. What are the critical missions of your organization?
3. In which year did your organization introduce the use of computers?
   - In which departments?
   - What applications are mainly used?
4. What were the actual or perceived needs for the use computers.
5. What aspects of your work have been computerized?
   - Have these needs been met? Please explain how
6. What gains have you realised from this computerization?
7. How has computerization of operations affected performance of various sections in your organization?
8. Would you say that computerization in this organisation has achieved the following aims
   - Efficiency of operations
   - Increased productivity
   - Improved quality of work
   - Reduction of costs
   - Staff motivation
   - Enhanced centralization/decentralization
9. How has computerization affected the trend of annual recruitment of labour in your organization?

10. What observable labour trends have emerged as a result of computerization in your organization?

11. What training requirements have arisen in your organization as a result of computerization? How did your organization respond to this?

12. What category of people did your organization train and in what areas?

13. Has computerization led to redundancies in your organization? If so what category of people were affected?

14. Does your organization have a policy on actual or potential displacement of labour? If so please explain.

15. Apart from computerization, what other factors would you say have influenced organizational performance and labour structure in your organization.

APPENDIX C

REFERENCE TABLES

Table C(1): Computer installations in Kenya, 1961-81

YEAR	ORGANIZATION	NO. OF INSTALLATION (MAINFRAMES)
1961-1964	E.A.R&H, E.A.P&L	2
1965-1969	E.A.AIRWAYS, E.A.P.T, KENYA GOVT	12
1970-1974	K.B.S, E.A CUSTOMS AND EXCISE,KENYA BUS SERVICE,NAIROBI CITY COUNCIL, U.O.N	28
1975-1979	AGRI.FINANCE CORP. K.C.C., K.M.C, K.P.A	36
1980	C.B.S.,I.C.D.C., K.A.R.I.,K.N.E.C. K.T.D.A.	85
1981	GOVT.PARASTATAL AND PRIVATE CORPORATIONS	127

Source:Scott (1982)

Table C(2): Number of employees at AGS Department.

AG	Category	1985	1990	1995
	Senior management	11	11	11
	Middle management	18	18	18
	Supervisory cadre	14	14	14
	Operational cadre	24	24	24
	Total number	67	67	67

Source:Document extracts AG,1995.

Table C(3): Number of employees in NSSF

NSSF	Category	1985	1990	1995
	Senior management	43	59	70
	Middle management	250	298	412
	Supervisory cadre	117	242	388
	Operational cadre	268	485	720
	Total number	678	1084	1690

Source:Document extracts NSSF,1995.

Table C(4). Number of employees at BBK

BBK	Category	1985	1990	1995
	Senior management	80	82	85
	Middle management	168	180	163
	Supervisory cadre	249	251	501
	Operational cadre	2458	2755	2764
	Total number	2955	3268	3513

Source:Document extracts BBK 1995

Table C(5): Annual labour intake at NSSF

NSSF	Category	1985	1990	1995
	Senior Management	*	1	3
	Middle management	*	4	16
	Supervisory	*	2	7
	Operational	*	3	15

Source:Document extracts NSSF 1995

Table C(6): Annual labour intake at BBK

BBK	Category	1985	1990	1995
	Senior management	*	4	6
	Middle management	*	5	7
	Supervisory	*	4	4
	Operational	*	340	99

Source:Document extracts BBK 1995

Table C(7): Staff trained in various areas in AG.

MOF	1985	1990	1995
Senior management	9	6	7
Middle management	15	17	14
Supervisory cadre	9	12	10
Operational cadre	17	12	18
Total	51	52	49

Source:Document extracts AG, 1995.

Table C(8): Staff trained in various areas in NSSF.

NSSF	1985	1990	1995
Senior management	3	6	10
Middle management	3	5	15
Supervisory cadre	4	10	6
Operational cadre	2	4	0
Total	12	25	31

Source:Document extracts NSSF, 1995.

Table C(9): Staff trained in various areas in the Bank.

NSSF	1985	1990	1995
Senior management	80	82	85
Middle management	165	180	163
Supervisory cadre	240	251	501
Operational cadre	2016	2341	2350
Total			

Source:Document extracts BBK, 1995.

Table C(10): Staff staff trained in computer courses, AG.

AG	1985	1990	1995
Senior management	0	11	5
Middle management	0	6	3
Supervisory cadre	0	12	2
Operational cadre	0	24	0
Total	0	53	10

Source: Document extracts AG, 1995.

Table C(11): Staff trained in computer training courses in NSSF

NSSF	1985	1990	1995
Senior management	1	0	44
Middle management	3	4	10
Supervisory cadre	3	0	75
Operational cadre	0	2	2
Total	7	6	131

Source: Document extracts NSSF,1995.

Table C(12): People trained in computer courses in BBK

BBK	1985	1990	1995
Senior management	80	82	85
Middle management	165	180	163
Supervisory cadre	242	250	495
Operational cadre	2454	2360	2340
Total	2941	2872	3083

source: Document extracts BBK, 1995.

APPENDIX D

BUDGET

ITEM/ACTIVITY	KSH.
1. Stationary	4,000
2. Travelling	4,000
3. Subsistence	6,000
4. Proposal	
a) typing	2,000
b) photocopying	2,000
c) binding	1,000
5. Thesis	
a) typing	6,000
b) photocopying	5,000
c) binding	5,000
6. Miscellaneous	1,000
TOTAL	**36,000**

APPENDIX D

BUDGET

ITEM/ACTIVITY	KSH.
1. Stationary	4,000
2. Travelling	4,000
3. Subsistence	6,000
4. Proposal	
a) typing	2,000
b) photocopying	2,000
c) binding	1,000
5. Thesis	
a) typing	6,000
b) photocopying	5,000
c) binding	5,000
6. Miscellaneous	1,000
TOTAL	**36,000**