

**The dynamics of the adoption and use of ICT-based initiatives for
development: results of a field study in Mozambique**

by

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ABSTRACT

The dynamics of the adoption and use of ICT-based initiatives for development: results of a field study in Mozambique

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Key Words: Adoption and use of ICT, HEM, development, globalisation, ANT, translation, ST, institutionalisation, due process model, human environment model, BPR, Telecentre, *Galatee*.

The research focused on examining the interplay between innovations in information and communication technology (ICT) in three different micro-level settings with broader development processes within the emerging global economy of Mozambique. There is a great deal of concern among different national governments, international and national agencies about the role of ICT in development. The question often asked is how we can understand the contribution of ICT initiatives to the socio-economic development of a country.

This research was conducted as follows. First of all, the nature of the problem was analysed from four points of view: globalisation, focusing on the global-local debate, discourses around development, transfer of ICT-based innovations to developing countries and the relationship between IS/ICT and organisational change in the context of

a developing country. Secondly, a literature survey was undertaken to discuss these issues. The results of the literature survey guided the empirical research undertaken in two organisations and one rural community in Mozambique. Thirdly, the results of the empirical work were analysed with regard to the four perspectives discussed earlier.

The research objective required the development of a framework for understanding the process of the adoption and use of ICT-based initiatives for development. Theories such as Actor-Network Theory, the Human Environment Model and Structuration Theory form the basis of a framework that was constructed using the results of the fieldwork.

The framework is composed of three levels of analysis: the micro-level analyses the ICT-related initiatives by using the sociology of the translation process from an ANT perspective and by applying the due process model. The meso-level examines the social context within which the ICT-related initiatives are implemented. For this purpose the human environment model (HEM) is used. Finally, the macro-level attempts to describe the interaction between the ICT-related initiatives and socio-economic development. This part of the framework is addressed by the application of the structuration theory and concepts related to sustainable development.

The proposed framework can be used as an analytical tool to guide the analysis of the process of implementation of ICT-based initiatives in organisations and communities, and can also be applied as a normative tool to support the process of introducing a new ICT-based initiative in organisations or communities, especially within the context of developing countries. The author argues that the use of this framework can enhance the likelihood of achieving institutionalisation of an ICT-based initiative within a particular organisational setting.

I declare that

**The dynamics of the adoption and use of ICT-based initiatives for development:
results of a field study in Mozambique**

is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Esselina Macome

DEDICATION

To my husband *Martinho* and our children *Carmen Taila* and *Marcelino Isaac*

To the memory of my father *Marcelino Nhaelane Lucas*

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To My Lord for health and opportunities.

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Alphabetical List of Frequent Abbreviations

| | |
|---------|--|
| ABSA | Amalgamated Bank of South Africa |
| ANT | Actor-network theory |
| BCM | <i>Banco Comercial de Moçambique</i> (Commercial Bank of Mozambique) |
| BE | Beira |
| BM | <i>Banco de Moçambique</i> (Central Bank of Mozambique) |
| BPD | <i>Banco Popular do Desenvolvimento</i> |
| BPR | Business Process Re-engineering |
| CAD | Computer Aided Design |
| CAL | Local Advisory Committee |
| CFP | Primary Teacher Training Centre of Namaacha |
| CIUEM | Eduardo Mondlane University Informatics Centre |
| CM | <i>Conselho Municipal</i> (city council) |
| CMA | <i>Colégio Maria Auxiliadora</i> |
| CPI | <i>Comissão Nacional da Política de Informática</i> |
| CSDIPAU | Computer System Development and Implementation Project Administration UNIT |
| Dadm | District Administration |
| DCs | Developing countries |
| DD | Director of the Department |
| DE | <i>Departamento do Estrangeiro</i> (Foreign Department) |
| DMI | <i>Departamento de Matematica e Informatica</i> |
| DOI | Department of Information Technology and Organisation Methods |
| DP | Data processing |
| DT | <i>Departamento de Tesouraria</i> (Treasure Department) |
| EDM | <i>Elctricidade de Moçambique</i> (Electricity Company of Mozambique) |
| EMU | Eduardo Mondlane University |
| ERP | Enterprise Resources Planning |

| | |
|-----------|---|
| FDC | <i>Fundação para o Desenvolvimento da Comunidade</i> |
| FRELIMO | <i>Frente de Libertação de Moçambique</i> |
| GIS | Geographical Information Systems |
| GNP | Gross National Product |
| HD | Head of Department |
| HDI | Human development index |
| HEM | Human Environment Model |
| HO | Head Office |
| HRD | Human Resource Department |
| ICT | Information and Communication Technology |
| ICT/IS | Information and Communication Technology/Information Systems |
| IDRC | International Development Research Centre |
| IFIP | International Federation for Information Processing |
| IIASA | International Institute for Applied Systems Analysis |
| IMAP | <i>Instituto de Magistério Primário</i> (Primary Teacher Training Institute of Manhiça) |
| INE | <i>Instituto Nacional de Estatística</i> |
| IS | Information Systems |
| ISAID | Information Society Africa Development Conference |
| ISP | Internet service providers |
| IT | Information Technology |
| IT/IS | Information Technology/Information systems |
| MAAC | Mozambican Advisory Acacia Committee |
| MIS | Management of Information System |
| MT or MZM | <i>Metical</i> (Mozambique National Currency) |
| NHS | National Health System |
| OPP | Obligatory Passage Point |
| PARPA | <i>Programa de Redução da pobreza absoluta</i> (Poverty Alleviation Programme) |
| PNUD | <i>Programa das Nações Unidas para o Desenvolvimento</i> |
| RENAMO | <i>Resistência Nacional de Moçambique</i> |

| | |
|-------|--|
| SADC | Southern African Development Community |
| SAF | Structural Adjustment Programme |
| SAP | Software Application Product |
| SSADM | Structured System Analysis Development Methodology |
| ST | Structuration Theory |
| TAI | Technology Achievement Index |
| TDM | <i>Telecomunicações de Moçambique</i> |
| TQM | Total Quality Management |
| UNDP | United Nations Development Programme |

Chapter 1

Introduction

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Introduction

1.1. Introduction

This chapter of the thesis introduces the research problem and the analytical approach. The key aim of this thesis is to examine the interplay between information and communication technology (ICT) innovations in different micro-level settings within the broader development context in Mozambique - a country currently experiencing various attempts at global integration through infrastructure development, education initiatives and various socio-economic development programmes.

This chapter contains six sections. The first section presents the justification and motivation behind the main aims of the thesis. In section two, the problem is discussed from four different points of view: globalisation, development, transfer of ICT innovation and organisational change. This discussion leads to the formulation of the purpose and research questions for the thesis in section three. The fourth section discusses the significance of this research and its key contributions. The empirical setting is described in section 5, followed by the final section which provides a road map of the thesis.

1.2. Justification of the topic and motivation for studying the problem

The key theme of this thesis is the analysis of the increasing interconnections between ICT innovation in micro-level settings of organisations and communities with broader development processes within the emerging global economy of Mozambique. This analysis helps to draw implications for developing countries in general. Castells (1996) argues that the global economy would lead to increased productivity and efficiencies if organisations were to invest in a comprehensive reform programme of institutional and organisational change driven by technology and information. Recent advances in ICTs are becoming central to the process of socio-economic change and

development in different contexts, especially that of developing countries (Avgerou, 1998; Avgerou and Walsham, 2000; Walsham, 2001). While ICT-enabled development initiatives in the government sector (for example education and health) have been ongoing since the eighties, in recent years there have been signs of government organisations in developing countries investing in various projects that were previously the domain of the private sector. These initiatives involve the application of new management techniques such as Business Process Re-engineering (BPR), Enterprise Resources Planning (ERP) and Total Quality Management (TQM).

The use of ICTs and the adoption of new management techniques provide organisations in developing countries like Mozambique with the promise of actively participating in globalisation processes which could contribute to national development efforts (Kiggundu, 1991; Saxena, 1996; Bada, 2000; Avgerou, 2001b). For example, recently in Mozambique, within the government development framework of poverty alleviation, various ICT-related projects have been initiated in the public and private sectors, as well as in rural communities and organisations (Governo de Moçambique, 2001a). A number of examples can be seen in Mozambique. For instance, the Institute for Prevention of Natural Disasters is engaged in the development and implementation of the information system for the prevision and control of natural disasters; the Central Bank together with the Ministry of Planning and Finance are in the process of developing a national payment system; researchers from the Eduardo Mondlane University and Ministry of Health are implementing a health information system to strengthen the district management of health facilities.

This research has two key motivations. Firstly, Mozambique, a developing country, is now at peace after several years of civil war and is attempting to implement a broad recovery programme founded on an ICT-based vision. This research seeks to contribute to the attainment of this vision. Secondly, while many organisations are in the process of implementing different ICT-related projects in order to improve their efficiency, little is known about their impacts and the efficiencies that are achieved on the ground. There is currently a dearth of studies that analyse such organisational

experiences with new ICTs and associated management techniques, and how these lead to practical improvements in organisational functioning. A systematic analysis of these experiences can help to guide future efforts in the country, and this research seeks to contribute to this body of knowledge. This study reinforces the efforts of groups like the International Federation for Information Processing (IFIP) Working Group 9.4 on ICT in developing countries by systematically analysing experiences of Mozambique. The next section presents some key defining aspects of the research problem.

1.3. Defining aspects of the research problem

The research problem is perceived as being shaped by four key issues. The first concerns globalisation and the nature of the interaction between global processes of technology and management with the local realities of organisations and infrastructures. The second concerns the debate on development and the role that ICT can play in shaping socio-economic growth processes. The third concerns ICT innovations and how these are shaped by social aspects. The fourth issue concerns processes of ICT-enabled organisational change, and the associated difficulties in attaining them.

1.3.1. From the perspective of globalisation

In recent years, the role of globalisation processes in shaping ICT use has been argued by many authors (Avgerou, 2000; Avgerou, 2001b; Walsham, 2001). Indeed, ICT-related initiatives in many parts of the world reflect and also shaped these globalisation trends. Giddens (1990:64) gives a useful definition of globalisation as ‘the intensification of the world-wide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa’. This means that this is a dialectical process because these local developments may become a function of events occurring in different locations many miles away and *vice versa*. Globalisation is related to the way in which we live and it

is a dynamic process (Giddens, 1999). Similarly, Castells (1996) describes the trend of an increasing interconnection of economic activities and social relations, which he refers to as a 'networked, deeply interdependent global economy'. Thus globalisation refers to a world in which societies (and cultures) in contemporary times, have in one way or another come closer together (Kiely, 1998). Beck (2000: 11) asserts:

Globalisation denotes the processes through which sovereign national states are criss-crossed and undermined by transitional actors with varying prospects of power, orientations, identities and networks.

Kiely (1998) emphasises the importance of explicitly including globalisation as an issue for empirical investigation. IS researchers have in recent years started to address issues arising from globalisation, including how organisations, especially in developing countries, can utilise and adapt IT to the needs of their social and cultural context (Walsham, 1998; Avgerou and Walsham, 2000). New technologies cannot be mechanically applied whilst excluding the local context, and need to be actively adapted. Global techniques and ICTs invented in the developed world need to be modified and adapted to developing country situations. Such processes of adaptation are very evident in settings like Mozambique where there are significant differences in context as compared to countries in the developed world. This research seeks to examine this complex interplay between processes of globalisation and how they shape and are shaped by ICT initiatives in different micro-level settings of organisations and communities in Mozambique.

One approach to the study of globalisation is that of analysing processes of integration of national economies, politics, ideas, culture and people into one seamless whole spread over territorial borders, ideological divides, civilizations, classes and races (Held, *et al.*, 1999). In the economic sphere (which is the primary starting point for many scholars), the process is observed mostly in the expansion and mobility of the factors of production, especially capital, across geographical boundaries. However, processes of integration are not 'naturally' achieved, and increasingly authors have conceptualised globalisation as a dialectical process, which simultaneously integrates and disintegrates (Castells, 1996). We adopt a similar perspective on globalisation. While ICTs provide a developing country like Mozambique with the potential to

address some of its socio-economic problems, this potential is not ‘naturally’ achieved. This potential is shaped by what actors do in micro-level situations. It is these micro-level dynamics that this research seeks to understand and analyse.

1.3.2. From the perspective of development

The main objective of this subsection is to analyse some aspects of the evolution of developmental thought, especially as regards the interaction between ICT and key dimensions of development.

Development is a multifaceted concept and encompasses various inter-connected social, economic and cultural aspects (Reddy, 1987; Max-Neef *et al.*, 1989; Sen, 1993; Escobar, 1995; Yeung and Mathieson, 1998). The quotation below illustrated the multifaceted dimension of development.

Development must, therefore, be conceived of as a multidimensional process involving major changes in social structures, popular attitudes, and national institutions, as well as the acceleration of economic growth, the reduction of inequality, and the eradication of absolute poverty. Development, in its essence, must represent the whole gamut of change by which an entire social system, tuned to the diverse basic needs and desires of individuals and social groups within that system, moves away from a condition of life widely perceived as unsatisfactory and toward a situation or condition of life regarded as materially and spiritually “better”. (Todaro quoted by Roode (forthcoming):14)

In traditional development theory, capital accumulation has been the central point of development, and how it could be enhanced through deliberate industrialisation, centralised development planning and external aid. The underdeveloped economies, however, were thought to be characterised by a number of features that set them apart from the economies studied by orthodox economics, which called for modification of the existing theory (Escobar, 1995).

The early modernisation approach saw different countries of the world occupying different stages of growth, and countries were compared on the basis of their GDP

(Gross Domestic Product). Development was conceptualised as a universal process consisting of various stages abstracted from the experiences of countries in Europe and North America. In such a model it is assumed that the final stage will be characterised by migration from rural to urban areas, and infrastructure creation within the large cities would serve as essential engines of development (Hettne, 1990). Developing countries were expected to take the benefits of scientific and technological achievements and achieve 'higher' levels of development.

The focus on development based primarily on the economic criteria of GDP following stages has been criticised by many authors (Max-Neef *et al.*, 1989; Hettne, 1990; Sen, 1993; Escobar, 1995; Yeung and Mathieson, 1998). These criticisms have led to development being redefined in order to include the social well-being and political structures, as well as the physical environment as reflected in the UNDP on Human Development publications (UNDP, 1999, 2000a, 2001a). These reports take into consideration non-economic dimensions of development such as welfare, social equity, gender balance, democracy, empowerment and sustainable development.

Max-Neef *et al.* (1989) proposed the human scale development model, which focused on the satisfaction of the fundamental human needs. As Max-Neef and his colleagues (1989:30) stated:

The fundamental human needs are essential attributes related to human evolution; satisfiers are forms of being, having, doing and interacting, related to structures; and economic goods are objects related to particular historical moments.

This perspective emphasises the role of human beings in development processes and disputes the traditional linear notions of development that do not account for variations in the socio-economic contexts of development (Hettne, 1996). The Human Scale Development Model (HSDM) is based on human needs, self-reliance and organic articulations. These components of the HSDM point out that development

... must be sustained on a solid foundation which is the creation of those conditions where people are the protagonists of their future. If people are to be the main actors in Human Scale Development both the diversity as well as the autonomy of the spaces in which they act must be respected. Attaining the transformation of an object-person into a subject-person in the process of

development is, among other things, a problem of scale. There is no possibility for the active participation of people in gigantic systems which are hierarchically organized and where decisions flow from the top down to the bottom. (Max-Neef *et al.*:13).

They also argue that

...fundamental human needs cannot, by definition, be structured from the top downwards. It cannot be imposed either by law or by decree. It can only emanate directly from the actions, expectations and creative and critical awareness of the protagonists themselves. Instead of being the traditional objects of development, people must take the leading role in development. (Max-Neef *et al.*: 39).

The Max-Neef model thus emphasises a bottom-up approach to creating social well-being, as a basis for eradicating poverty, rather than just being concerned with raising the GDP. The development process is characterised by dependency relations. These relationships should flow from low to high levels, i.e., from the local level and through the national to the international. The concept of self-reliance at all levels has been argued by Max-Neef *et al.* as part of the understanding of the sustainable development notion. Self-reliance is understood “in terms of a horizontal interdependence and, in no way, as an isolationist tendency on the part of nations, regions, local communities or cultures.” Max-Neef *et al.* (1989: 49). Based on the notion of self-reliant Human Scale Development, Roode (forthcoming) derives a working definition for sustainable development. The definition below is also assumed in this research work.

In this notion of self-reliant human scale development, we found a satisfactory definition of sustainable development. To formalize this: sustainable development is achieved through self-reliant human scale development which flows from the individual level to the local, regional and national levels, and which is horizontally interdependent and vertically complementary (Roode, forthcoming: 19).

It is under this new paradigm of development that benchmarks of progress were developed in order to include other aspects such as economic performance, competitiveness foundations, health, education, environment, democracy and freedom (Yeung and Mathieson, 1998). These benchmarks are seen to be crucial for achieving

balanced development in terms of human well-being. Currently, a new paradigm accounting for development is emerging based around “knowledge” and information. This paradigm is built around the role of ICT to stimulate socio-economic growth in developing countries. ICTs offer new ways to exchange information and conduct business which have the potential to change the nature of services provided by the financial and other sectors in both the public and private domains (World Bank, 1998, 1999; Madon, 2000; PNUD, 2001; UNDP, 2001b). The African Development Bank Report (1998), like an earlier World Bank annual report (1997), indicates an increase in the provision of information services in Africa, which can potentially help to address the deep-rooted problems of poverty and poor infrastructure. But the extent to which this potential is realised depends directly on the ability of people to adapt, adopt and use ICT to address local and regional development challenges.

Alleviation of poverty thus depends on creating a social environment that is conducive to providing universal access to basic welfare systems. This relational perspective of development differs from the traditional models that focused on the analysis of the stages of economic growth. This signifies that the impact of the usage of ICT-related technologies should not be measured in terms of the number of electronically connected individuals, but also in terms of its accessibility and contribution to social progress (Uimonen, 1997).

ICTs can support methods to perform more effective trade promotion functions, which in turn can help to address Africa’s historical lack of international competitiveness. For example, in the current times of interconnectivity, promoting trade requires efficient financial and payment systems to settle transactions. Efficacy in performing these transactions can potentially be achieved through the use of ICTs that can help to enhance the scope of tradable services. Such enhancements can have broader impacts on other sectors of electronic commerce, banking, insurance, advertising, consulting and other professional services. Press (1997) has established a positive correlation between the number of Internet hosts in a country and the Human Development Index (HDI) (Press, 1997), which emphasises the central role of ICTs in natural development processes.

Information and knowledge can help to build stronger networks through the facilitation of dialogue and information exchange (Mansell and When, 1998). Such networks built around technology and information have been argued by Castells (1996) to provide the basis of the contemporary ‘network society’. Networks potentially provide individuals with the opportunity to make a difference by sharing their knowledge with others for the larger good (Talero and Gaudette, 1995). Development in ICTs outruns society’s ability to use it ‘appropriately’, raising the challenge to the network to put ICTs to work to improve the quality of the life of human beings (Drucker, 1993; Sen, 1993). This research is motivated by the ideology that ICTs should be used in developing countries to address the problems of poverty alleviation and to create a social environment that is conducive to providing citizens with universal access in order to satisfy their fundamental human needs.

Yamakage (1990) argues that ICTs can contribute to social development in developing countries, if these countries have the autonomy to define their own priorities and requirements. It is important that ICT implementation is focused on addressing these basic priorities to support services such as health and education. Consequently, the success of ICTs should not be solely measured in terms of efficiencies but rather in terms of accessibility and contribution to social progress (Uimonen, 1997). ICT should not only be used to enhance industrial ability to manufacture goods and services, but also to create informed societies and communities with access to basic services. For individual actors and organisations to be innovative and make free and informed decisions, they need to process information freely and use it properly. ICT itself does not determine the change, but facilitates it, shaped by the social context of its application (Uimonen, 1997). Puiatti and Accascina (2001) in their work are reporting good experiences of applying ICT for development in Egypt.

The importance of expanding the access of developing countries to ICT and related technology has been recognised by governments and international agencies with increasing consensus that ICT-related technology should be regarded as a strategic national infrastructure (Kenney, 1995; Nidumolu, *et al.* 1996; IDRC, 1999, 2000;

Conselho de Ministros, 2000; Madon, 2000; Yahaya, 2000; PNUD, 2001). Development, conceptualised as a discourse (Escobar, 1995) can in contemporary times be characterised by various dimensions of new ICTs. These range from the need to create more ICT infrastructure, develop different applications, and develop ‘knowledge workers’ who can form the basis of new “information societies”. While creating infrastructure is a starting point, although expensive, it is perhaps the easiest part. It is more complex to stimulate processes through which individuals, organisations, communities and countries create capacities to use information effectively in their local contexts and for their needs (Madon, 2000). It is this perspective that encouraged the Government of Mozambique to approve a national ICT policy and designed its implementation strategy with the notion of integrating the solution of developmental problems within the ICT vision. In this way each ICT project defined within the implementation strategy framework should be linked to the development priorities of a specific community. In this manner each of the projects at the local level should be horizontally interdependent with, and vertically complementary to, other projects at higher levels.

Driven by the belief that in current times ICT is one of the key motors for development, governments are taking wide-ranging initiatives to rapidly create knowledge-based economic structures and information societies comprising networks of individuals, firms and countries interlinked electronically through webs of informational relationships. ICTs present government with opportunities to create and support strategies to address basic development needs and create new infrastructure. Developing countries face a complex mix of developmental challenges, including the need to recoup a fair share in international trade, the development of human capital through better health and education, to promote effective macroeconomic management and good governance, and to address questions of agricultural development, food security and environmental conservation (Oshikoya and Hussain, 1998).

Technology, development and culture can be considered as a large system dependent upon and linked together by different relationships (Escobar, 1995). Technology can be seen as an agent of development, which generates mechanisms of feedback and

learning that can further influence broader development processes. Such a development cycle supported by technology provides the potential to reconfigure the global context of information and knowledge in which the local entity operates. Understanding the critical micro-level dynamics of the ICT innovation within the broader context of development in Mozambique, is a key aim of the thesis.

1.3.3. From the perspective of transfer of ICT innovation

At least two different meanings of innovation are found in the literature. The first refers to something totally new in society, an ‘invention’ (Bijker, 1987, 1997; Bijker and Law, 1997). The second meaning of innovation refers to something within a particular setting, but not new *per se* (Vidgen and McMaster, 1996; McMaster *et al.*, 1997). This research is concerned primarily with the second kind of innovation that is typically designed in the developed world and introduced to developing countries like Mozambique through a ‘technology transfer’ process. This process involves not only the transfer of technology but also with its various organisational and management practices, which are often found to contribute to the tension within socio-organisational contexts of developing countries (Avgerou, 1996, 1998, 2001b; Bada, 2000). The potential value and effectiveness of the transfer process is dependent on the local socio-organisational conditions and the ability of the organisation to adapt the ICTs in order to address local priorities (Odedra, 1991; Bhatnagar and Odedra, 1992; Odedra-Straub, 1996, Avgerou and Walsham, 2000; Bhatnagar, 2000).

An approach to studying the process of technology transfer is provided by Rogers’ (1983, 1995) theory of diffusion of innovations. This theory, which has emerged over several decades, has influenced several disciplines, including IS. Diffusion is defined as a process by which an innovation is communicated through certain channels over time among the members of social systems. Research within this tradition has typically focused on identifying factors that influence the rate of diffusion, especially related to beneficial innovations. The rate is ‘measured’ by seeing how an organisation passes through different sequential stages of the diffusion process. Diffusion theory researchers have tried to understand the factors that influence the

ICT/IS innovation adoption decisions (Attwell, 1992; Fuller and Swanson, 1992; Cool *et al.*, 1997, Straub *et al.*, 2000), typically at the organisational and intra-organisational level, rather than with an inter-organisational focus (Prescott and Conger, 1995). Another assumption of the traditional diffusion theory perspective has been the homogeneity of the institutional environment across the adopting units, which tends to obscure variations across the units arising from geographic distance from the source of the innovation, local norms and regulations, and the availability or not of factors to support the diffusion system.

The focus of diffusion studies on the organisational level tends to obscure the influence of external factors on the innovation process, such as the deregulation of an industry, or the infrastructure conditions that are unique to a country or society. Such a 'context-free' view of innovation is limited as it treats IS primarily as a technological innovation, and does not adequately consider the embedded nature of technology in products, services, and organisational practices. It has now been well established by IS researchers that contextual factors play an important role in influencing the ability of an organisation to adopt and effectively apply technological innovations (Williams and Edge, 1996; Du Plooy, 1998; Barrett, 1999; Allen, 2000; Avgerou, 2000; Walsham, 2001). The traditional perspective of diffusion theory carries the implicit assumption that innovations remain invariable over time, which is especially problematic in the current period of globalisation that is characterised by processes of rapid technological change.

Some of the limitations of the diffusion model can be summarised as follows:

- There is relative neglect of the inter-organisational level of analysis and 'external factors' that shape innovation processes.
- The institutional environment across adopting units is assumed to be homogeneous.
- There is an implicit assumption that innovation remains invariable over time and passes through sequential stages.

In this research, we attempt to address these limitations, drawing upon an alternative theoretical approach that is provided by Actor-Network Theory (ANT) (McMaster *et al.* 1997; Büscher and Mogensen, 1997, Knights and Noble, 1997; McMaster *et al.*, 1998).

ANT proposes the concept of ‘translation’ to replace ‘diffusion’ and sees innovation spreading as a result of how actors ‘translate’ the interest of others so that they become aligned with their own interests. Successful ‘translation’ of the interests of both human and non-human entities so as to create effective alliances, contributes to effective ‘transfer of technology’. While we discuss ANT in depth in Chapter 2, it is important to point out how the ANT approach helps to address some of the limitations of diffusion theory. ANT does not see technology as an independent artefact that ‘diffuses’ out from one central point, but views technology as part of a complex heterogeneous network of human actors and non-human artefacts. The effectiveness of the transfer process is then dependent on how these networks are created, stabilised and strengthened over time. Such a conceptualisation has heterogeneity and not homogeneity at the heart of its analysis. The difference between the ANT and diffusion approach is effectively captured in the following quote by McMaster *et al.* (1998).

ANT is concerned with creation of facts (black boxes, technologies, innovations), unlike other classical theories of innovation, such as the deterministic Rogerian *diffusion theory* (Rogers, 1995), which purport to discover pre-existing but otherwise hidden facts (usually by lone heroic discoverers or inventors). In traditional theories, once a fact has been uncovered, it mysteriously then begins to diffuse throughout society, largely intact and unchanging and propelled by power of its own self-evident factuality - like a bolt from Mjollnir (The hammer of Thor, Norse god of thunder) flying straight from the halls of Asgard right into the world of an unsuspecting and hitherto ignorant humanity.

ANT sees the creation of facts as black boxes that come into being when the interests of human and non-human actants in a single collective are aligned, thereby creating a (relatively) stable network. Facts are not diffused in the classical sense; instead, claims are translated and strengthened (or weakened) through the enrolment and inscription of additional human and non-human

actants. They are thereby constantly transformed as the network lengthens across time and space (McMaster *et.al.*, 1998:345-46).

1.3.4. From the perspective of ICT/IS and organisational change

Information systems are widely acknowledged to be of central importance to contemporary organisations. The relation between IS and organisation has been of central concern in IS research, with an increased focus currently on understanding the nature of mutual interconnections of IS and organisations (Orlikowski, 1992, 1993a; DeSanctis and Poole, 1994; Monteiro and Hanseth, 1996; Avgerou, 2001a). Such an approach emphasises that contemporary organisations are entangled with technology, and one cannot be analysed without understanding the other. This relationship between technology and organisation is constantly being negotiated over time. This entangled view of technology emphasises the role of context and also of processes and challenges. The ‘goal-based’ view of change advocates the role of factors internal to the organisation in influencing change (Kirton, 1980; Child, 1992), and the ‘adaptation’ model focuses on the role of external factors (Goodman, 1982; Levy and Merry, 1986; Hall, 1991). The view of technology adaptation is compatible with the ‘interactive’ view (Pettigrew, 1985, 1987; Slappendel, 1996) that regards organisational change as an emerging process based on the interaction of both internal and external forces, structural properties and managerial actions.

The planned view of change has been the dominant model in organisation and IS researches and assumes that individuals are rational in their actions and guided by goals of the organisations (Wilson and Rosenfeld, 1990; Wilson, 1992). Such a view is based on a deliberate, purposeful and explicit decision to engage in a program of change (Levy and Merry, 1986) to improve organisational performance. Top management is seen responsible as for creating and communicating a vision of the change initiative and the agenda of implementation to help attain this vision (Levy and Merry, 1986; Plant, 1987; Wilson, 1992). Top managers are seen as the primary source of the organisational change, and their actions as being crucial to improve the organisation’s “fit” with the environment. Planned change often treats culture in a functional way as a variable that can be managed, along with other variables like size,

structure and technologies, (Allaire and Firsirotu, 1984; Meek, 1988). In planned organisational change there is room for the use of external agents of change such as management consultants to initiate and/or support the change initiative. Different approaches have been suggested in order to help management plan for and implement ICT-related organisational change. Models such as those of Benjamin and Morton, (1988); Davenport *et al.*, (1989); Benjamin and Levinson, (1993) focused on the importance of having a strong management team to champion the change effort. Others have argued for a need to have a structural fit or appropriate technical fit with ICT innovation and organisation (Davenport and Short, 1990; Venkatraman, 1994).

In recent years, information system researchers have criticised the planned approach to change on the grounds of its ignoring the context and the process and its emphasis on control and technology determinism (Smirch, 1983; Suchman, 1987; Ciborra, 1999; Ciborra and Hanseth, 2000). Ciborra (1999), in his research work suggested that development and implementation of ICT initiatives should support micro-practices for the improvement of the use of the ICT in organisations. In this regard the improvisation approach plays an important role.

However, there are an increasing number of voices that argue that structure and people are not readily amenable to change. Oliver (1997) argues that many organisational practices are simulated within a strong and prevailing culture that is difficult to change. These institutionalised activities are generally upheld because of their longevity, which in itself is considered a sufficient condition for usefulness because of inertia and costs of change (DiMaggio and Powell, 1991). Planned change is typically a 'technological determinant' and sees technology as a primary and autonomous driver of organisational change (Blau *et al.* 1976; Carter 1984; Huber, 1990).

The increasing emphasis on the organisational context of IS has been accompanied by a change in focus from the use of computers within a specific organisation to a broader perspective analysing inter-organisational factors that influence ICT use (Reekers and Smithson, 1996). More recently the focus has been on national and

international factors that influence the use of ICT in organisations (Barrett, *et al.*, 1997; Walsham, 1998; Chriysochos, 1999; Bada, 2000; Madon and Sahay, 2001). These developments reflect an increased understanding of the diverse factors that influence the use of ICT and the appropriate approach required for studying them. Some such approaches that are increasingly being adopted are the contextualist approach, improvisation, drift and situated analysis.

A contextualist approach to studying ICT and organisational change focuses on the interaction of multi-level structures and systems within which ICT is implanted and the process of change that takes place over time (Walsham, 1993; Braa, 1997). The literature on the contextualist approach will be considered in more detail in Chapter 2. However, the contextualist model has been criticised for lacking an adequate theoretical underpinning and a conceptual model for linking the external context and the internal organisational context (Pettigrew and Whipp, 1992). For Pettigrew *et al.* (1992) it is important to complement rational models with others, which are able to identify the possible causes of change such as political, cultural and economic. In this way these models would be socially rich and able to capture the dynamic relationship between technology innovation and social changes in the organisational context.

Orlikowski (1996) described situated analysis or the situated change perspective, which sees change as endemic to the practice of organising and hence as enacted through the situated practices of organisational actors, as they improvise, innovate and adjust their work routines over time. Within this perspective, change has been seen as emergent from everyday practice and inseparable from the ongoing actions of the members of the organisation.

After the presentation of the four viewpoints of the research problem, the purpose and research questions of this study are highlighted in the next section.

1.4. Purpose and research questions

A key aim of this thesis is to develop and apply a conceptual framework for analysing ICT implementation in organisational and community settings but situated in the broader context of developing countries, where ICT implementation with development objectives is emphasised. While ANT provides the conceptual lens to scrutinize the translations occurring in micro-level settings, these dynamics are related to broader processes arising from globalisation and development. New discourses arising from these macro-processes are helping to create ‘new structures’ that both enable and constrain the micro-level dynamics. We draw upon structuration theory to understand these linkages between the micro and macro-levels, and how the potential for change exists, even in previously marginalized contexts like Mozambique.

In the previous section, four different perspectives of the research problem were discussed which emphasise the complexity of the relationship between ICT and organisations in the context of a developing country. The purpose of this thesis is to create a better understanding of the interplay between ICT and organisations in Mozambique. Understanding gained at the organisational and community levels has implications, such as how ICTs can be leveraged to effectively support broader development processes in Mozambique.

With this in mind, the study seeks to address the following research questions:

- How do we understand the dynamics of the ICT-related innovations (applications) within organisations and rural communities?
- What can be done in order to make the use of ICT more effective?
- To what extent is ICT contributing to development processes in Mozambique?

These questions are analysed at two interconnected levels. The macro-level addresses issues around development and globalisation, specifically the question of: ‘How do various actors in Mozambique (mainly Government, business and community leaders) leverage to support the country’s quest for global integration?’ At the micro-level, the implementation of ICT innovation is analysed in three different case settings. The

important question here is this: ‘How does an ICT innovation become institutionalised within a particular setting?’ These two levels, and their interconnections, are analysed during the course of this thesis.

Two of the case studies presented in the thesis are at the organisational level (Central Bank and electricity company of Mozambique) and the third in the community (Telecentre). The case analysis is conducted and sensitised to the social transformations currently occurring in Mozambican society, and the conflicts, tensions and expectations that emanate from these processes of change.

For several reasons, it is important to create a better understanding of the implementation of ICT-based initiatives in the Mozambican context. Firstly, an understanding of these processes will help organisations and government to apply ICT/IS more effectively in specific settings. Considering the large amount of resources demanded for the implementation of such initiatives, it is important that these resources be used effectively. Effective micro-level experiences can help to develop confidence in people and policy makers, who can then more broadly support the quest to be ‘included’ in the global process.

Secondly, an understanding of these processes may be of interest to members of society in general and, in particular, to those directly involved. An ICT innovation often affects the organisation or community as a whole and also those who are in contact with these organisations. This is especially important for the public organisations in their activities and for the quality of the product and /or services produced.

Thirdly, an understanding of these processes may address the linkage of development and globalisation discourse and ICT innovation in the context of Mozambique. Clearly, a better understanding of ICT dynamics in organisations might help us in directing the ICT applications for the priorities of the development of the country.

1.5. Significance of the research

It is generally assumed that ICT enables organisational change to take place and contributes to the socio-economic growth of developing countries (Madon, 2000; UNDP, 2001b). However, we need to gain a better understanding of the conditions within which such enabling potential is realised.

The first contribution of this thesis comes from the description and analysis of three case studies. This contextualist and situated analysis contributes to an increased understanding of the variety of organisational trajectories that are associated with the introduction of new ICTs. The nature of these trajectories is essentially not understood in the context of a developing country like Mozambique.

The second contribution arises from implications for policy makers, responsible for promoting ICT and developmental strategies. Policy makers need to understand the function, dynamics and causes of why and how ICT projects fail at the micro-level, and how these reasons can be addressed through policy interventions. For example, a number of projects in developing countries fail because of managers not having an appropriate blend of both technical and social skills (Bada, 2000; Yahaya, 2000). These differences require interventions in educational policy such as curriculum changes.

By explicitly considering the interaction between ICT innovation, organisational and development in local (specific) contexts, policy makers can develop approaches to break the vicious circle of organisational under-development and poor ICT infrastructure, and help to initiate a virtuous circle of organisational development made possible by ICT innovation.

In summary, this study aims to be of significance to policy makers, IS researchers and professionals, and to managers and users. In this study, it is expected that the key contributions will arise from the application of the theoretical framework to empirically analyse the interplay between development and ICT dynamics at the

organisational and community level. This interplay is shaped by the processes of globalisation. This implies that a better understanding of the contribution of ICT to socio-economic national development will be gained.

1.6. Setting the scene: the three case studies

In Mozambique, the government has launched a recovery development programme, which aims to alleviate conditions of dire poverty within the country. The recovery programmes manifest themselves across the economy and society as part of a general package of reform, known as the Poverty Alleviation Programme (PARPA), (Governo de Moçambique, 2001a). The PARPA is a comprehensive programme of reform aimed at restructuring the economy by introducing changes in the country's public and private institutions as well as in rural communities with a view to improving the basic living conditions of Mozambican citizens. The rural community is targeted as the first priority with a view to reducing the imbalance between different parts of the country.

Recently, the Government of Mozambique launched a national strategy of reform of the public sector (Governo de Moçambique, 2001b) as part of the overall PARPA framework. It involves, among other issues, reduction in government spending for the public sector and increased modernisation of the public sector.

It is within this context of reform that the following three case studies are empirically investigated: (a) implementation of a computer-based information system in a public company – an electricity company (b) business process re-engineering in a bank and (c) an ICT-based project (Telecentres) at the community level. A brief overview of the three cases is follows.

Within the electricity industry the government established the objective of extending the electricity infrastructure across the whole country, and reducing the cost of production and distribution. The electricity industry is experiencing various

transformations with a view to improving its public services and becoming more 'customer-oriented'.

Since 1993, there has been an increase in the number of licensed banks, from 2, in 1993, to 12 commercial banks in 2000, and more than 30 different exchange houses. Moreover, the role of the central bank in the financial sector has been growing (BM, 2000). Based on this situation the BM decided to embark on a modernisation programme in order to face the new challenges of the times. Business process Re-engineering (BPR) should be seen as a component of the modernisation initiative within the BM.

The Telecentre project is the first experience in Mozambique of introducing an ICT project in rural communities. Considering that the rural community is one of the government priority areas for the PARPA, this case is essentially an interesting and relevant one to analyse. Conclusions drawn from this case analysis can have larger implications for national development policy.

In general, there is a proliferation of ICT solutions in the country, which have implications for a range of different services. In Mozambique at present, banks, public and private institutions and government spend a considerable amount of resources on ICT in order to improve their services. In general, the public and private institutions, and financial institutions in particular, are increasingly automating their processing with a view to providing faster and better quality services to customers. However, little is known of the actual gain of these projects on the ground.

Simultaneously, there is also an increase in the level of activities of international aid agencies, multinational enterprises and ICT management consultants who advise local organisations and government institutions to become global players through introducing strategic planning and major restructuring programmes (Price and Johri, 1992). Despite this increase in ICT-related projects in organisations and communities, the precise nature of these changes has not been studied. Some studies have only focused on conducting cross-sectional examination factors that influence ICT

diffusion (Kluzer, 1992, 1993), without a detailed study of the nature of associated organisational changes. Therefore, the Telecentre, banking and electricity industry can indeed be considered an appropriate setting for a study which aims to examine the interplay of the ICT dynamics and development under the globalisation trend. A more detailed discussion of each case study is undertaken in Chapter 4.

1.7. Structure of the thesis

The thesis is organised into six chapters. Chapter 1 has presented the justification and motivation of the study built around four different perspectives (a) Globalisation (b) Development (c) Transfer of ICT innovation and (d) Relationship between ICT/IS and organisational change.

Chapter 2 describes the natural context and some implications of globalisation. It is divided into three parts. The first part presents the background of Mozambique in terms of geography, socio-economic status and ICT infrastructure status. The second part covers the literature review. Finally, the third part presents a framework starting from Du Plooy's work on human environment for the adoption and use of IT (Du Plooy, 1998) and based on the contextualist approach and situated analysis to study ICT innovation in a specific context such as a developing country (Mozambique).

Chapter 3 is devoted to an overview of the relevant research approaches in information systems, research methodology and assumptions adopted for epistemology and ontology. In addition, it also outlines the case study strategy applied in this research work.

Chapter 4 and Chapter 5 describe the case studies and analysis respectively. Chapter 4 starts by outlining the fieldwork process and the organisational context and then describes each case study in terms of the implementation of the ICT-related initiative in each case. Chapter 5 commences with the examination of each case study through translation under the ANT perspective, and continues with an interpretation of the

field results through analysis of the social and local context (human environment) in which the process of adoption and use of ICT initiatives is taking place. The contribution of each case study to development is examined and the initial framework for the analysis of the case studies results presented in Chapter 2 is refined.

Finally, in Chapter 6, an overview is given of the research analysis presented by examining how the research questions have been addressed. The research contributions and their implications are discussed and evaluated against criteria formulated by researchers in the field. The limitations of the research and potential areas for further research are also discussed.

Chapter 2

Background information on Mozambique, literature review and framework for analysis

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Background information on Mozambique, literature review and framework for analysis

2.1. Introduction

In Chapter 1, we articulated the problem of ICT implementation in Mozambique and how this was shaped by broader processes of globalisation, development, transfer of ICT innovation, and micro-processes of change within organisations. This chapter presents background information on Mozambique and situates the question of ICT within development and globalisation processes. This background helps to sketch an organisational analysis, for which it draws upon actor-network theory, structuration theory and contextualist approach. This helps to design the framework for the analysis of the results case studies.

The chapter is organised into 3 parts. The first part describes the background information on Mozambique, including demography, existing ICT infrastructure and human resources. The second part is concerned with a review of social theory, with particular emphasis on actor-network and structuration theory, and aspects of change in organisations. The last part is concerned with the design of the framework for the analysis of the field results.

Part I: Background information on Mozambique

2.2. Background of Mozambique

The background information is presented under three headings. The first provides a review of the political situation. The second describes demographic conditions including geography and population. The third section describes the situation regarding ICT infrastructure in the country.

2.2.1. The country: an overview of the political situation overview

Mozambique, an African country, was colonised by Portugal for a long period of about five hundred years. Mozambique engaged in an armed struggle for its independence from 1964 to the 1974, and independence was gained on the 25th of June 1975 under *Frelimo* single party rule. Following independence, many skilled people and professional workers fled the country, unable or unwilling to endure the arduous adjustment to the new social and political conditions. For example, the only existing university in the country at that time had its academic staff reduced to 5 Mozambican professors (Eduardo Mondlane University (EMU), 1989). This exodus of skilled staff also took place in different socio-economic sectors of the country, like health and agriculture.

The new government based its vision on a centralised economy. During the first two years of its existence it launched a programme to nationalise different companies considered to be strategic for development. It was under this programme that the Electricity Company of Mozambique (EDM) was established as a result of the nationalisation of all companies that dealt with the production and distribution of electricity in the country.

Shortly after gaining independence, a civil war broke out in Mozambique which affected all aspects of development and led to millions of Mozambicans being displaced. This war, apart from causing serious loss of life, destroyed the socio-economic infrastructure in the country, such as schools, health facilities, telecommunication and electricity networks. In 1990, a new constitution was adopted in the country and a multiparty system was established. The country changed its official name from the People's Republic of Mozambique to the Republic of Mozambique (Governo de Moçambique, 1990). In 1992, after many rounds of negotiations, a peace agreement was signed between the parties involved in the civil war (Mozambican Government and the *Renamo* Movement) (Awepa, 1992). Since then the country has been in peace under a multiparty ruling system.

2.2.2. The country: geography, population and economy

Mozambique is a country situated in South-eastern Africa between the parallel 10 degrees 27' north and 26 degrees 52' south, and between the meridian 30 degrees 12' east and 40 degrees 51' west. It is bounded by the Indian Ocean to the east, Tanzania to the north, Malawi, Zimbabwe and South Africa to the west, and Swaziland and South Africa to the south (map 2.1). The total area of Mozambique is about 801,509 square kilometres. The northern and western regions are mainly mountainous and hilly. Parts of the central and the coastal region consist of large plains.

Administratively, Mozambique is divided into eleven provinces, with Maputo as the capital city of the country. The provinces are divided into districts and the districts into administrative posts. In total, the country has 128 districts, 23 cities, 387 administrative posts and 68 towns (International Institute for Applied Systems Analysis (IIASA), 2001)



Map 2.1: Map of Mozambique

The climate is predominantly tropical, with three main sub-climates: a humid tropical climate in the northern, central and southern coastal areas; a dry tropical climate in the south and the Zambezi valley; and a high altitude tropical climate in the mountainous regions in the interior. The country's flora is mainly open forest and savannah. The

climate is characterised by two principal seasons, the rainy season, which lasts from October to November and the dry season, which last through the middle of the calendar year from April to May. Mozambique has an average annual rainfall of between 1,000 and 1,500 mm.

Based on the census data from 1997, the estimated population of Mozambique in 2000 is about 17,242,240 inhabitants (Instituto Nacional de Estatística (INE), 1999). The density of the population was approximately 21 people/Km². Nearly 75% of the population live in rural areas. About 45.7% of the population consists of children under 15 years of age. The average household size is 4.6 persons. More than 70% of the households are headed by men, (INE, 1999). Longevity, measured as life expectancy at birth, was estimated at 46 years for the population as a whole (ibid.).

Living conditions in Mozambique are poor. The majority of houses are without electricity, piped water and sanitation. Only about 5% of houses have access to electricity (25% of houses in urban areas and only 2% in the countryside), 15.3% of houses have access to piped water (2.4% inside the house, 6.1% outside the house and 6.8% stand pipe) (United Nations Development Programme (UNDP), 2000b). More than 60% of the population is illiterate. More than half of the male population is literate in contrast to little more than 20% literacy among female population. Total gross national product (GNP) for 1997 in Mozambique was estimated to be approximately US\$2.4 billion, and per capita GNP was US\$143 (ibid.).

In 2001, the United Nations Development Programme calculated the human development index (HDI) which comprised of three basic components of human development: longevity (life expectancy), knowledge (adult literacy and mean years of schooling) and standard of living (purchasing power based on real GDP (Gross Domestic Product) per capita). An index lower than 0.500 is considered a low HDI, an index between 0.500 and 0.799 is a medium HDI and an index equal to or higher than 0.800 is a high HDI. The HDI in 2000 for Mozambique was calculated at 0.341, categorising Mozambique as having “low human development”. The country with the

highest HDI is Norway (0.939), and the lowest is Sierra Leone (0.258) (UNDP, 2001a). The ranking of Mozambique in HDI is 157 in a group of 162 (ibid.).

About 60% of the Mozambican population has a monthly income equal to or lower than US\$20; the national poverty line, adjusted for differences in the cost of living in various parts of the country is about US\$0.50 (fifty US cents) per person per day. At the national level the incidence of poverty is 69.7% (UNDP, 2000b).

2.2.3. The country: ICT infrastructure, utilisation and experiences

The UNDP, in 2001, introduced the concept of the Technology Achievement Index (TAI), which attempts to capture how well a country is creating and diffusing technology, and building human skills. TAI is not a measure of whether the country is leading in global technology development but focuses on how well the country as a whole is participating in the creation and use of technology. TAI has four components: creation of technology (capacity to innovate and creative adaptation), diffusion of recent innovations (for example, the Internet), diffusion of old innovations (for example, telephone and electricity) and human skills (indicated by mean years of schooling and enrolment of students in tertiary education in science, mathematics and engineering) (PNUD, 2001). These components taken together reflect the capacity of the nation to participate in technological innovations at the present time.

A TAI index below 0.20 is considered low (marginalised countries), between 0.20 and 0.34 is for dynamic adopters, an index between 0.35 and 0.49 is potential leaders and an index equal to or higher than 0.50 is a high TAI (leaders). The TAI for Mozambique was the worst in the world calculated at 0.066, reflecting a state of extreme marginalisation in terms of participation in the creation and use of technology. The country with the highest TAI is Finland (0.744) (PNUD, 2001).

In 2000 the Government of Mozambique conducted the first national survey on ICT infrastructure. The results of the survey indicate that the country is gradually entering

the global information society. However, the spread is very uneven with more than 50% of the ICT equipment and infrastructure being located in the capital city, Maputo (*Comissão Nacional da Política de Informática (CPI), 2000*). The present ratio of Mozambican inhabitants per computer is 3:1000 and in relation to Internet use, 2:10 000 (Gaster, 2001).

Telecommunication data

In Mozambique, telecommunication services are provided in a monopolistic arrangement through a public enterprise called '*Telecomunicações de Moçambique*' (TDM).

The national telecommunication density is around 0.46, indicating that many Mozambicans still do not have access to telecommunication facilities, particularly those who live in rural areas (TDM, 2001).

Table 2.1 below shows some telecommunication data in terms of services. Although the data show that the TDM is increasing its capacity in offering more telecommunication services to the Mozambican population in general, there is still much work to be done in order to extend these services to the majority of Mozambican citizens.

Table 2.1: Mozambique telecommunication infrastructure data (source: TDM, 2001)

| | 1997 | 1998 | 1999 | 2000 |
|--|-------------|-------------|-------------|-------------|
| Installed capacity in telephone communication | 104556 | 105612 | 113606 | 121754 |
| National network connection capacity (circuit) | 8745 | 8995 | 17017 | 20457 |
| Primary external network capacity (par) | 126049 | 129424 | 136459 | 147359 |
| Secondary external network capacity (par) | 171107 | 176177 | 185917 | 197231 |
| Installed network line | 9423 | 13319 | 13516 | 18354 |
| Number of telephone lines | 65606 | 75354 | 78072 | 85714 |
| Mobile phones | 2500 | 6725 | 12243 | 51065 |
| Internet providers through telecommunication company (TDM) | 5 | 5 | 5 | 6 |

The telephone system is relatively good in urban areas and a fair service can be found in rural areas. In 1995 Mozambique had just one provider for the Internet services, about 100 Internet users and in the year 2000 the figures changed to 10 Internet

service providers (ISP) and about 2: 2536 Internet users, (African figure 1:5000 and South Africa 1:65) (CPI, 2000). Currently, the country has 13 schools with access to the Internet, as part of the Schoolnet project (ibid.). These data show how unequal Mozambique is in terms of Internet access, i.e. its digital divide status. Digital divide refers to inequality of access to Internet. Access is only a precondition for overcoming the inequality in a society dominated by functions and social groups around the Internet.

The diffusion of Internet use is very rapid in global terms. Castells (2001) in his work on Internet access, presents data that show the level of Internet penetration in different regions of the world's population. These data refer to September 2000, and in this period there were approximately 378 million Internet users, representing 6.2 percent of the world's population. These percentages of users were distributed as follows: North America had 42.6%; Western Europe accounted for 23.8%; Asia region with Japan included had 20.6%; Eastern Europe 4.7%; Latin America 4%; Middle East 1.3% and Africa .6% (most of users are from South Africa).

ICT-related facilities

Table 2.2 shows the basic data of ICT obtained from the ICT national survey. From this table, it is clearly evident that the majority of Mozambicans are still far away from having access to computers and Internet-related technologies. There are also differences among provinces within the country and compared to the rest of the country the capital city Maputo has the best ICT statistics.

Table 2.2: Basic data from the ICT survey (source: CPI, 2000)

| Designation | Cabo Delgado | Niassa | Nampula | Zambézia | Tete | Manica | Sofala | Inhambane | Gaza | Maputo Province | Maputo City | Total |
|------------------------------|--------------|--------|---------|----------|------|--------|--------|-----------|------|-----------------|-------------|-------|
| Number of existent Computers | 65 | 172 | 402 | 337 | 348 | 203 | 880 | 79 | 118 | 712 | 8201 | 11516 |
| E-mail access | 18 | 16 | 66 | 90 | 13 | 122 | 110 | 13 | 17 | 768 | 4 024 | 5257 |
| Internet access | 9 | 15 | 50 | 36 | 13 | 17 | 78 | 11 | 14 | 64 | 2 229 | 2536 |
| No. of ICT professionals | 12 | 9 | 32 | 82 | 37 | 13 | 154 | 3 | 5 | 25 | 693 | 1064 |

As Castells (2001:269) stated:

The fundamental digital divide is not basically measured by the number of connections to the Internet, but by the consequences of both connection and lack of connection. Because the Internet, as shown in this book, is not just a technology. It is the technological tool and organisational form that distributes information power, knowledge generation and networking capacity in all realms of activity.

Castells argued that presently there is unlikely to have worldwide development without Internet-based support.

Because without an Internet-based economy and management system, there is a little chance for any country to generate resources necessary to cover its developmental needs on a sustainable ground – meaning economically sustainable, socially sustainable, and environmentally sustainable. (Castells, 2001: 269).

Zuboff (1996) argues that the notions of an information economy and informed organisations will not be taken place if traditional actions and procedures about management, work are simply included in new ways.

She explains as follows:

An information economy requires more than infrastructure investment. It requires a new social moral vision, binding members of the firm together in ways that contrast profoundly with the well worn emotional pathways of the industrial hierarchy. Until these matters are seriously engaged by the leadership in a majority of our business organisations, the notion of an information economy is much like the foolish emperor of fairy tale fame, naked and very much at risk (ibid.:2).

ICT Policy and its implementation strategy

In 1999 the government of Mozambique created an official commission under the leadership of the Prime Minister with the task of designing a national ICT policy. For the composition of the commission, see Appendix 2.1. This policy was developed through a participative process in which citizens representing various groups were involved over several months.

The ICT policy describes the framework to integrate ICT issues into overall national development strategies. It outlines guidelines, principles and objectives to enable this integration to take place.

In terms of the policy it is argued that ICT efforts need to be integrated with the country's different developmental aspects, such as programmes for the reduction of dire poverty, the improvement of the basic living conditions of the citizens, enhancing educational and knowledge development, improving the quality of services in public and private institutions, and increasing the participation of citizens in democracy and political life. The ICT policy was approved by the government in December 2000 (Conselho de Ministros, 2000).

The main objectives of the ICT policy were defined as follows:

- To raise awareness among Mozambicans of the potential role of ICT in sustainable development.
- To contribute to the elimination of dire poverty and to the improvement of the living conditions of Mozambicans.
- To provide universal information access to all citizens.
- To contribute to increasing quality in public and private institutions.

The role of different stakeholders in achieving the above objectives was clearly defined in the ICT policy, including government, the private sector, higher education and research institutions, and society at large, as well as international development agencies. The policy also defined the following priorities:

- Education and Human Resources
- Health
- Universal Access to Information
- ICT Infrastructure
- Governance.

Other areas include agriculture, natural resources, tourism and environment, public security and electronic commerce, etc.

In 2001, the Mozambican national commission for the development of ICT policy also developed an ICT implementation strategy in the defined priority areas. The ICT implementation strategy consists of defining and designing programmes and projects. Within each area of intervention, different high priority projects were identified to be launched in the short term (2001 to 2004) and long term (beyond 2005) (CPI, 2001).

ICT Utilisation and experiences

The use of ICT in Mozambique can be traced back to the second half of 1960s, when the first computer (of unknown type) was introduced into a tobacco company (Kluzer, 1993). However, the Railway Company had begun using mechanical tabulators for statistical purposes on transit trade in the late 1940s. In the sixties the main objective of using computers in different companies was to support the provision of administrative and accounting operations (ibid.).

The situation now has changed quite significantly, and ICT tools can be found in various areas of socio-economic development and in society in general, both at home and in workplaces (CPI, 2000).

One example is the pilot project on ICT utilisation in health care. This involves the use of GIS (Geographical Information Systems) for mapping malaria areas in the country; health information systems at the district level to strengthen the management of health facilities; tele-medicine so that patients in remote areas can have consultations where specialised medical services are not available.

In the area of education, there are experiences of using ICT-based tools in the learning and teaching process. For example, within the *Acacia* programme there is a Schoolnet project, the aim of which is to introduce and use Internet-based tools in pre-secondary schools in Mozambique (schools which provide 11th and 12th classes). EMU is currently preparing a project proposal for the introduction of distance education in the country, with the aim of using ICT as an enabler for the process. Presently, a national NGO '*Fundação para o Desenvolvimento da Comunidade*' (FDC) is involved in an initiative to establish networks for primary schools in the rural areas (6th and 7th grades). These examples have strong records of investment in human capital.

However, the Mozambican Government, supported by other development agencies and the private sector, will continue to allocate resources to the education network.

Currently, the country is experiencing a process of testing the use of ICT and related technologies insofar as they contribute to rural development. The establishment of Telecentres is an example of this initiative. Additional information related to the Telecentres experience in Mozambique is provided in Chapter 4 of this thesis.

Different public and private institutions are implementing ICT-based solutions in order to improve the quality of provision of their services. In Chapter 4 of this work, a description of two case studies is presented, addressing the adoption and use of ICT-related initiatives in the banking and electricity industries.

Human resources – specifically, IT

In recognition of the key role of human capital as an engine of the global information economy (UNDP, 1999, 2000a, 2000b, 2001a, 2001b), the Mozambican ICT policy has identified the area of human resources as a priority for development (Conselho de Ministros, 2000). Strategies for ICT education and human resource development are considered critical, and only by developing skills and capacity can the country succeed socially and economically (CPI, 2001).

According to recent statistical data, only about 40% of the Mozambican population are classified as literate, while a further 10% have received tertiary training, and less than 1% of the overall population has ICT skills or experience (Massingue, 2001). From Table 2.2 it is clear there is a shortage of ICT professionals countrywide. This tremendous shortfall in ICT skills is reflected in the fact that since the inception of the informatics degree course in 1987 at the EMU, only around 100 students have graduated (Departamento de Matemática e Informática (DMI), 2002). This tremendous shortage emphasises that the ICT skills shortage has been and will continue to be one of the most serious challenges to the process of adoption and use of ICT within the country, and in particular, in public sector organisations.

After presenting the overview of the background of Mozambique, the next part of this chapter will review the different theories that constitute the pillars of this research work.

Part II: Literature review

2.3. Social theory

2.3.1. Actor-network theory

The objective of this section is to provide a brief overview of actor-network theory (ANT) in IS studies and also to demonstrate its applicability to this study.

This section is divided into three subsections. The first subsection covers ANT concepts and the sociology of translation in particular. This is followed by a subsection which articulates the role of ANT in IS and, finally, the third subsection highlights the limitations of ANT.

2.3.1.1. Actor-network concepts and the sociology of translation

Actor-network theory is an alternative approach to the theory of social construction of technology for the conceptualisation of the role of technology in micro-studies.

Drawing on the key concepts and the assumptions for the social shaping of technology, Callon and Law (1989) make use of the actor-network approach to emphasise the interrelated and heterogeneous character of all components (social and technical). Actor-network theory is mainly concerned with researching the social and technical issues related to technology. The theory assumes that social and technical factors are inextricable. This means that people and artefacts have to be analysed within the same framework and context (Latour, 1987; Akrich, 1997; Akrich and Latour, 1997). The symbolic boundary between people and ICT is in a constant state of flux across a wide spectrum of contemporary work and leisure activities, and actor-network theory offers one way to research the issues and dilemmas in this new world.

Work in the sociology of scientific knowledge and social studies of technology has contributed to an understanding of technology as an integral part of social life (Barnes *et al.*, 1996). In actor-network theory as articulated by Latour (1987; 1991, 1997b) and Callon (1986; 1991), technological innovation is viewed as an attempt to build

and stabilise a diffuse system of allies composed of both human and non-human entities. The idea of an actor-network centres around the notion that the development of technology involves the building of networks of alliances between human and non-human actors. This corresponds to a breakdown of the clear division between science and society, and it argues that there is no such thing as a social problem that does not have technological components, nor is there a technological problem that does not have social components. No project is purely technical, nor is it purely social. Actor-network theory proposes the use of networks of interrelated human and non-human actors who shape the way things are, as 'actor-networks'. This renders possible the circumvention (avoidance) of technological determinism in which technical projects and innovations proceed naturally unless they are actively stopped, and replaces it with the idea that things do not happen unless human and non-human actors make them happen.

One of the strengths of the actor-network approach is the systematic avoidance of what can be called 'methodological dualism': the drawing of *a priori* distinctions between what is 'technical' and what is not (and is therefore by implication 'social') (Bloomfield and Vurdubakis 1997:85). 'Rather than assuming that we are dealing with two separate, but related, ontological domains - technology and organisations - we propose to regard them as but phases of the same essential action' (Latour 1991:129). The presumed separation between technology and organisation is a sense-making device, one of the means by which we orient ourselves in the world (Bloomfield and Vurdubakis 1994). In ANT, identities are negotiated through the deployment of various human and non-human intermediaries, which thereby mediate the relationships between actors. Intermediaries are passed between actors. This can imply a distinction between actors who have agency, and intermediaries, which are seen as essentially passive. However, it should be noted that attributions of agency versus passivity are context-dependent, made for particular purposes (Bloomfield and Vurdubakis 1997). For instance, in the case of the use of IT in the NHS (National Health System) studied by Bloomfield and Vurdubakis (1997:89), the intermediation between the domain of technology and the (social) world of the organisation is interlinked with the intermediation between the professional groups of management

and clinicians, and their respective rationalities (medical/administrative). Thus, in addition to constituting/negotiating the boundary between the ‘technical’ and the ‘social’, the IT-review at the NHS is an intermediary device which effects translations between the worlds of management and medicine, the commercial ethos of management consultancy and the public service orientation of the NHS (Bloomfield and Vurdubakis 1997).

The theory (ANT) is not a stable body of knowledge that can be used by researchers in an unproblematic way, since its developers themselves have frequently revised or extended elements of it (Braa, 1997; Walsham, 1997, 2001). However, there are some basic concepts of ANT that have remained relatively stable over the last few years. From the work of Walsham (1997, 2001) and based on Latour’s viewpoints (1996, 1997a), Table 2.3 presents some key concepts of this theory.

Table 2.3: Summary of ANT key concepts (source: Walsham, 1997, 2001)

| Concepts | Description |
|---------------------------|--|
| Actor or actant | Actor network is the heterogeneous network of aligned interests including people, organisations and standards |
| Enrolment and translation | To create a body of allies, human and non-human through a process of translating their interest to be aligned with the actor network |
| Delegates and inscription | They are actors who ‘stand in and speak for’ particular viewpoints which have been inscribed in them |
| Irreversibility | The degree to which it is subsequently impossible to go back to a point where alternative possibilities exist |
| Black box | A frozen network element often with properties of irreversibility |
| Immutable mobile | A network element with strong properties of irreversibility and effects which transcend time and place |

Based on an overview of actor-network theory, Walsham asserts that:

ANT examines the motivations and actions of actors who form its elements, linked by associations, of heterogeneous networks with aligned interests. It is also recognised that a key future of the theory is that actors (or actants) are taken to include both human beings and non-human actors such as technological artefacts. A major focus of the theory when applied in particular contexts is to try to trace and explain the processes whereby relatively stable networks of aligned interests are created and maintained, or alternatively to examine why such networks fail to establish themselves (Walsham, 2001: 46).

Sociology of Translation

One of the main concepts of ANT is translation, which means that an entity A defines B. There is no difference if B is human or non-human, collective or individual. B might be endowed with interests, projects, desires, strategies, reflexes or afterthoughts. All translations must be collected in the network. There should not be a difference between those that are reasonable and those that are considered unrealistic. All entities and all the relationships between these entities should be described, for together they make up the translator. Translation is concerned with the process of definition and inscription. The relationship between actors and their networks is never finally resolved.

The sociology of translation is based on Latour's (1991) alternative to technological determinism, in which things do not happen unless other actors make them happen. It implies that each actor who takes the project further may take it in a different direction than that intended by the previous actor. Latour (*ibid.*) uses the term 'translation' to describe this effect, playing on both of its meanings. The innovation is translated or carried from one position to another in the sense of a mathematical manipulation; the innovation is also interpreted or transposed from one position to another in the linguistic sense of the word 'translation'. Translation operates between actors: an actor gives a definition to another actor, imputes to him/her/it/them interests, projects, desires, strategies, reflexes and afterthoughts (Callon, 1991). An actor might be the company that has conceived, produced and distributed a machine, and another actor its users. The translation operation is regulated by conventions that are more or less local, and are always revisable (Callon, 1991). The final shape and position of the innovation is unlikely to be that of the original developers. In each stage of its life, the project is taken and adapted by the actors that become involved in it. Only in the rare case when the future users can be persuaded to follow the initial goals, does the innovation proceed as originally planned. All too often, however, the issue becomes unfocused and unintended effects occur.

When an innovation is introduced into an organisation, it creates a new meaning and therefore disturbs the circuit of social integration. The new meaning is fixed in the obligatory passage points. An obligatory passage point (OPP) occurs in an actor-

network linked by discourses presenting the solution of a problem in terms of resources owned by the agent that proposes it. An OPP will allow the creation of alliances and control over resources that agents need to achieve their outcomes. The concept of OPP was developed within the sociology of translation and actor-network theory (Callon, 1986; Latour 1987, 2000). Callon (1986) characterizes four moments of translation through the following concepts:

a) *The problematisation or how to become an indispensable actor*

Certain actors, or initiators, attempt to impose their definition of the situation on the others. Thus, they seek to be indispensable to other actors by defining the nature of the problems and suggesting that these problems would be resolved if actors negotiated the ‘obligatory passage point’ suggested by them. This includes

- The inter-definition of the actors and
- The definitions of the obligatory passage points.

In the problematisation phase, a primary actor or initiator problematises an issue. Initiators define the problems and identities of other actors in a way that makes the former an obligatory passage point for the solution of the problems or issues. It is a stage in the process of network building where certain actors are concerned with defining their identity and other actors’ identities in the network.

b) *The devices of ‘interessement’ or how the allies are locked into place*

This is a series of processes by which the initiators seek to lock the other actants into the roles that are proposed for them in that programme or initiative. At the general level of ‘*interessement*’ is ‘actions by which an entity attempts to impose and stabilise the identity of other actors it is defined through its problematisation’ (Callon 1986: 207-8). This means that one actor (or certain actors) raises issues and defines the identities of other actants. The initiator achieves this by making himself indispensable to the actors and indispensable to the solution for the problem. After the identities of the actors have been defined, those experiencing the problem must be isolated. This isolation consists of impeding any other possible alliances or interference that might

challenge the legitimacy of the OPP. If the '*interessement*' is successful it will confirm the validity of problematisation and the alliances.

c) Enrolment: How to define and co-ordinate the roles

Enrolment is a set of strategies in which the initiators seek to define and inter-relate the various roles they allocate to other actors. It requires the initiator to convince other actors to join him. Thus it is a multilateral power process. Intentions and intentional influences are of central importance in organisational life. This is emphasised in what is labelled as 'ideological control'. This control takes place by influencing ideologies held by organisational actors, shaping their ideas of what reality is about, how reality should be, and how the desired state can be achieved. Ideological control in organisations tends to be based on authority rather than on motivation. Thus motivation is central to enrolment since enrolment has to do with binding elements together. Successful networks of aligned interests are created through enrolment of a sufficient body of allies, and the translation of their interests so that they are willing to participate in particular ways of thinking and acting that networks maintain. Enrolment can be seen as a successful outcome of problematisation and the '*interessement*' processes.

d) The mobilisation of allies: the spokespersons as representative

During the mobilisation stage, the initiators use a set of methods to ensure that spokespersons for relevant collectives are able to represent those collectives properly, so that the initiators are not betrayed by the spokespersons. This step consists of establishing the legitimacy of the spokesperson.

The movement between each step is called displacement and when displacement occurs power is exercised. Information systems can be viewed as OPPs. For example, in practice some commercial airlines force travel agents to use their reservation systems. Those airlines have converted their systems into successful OPPs that travel agents must traverse if they want to sell airline tickets.

Of particular interest are the related concepts of stability, irreversibility, convergence and obligatory passage points. Network building is a search for stability which is

made possible to the extent that changes set in train during network construction become irreversible (Callon, 1991; Law and Callon, 1997); either because it would be too costly to reverse them or because to do so becomes unthinkable. According to Callon (1991), convergence and irreversibility of techno-economic networks are both involved in the acts of translation and the networks that they sometimes succeed in forming. Convergence is the degree of accord (alignment and co-ordination) engendered (provoked) by a series of translations, i.e., convergence measures the extent to which the process of translation and its circulation of intermediaries leads to agreement. Controversies are translation as betrayal. The network is constructed according to the translation's own logic. A translation is irreversible in that it is impossible to return to a previous situation. Convergence can increase or decrease, and the same holds for irreversibility. The impossibility for other (past or future) translations developing and imposing themselves is a battle, a fight that is never definitely won. Irreversibility taken as the predetermination of translations and as the impossibility of a return to competing translations, is synonymous with normalisation. A network which irreversibilises itself is a network that has become heavy with immutable, durable devices (frozen elements or 'black boxes') and inscriptions, norms of all sorts and which, as a result, slips into a codified methodology and information system. If there are numerous and heterogeneous actants interrelated in the network, there will be a need to have a greater degree of network co-ordination. This will lead to a greater probability of successful resistance to alternative translations.

In summary it can be said that actor networking mixes humans and non-humans with inscriptions of all types. It can be understood through the study of translation operations, which inscribe the mutual definitions of relevant actors in the intermediaries in circulation. In this type of network it is clear that the behaviour of an actor is not fixed. It changes with the state of the network, which is also a product of previous actions. In this situation, it seems important to start the analysis of the network from the perspective of the actors and their changeable conditions.

The difference between the adoption and use of ICT from the traditional and ANT perspectives is presented in Table 2.4 through reinterpretation of the key concepts of the Rogerian diffusion theory, using ANT vocabulary.

Table 2.4: Diffusion reinterpreted as translation (source: McMaster et al. 1997)

| | Diffusion | Translation |
|------------------------|--|---|
| Innovation | A technology perceived to be new by the adopter | A technology yet to be 'black-boxed' |
| Communication | Channels (cosmopolite/localite) (mass media/interpersonal) through which innovations are transferred | Inscriptions and translations are made |
| Time | Speed of decision to innovate; earliness of adoption; rate of adoption | Network dynamics enrolment, control and dissemination |
| Social system | Homophily - sharing of interests of human actors | Interest - between actants (human and non-human 'actors') and goals - black boxes from when interests move in the same direction |
| Technology | Changes are made to the form and content of technology as a result of experiences of implementation (reinvention) | The technology changes (are translated) through being enrolled, regardless of whether the form or content of the technology is modified |
| Socio-technical stance | Social system and technology are separate - diffusion is adoption of technology by social system (technology transfer requires the bringing together of social and technical elements) | Social system and technology are inseparable - successful technology transfer gives the appearance of separation, but this is merely evidence that the actor network has stabilised |

2.3.1.2. The role of actor-network theory in IS

Some of the above concepts can be related to understanding attempts to build socio-technical information systems, which are adopted within an organisation. This cannot be explained 'solely by recourse to mere "technical" factors. Nor can it be explained by reference to the supposed effects of some powerful social forces which were "always there" but somehow mysteriously overlooked' (Bloomfield *et al.* 1997:130). Instead, to explain these deviations in information systems development, use and

implementation, we can consider several of the processes inherent in the building of heterogeneous actor-networks. The notions of intermediation and translation were used to good effect in the research on IT at the NHS by Bloomfield and Vurdubakis (1997). Attempts to apply actor-network theory in other disciplines were also presented in the 'Actor-Network Theory and After' conference in July 1997 at Keele University. These attempts were in such fields as sociology (Barry and Elam, 1997), health ethics and policy (Berg, 1997), ecology (Cussins, 1997), cultural studies (Hatt, 1997), urban planning (Murdoch, 1997), and linguistics (Myers, 1997). A selection of the conference papers has recently been published as a monograph (Law and Hassard, 1999). A special issue of *Organisation*, including a themed section on actor-network theory and managerialism, has been published in which several papers discuss how actor-network theory can be used for organisational analysis (Hassard, Law and Lee 1999). The use of ANT in IS research is increasing, e.g., Scandinavian academics are applying the sociology of translation and inscription to study information infrastructures (Monteiro and Hanseth, 1996; Hanseth and Monteiro, 1997; Monteiro, 2000). Organisational theorists at Gothenburg University are applying ANT, and in particular the sociology of translation, to organisational processes, institutional transformations, management and organisational identities (e.g., Czarniawska, 1998; Adolfsson, 1998; Dobers, 1998).

In a discussion of actor-network theory and IS research, Walsham (1997) observes that software devices can be seen as network elements which display strong properties of irreversibility and are mobile across time and space. He also reviews several recent applications of actor-network theory to IS empirical research, some of which were contained in the proceedings of the IFIP Working Group 8.2 Conference in Cambridge (Orlikowski *et al.*, 1996). They were as follows: the inscription of work in a classification scheme for nursing work (Bowker *et al.*, 1996); the process of translation in activity-based costing and accounting technology (Boland and Schultze, 1996); the processes of inscription and translation in the role of standards in EDI systems in the Norwegian health sector (Monteiro and Hanseth, 1996); and the attempted translation of interests in a car parking system (Vidgen and McMaster, 1996). Included was Walsham's own work with Sahay (Walsham and Sahay 1999),

which describes how and why the attempts at translation and alignment of interests around the development and use of administrative geographic information systems in India were a relative failure.

Walsham comments that some IS and actor-network researchers either explain the technology at the expense of social interactions, or conversely portray social interactions without giving detailed descriptions of the technological inscriptions. Walsham (1997) also outlines some of the existing criticisms and limitations of actor-network theory and classifies them into four broad strands: limited analysis of social structures; amoral stance; the problem of generalised symmetry; and the problem of description. The next subsection will draw and expand on Walsham's paper and bring in other authors' critiques of actor-network theory, which are relevant to information systems research in general and to this thesis in particular. The aim, as suggested by Walsham (1997), is to correlate the methodological approach and conceptual ideas of actor-network theory with insights and analysis drawn from other social theories.

ANT as an IS research method

As a constructivist theory, actor-network theory is, according to Monteiro and Hanseth (1996), an effective way of describing how minute, technical design solutions are interwoven with organisational issues; and as claimed by Walsham (1997:477), 'ANT can be used to illuminate the results from the field research.'

Walsham (1997:469) says that 'actor-network theory is both a theory and methodology combined', in that it allows the researcher to 'trace and document network elements, both human and non-human, processes of translation and inscription, the creation of black boxes or immutable mobiles and the degree of stability and irreversibility of networks and their elements' during his or her empirical work. This is no small task for a complex network (ibid.: 470). Walsham (1997:476) claims that actor-network theory studies produce an actual mass of detail which often leads to book-length outputs – for example Latour's monograph on *Aramis* (1992) but also Vaughan's (1996) book which is typical of in-depth sociological case study. On the one hand, it is stated that IS research is lacking in research-based books such as

those, and that studies based on actor-network theory could offer a contribution there (Walsham, 1997). On the other hand, as Mitev (2000b: 35) recognises, ‘the delivering of this type of books is extremely labour-intensive and time-consuming, for instance Vaughan spent nine years researching and writing her book on *Challenger*’.

Some IS researchers have found that ‘only a rich, integrative view of IS implementation does justice to the complex realities of social life in an organisation’ (Myers, 1994:198) and that implementation can only be understood in terms of its wider social and historical context. Furthermore, Harvey and Myers (1995:23) argue that ‘generalisable knowledge is often neither relevant nor meaningful, in which case we are better off understanding specific contexts’, and what is needed is ‘a rigorous approach to the analysis of the institutional contexts of IS practices, with the notion of context being one of the social construction of meaning frameworks’ (Harvey and Myers 1995:21). Sauer (1993:3) recommends studying all the cases so as not to reject any part of them as irrelevant and to come closer to a realistic understanding of the adoption of information systems in organisations. In this way a more holistic and interpretive approach which captures the full reality of organisational behaviour in ‘its setting’ has therefore been proposed and is increasingly being employed in IS research (Walsham, 1993).

The following are the research questions of this thesis: ‘How do we understand the interplay between the dynamics of the ICT-related innovations (applications) within organisations and rural communities and the development of Mozambique in terms of the globalisation trend?’ ‘What can we do to make the use of ICT more effective?’ ‘To what extent is ICT contributing to the development in developing countries in general and in Mozambique in particular?’ If one breaks these questions down into two levels of analysis the following questions are asked: How do the various Mozambican actors (mainly government, but also other categories, e.g. managers, community leaders, etc) perceive the role of ICT in the country’s development in the context of global integration? At the micro-level, the implementation of ICT innovation in the three cases is going to be analysed. The important question for this level of analysis is: ‘How does the ICT initiative relate to the developmental aspirations of the various

stakeholders (owners, managers, customers, community leaders, etc.) as actors involved in network formation to achieve particular developmental objectives?’ In the light of the characteristics of an interpretive research study that will be discussed in Chapter 3 in this dissertation, it seems appropriate that an interpretive epistemology should be adopted in this research work, from the perspective of actor-network theory. The justification for the use of ANT as one of the pillars of this research work is based on the fact that it provides theoretical concepts as a form of viewing elements in the real world. At the same time it suggests how these elements need to be traced in empirical work, and it is concerned with the investigation of social and technical issues of technology in a specific context.

2.3.1.3 ANT Limitations

Actor-network theory has its critics and limitations, as any theory does. In brief, the four broad strands of criticism identified by Walsham (1997) are as follows: Its disregard for social structures, its levelling and neutralising of the role of human actors, its lack of political and moral analysis, and its descriptive power as opposed to its capacity for explanation. These limitations point to a need to complement it with some form of social theory and contextualist approaches.

Social structures

Actor-network theory has been criticised for concentrating on how things get done to the detriment of how broader social structures shape socio-material practices, for giving interesting accounts of local contingencies and material arrangements, without taking into account macro-social structures, which influence the local ones. Different researchers (Reed, 1995; Law, 1994; Walsham, 1997) have voiced this criticism. In response to these criticisms, Latour (1991) has replied that the actor-network methodology can be used to move between levels of analysis, that the macro-structure is made of the same ‘stuff’ as the microstructure, and that macro-structures can be investigated with the same methodological tools as microstructures.

Humans and non-humans

The symmetry between human and non-human actors, which is related to the symmetry between the social and the technical, society and nature, politics and science, values and facts, has been criticised for having gone too far in erasing all distinctions and reducing people to the status of things. In other words, levelling human and non-human differences has political implications.

Moral and political issues

The disregard for macro-structures has led to criticisms of actor-network theory, and of strong social constructivism and relativism in general, for being amoral and apolitical in that it leads to ignoring the political biases that can underlie the spectrum of choices for relevant actors (Winner, 1993). This problem does not only occur in relation to ANT, it also exists in social construction theory. ANT does not give specific guidelines for examining the ethical and moral implications of IT (Walsham 1997; Bijker, 1993). Star (1991) refers to the ‘networks of the powerful’ and talks about how irreversible networks are only stable for some and discriminate against those who do not belong to the community of practice, those who use and maintain the network. Latour (1991) responded to criticisms of apoliticism and moral relativism:

Refusing to explain the closure of a controversy by its consequences does not mean that we are indifferent to the possibility of judgements that transcend the situation. For network analysis does not prevent judgement any more than it prevents differentiation. Efficiency, truth, profitability, and interest are simply properties of networks, not of statements. Domination is an effect not a cause. In order to make a diagnosis or a decision about the absurdity, the danger, the amorality, or the unrealism of an innovation, one must first describe the network. (Latour 1991:130).

Latour (1999) provides a counter-argument to the amorality of ANT studies of science and technology. He uses many of the key ANT concepts referred to in Table 2.4, but adds some new ideas, and takes a fairly political stance in advocating the need for the citizens’ engagement in the debates about science and technology in society.

Description

The argument put forward by Latour is that social constructivism is not in itself amoral, and that describing the network is not only a prerequisite, but also the only way to get explanations:

The explanation emerges once the description is saturated; if we display a socio-technical network - defining trajectories by actants' association and substitution, defining actants by all the trajectories in which they enter, by following translations and, finally, by varying the observer's point of view - we have no need to look for additional causes. Explanation is the stabilisation of a network. If one is capable of explaining effects of causes, it is because a stabilised network is already in place. (Latour 1991:129).

This is related to the criticism that actor-network theory is a method for describing, but not for explaining. Callon's answer (1991) is that these explanations are only offered by networks which increase their convergence and irreversibility (an agreement getting firmer), and that the descriptions delivered by intermediaries turn into explanations (and even predictions). This still leaves us with the question of how to examine the ICT innovation in a local context and also understand the interplay between ICT innovation and developmental aspirations and perceptions of the different actors within a specific context such as Mozambique. Walsham (1997) observes that identifying all the heterogeneous associations within an actor-network is difficult enough, without all those overlapping networks.

2.3.2. Structuration theory

This section of the thesis will provide an overview of structuration theory (ST) and its application in the field of information systems. For this research ST is applied in order to gain an understanding of how new structures that are built through the adoption and use of ICTs contribute to development.

This section is divided into four subsections. The first subsection outlines the key elements of ST. The second subsection covers the use of structuration theory in information systems research. After this, the third subsection discusses the limitations

of structuration theory and, finally, the fourth subsection outlines the relation between ANT and ST in information systems studies.

2.3.2.1. Key elements of structuration theory

‘Structuration refers abstractly to the dynamic process whereby a structure comes into being’ (Giddens, 1977:121). Giddens (1979:66) states that structuration means ‘conditions governing the continuity or transformation of structures, and therefore the reproduction of systems.’ Giddens (1984) also characterizes two major schools of sociological enquiry: those predominantly concerned with structure and those predominantly concerned with agency. The key concepts of ST are as follows below:

Agency

Human agency in Giddens’s formulation is the ‘capacity to make a difference’ (Giddens, 1984:14) (also known as ‘transformative capacity’). It is intimately connected with power; in fact, this is one of its characteristics, since the loss of the capacity to make a difference is also powerlessness. As Walsham and Han wrote in their work on structuration theory and IS research:

... the model of human agency in the theory views human beings as *monitoring their conduct and its results in a reflexive way* in which, together with an emphasis on the inevitability of *unintended consequence of intentional human conduct*, implies that all actions carries within the seeds of change; thus all action can both transform as well as reproduce existing structure. (Walsham and Han, 1991:78)
(Italics are from the quotation).

Structure

Giddens (1984:17, 377) defines structure as ‘rules and resources recursively implicated in social reproduction; institutionalised features of social systems have structural properties in the sense that relationships are stabilized across time and space’. Structure can be ‘conceptualised abstractly’ as two aspects of rules - normative elements and codes of signification. Giddens (1984) claims that structure exists only in memory traces, the organic basis of human knowledgeability, and is instantiated in action. For Giddens (1984) structure refers, in social systems, to the structuration properties allowing the binding of time and space in social systems, the

properties which make it possible for discernibly similar practices to exist across varying spans in time and space and which lend them a systemic form. To say that structure is a ‘virtual order’ of transformative relations means that social systems as reproduced by social practices do not have structures, but rather exhibit structural properties and that structure exists as time-space presence, only in its instantiations in such practices and as memory traces orienting the conduct of knowledgeable human agents. Giddens (ibid.) considers structure not merely as constraining, but also as enabling.

The duality of structure

The key principle in ST is the duality of structure. It is composed of two main concepts - structure and agency. These concepts are dependent upon each other and recursively related – human action is enabled and constrained by structure, but structure is also the result of human. Thus, the duality in ST refers to the way in which action and structure presupposes each other.

As Lyytinen and Ngweyama(1992) say:

All social activity, including work processes, can be viewed as enabled and constrained by social structures that are produced and reproduced via human agency. (Lyytinen and Ngwenyama, 1992:21).

The structural properties of social systems are both medium and outcome of the practices they recursively organise (Giddens, 1984). Giddens (1979) isolates three dimensions of institutionalised social structure: signification, legitimisation and domination. He also considers three key processes of human actions during interaction, namely communication, the exercising of existing power and sanctioning of conduct. The dimensions of structure are linked to the processes of interaction (the two poles of the duality) by means of three modalities; interpretive schemes, facility and norms. The dimensions of the duality of structure are given in the following diagram (Figure. 2.1).

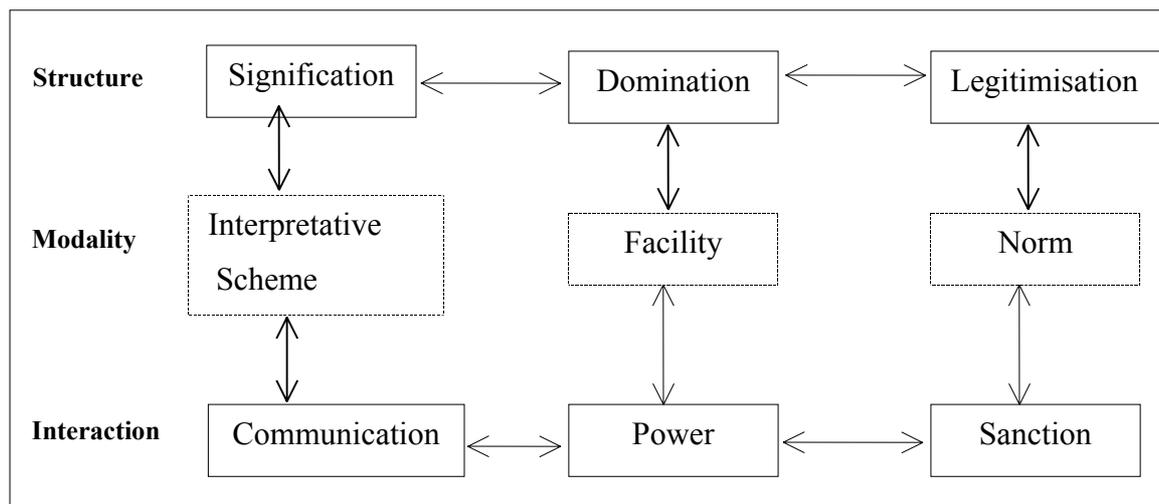


Figure 2.1: Dimensions of the duality of structure (source: Giddens, 1984)

Social structure and human interaction are broken down into three dimensions (solely for the purpose of analysis) and the recursive character of these dimensions is illustrated by linking modalities. Thus, as human actors communicate, they draw on interpretative schemes to help make sense of interactions; at the same time those interactions reproduce and modify those interpretative schemes, which are embedded in social structure as meaning or signification. Similarly the facility to allocate structures of domination and moral codes (norms) helps to determine what can be sanctioned in human interaction, which iteratively produces structures of legitimation. It is important to consider that the separation of structure and interactions into three dimensions is merely a helpful analytical device since dimensions are inextricably interlinked; for example, although signification is structured by language, language uses also expresses aspects of domination and has normative force. This signifies that social action can reproduce existing structure, but also produce a new structure.

In Giddens's view, structuration is the process whereby the duality of structure evolves and is reproduced over time and space. Agents in their actions constantly produce and reproduce the social structures, which both constrain and enable them. Thus structuration theory provides a connection between human action and social structure (Giddens, 1979, 1984). The key principle in structuration theory is the duality of structure: human action is enabled and constrained by structure, but

structure is also the result of human action. Thus, the duality in structuration theory refers to the way in which action and structure presuppose each other.

Social integration and system integration are two concepts that are part of structuration theory as Cohen (1990) stated, as quoted by Scheepers and Rose (2000:5):

Whereas social integration refers to face-to-face reciprocities between agents who meet in circumstances of co-presence, and therefore preserves a concern for *praxis in situ*, system integration refers to reciprocities between absent agents, i.e. agents who are physically absent and/or temporarily situated in different settings which admit the possibility of intersituational articulations of systems patterns.

Giddens (1984:376-377) defines social integration as reciprocity of practices between actors in the context of co-presence, understood as continuities in and disjunctions of encounters. And he considers system integration as reciprocity between actors or collectivities across extended time-space, outside conditions of co-presence.

Time-space distancing refers to the 'stretching of social systems across time and space on the basis of mechanisms of social and systems integration' Giddens (1984: 377). As the recursive and reflexive structuration of social action extends between people over geographical distance and time, so the embeddedness or bite of those practices increases.

Summary of structuration theory

Clark (1990) sums up structuration theory as a series of interrelated propositions:

1. The main substantive focus of social enquiry is not individual action and the experience of the individual actor (methodological individualism), nor the existence and requirements of some types of societal totality (structural-functionalism and to a certain extent, Marxism), but social practices. It is social practice that lies at the root of the constitution of both individuals and society.

2. Social practices are created by knowledgeable human agents with causal powers, i.e. powers to make a difference. Human agents are neither cultural dopes nor simply the product of class forces. They have a capacity for self-reflection in day-to-day interaction, a practice of ‘tacit’ consciousness of what they are doing and the ability under certain circumstances to do it.
3. However, these social practices are not random and purely voluntary, but ordered and stable across space and time. In short, they are *routinised and recursive*. In producing social practices, which make up the visible patterns which constitute society, actors draw upon ‘structural properties’ (rules and resources) which themselves institutionalise features of societies.
4. Structure is therefore activity-dependent. It is both medium and outcome of a process of structuration - the production and reproduction of practices across time and space. This process is what Giddens has called the ‘double hermeneutic’, the double involvement of individuals and institutions. However, the following quote perhaps makes it clearer: ‘we create society at the same time as we are created by it’ (Giddens 1984:14).

Giddens’ own summary of structuration theory can be found in Giddens (1984:1-40).

2.3.2.2. *Structuration theory and information systems*

Structuration theory has been applied in different studies within the field of IS (Barely, 1986; Orlikowski, 1991, 1992, 1993; Walsham, 1993; Scheepers and Rose, 2000).

Walsham and Han (1991) and Jones (1999) reviewed the literature concerning IS and structuration theory. Walsham and Han (*ibid.*) analyse the literature under the headings of operational studies, its use as a *meta-theory* and the use of specific concepts from the theory. Jones describes some of the key issues related to ST and reviews the ways in which ST has been used in the IS field. The reviews help to conceptualise the use of theory from one field (in this case social theory) to another

(information systems). From these two reviews a classification of the use of ST in the field of information systems can be done with three different purposes:

- To theorise - to re-conceptualise or theorise on aspects of the new field of information systems.
- To analyse: as an analytical framework for the retrospective understanding of empirical situations or cases.
- To operationalise: providing operational guidance for practitioners (in this case IS practitioners).

Theorizing

Different researchers have adapted ST in the field of information systems over the last decade (Orlikowski, 1991; Orlikowski and Robey, 1991; Walsham, 1993; Karsten, 1995; Walsham and Sahay, 1999). The work done by Orlikowski is an attempt to theorize aspects of the IS field using ST. In Orlikowski and Robey (1991) and Orlikowski (1991, 1992, 1993b), structuration theory is applied to the relationship between IT and organisations.

The duality of structure in interaction can be understood as follows: Agents communicate, exercise power and sanction their own behaviour and that of others by drawing on modalities (stock of knowledge, rules and resources) and in doing so produce and reproduce structures of signification, domination and legitimisation. Indeed, ST provides an important overarching framework for theorising about relationships between technological change, beliefs, action, and structures (Orlikowski, 1991, 1992). In ST, technology is viewed both as constructed and enacted by humans and as having institutional properties that constrain and enable human action (Orlikowski and Robey, 1991).

Orlikowski (1992) proposes a model derived from Giddens's structuration theory to investigate the relationship between technology and organisations. This proposal is grounded in the concept of the duality of structure. She (Orlikowski, 1992:405) sees the technology as structure:

I propose that it should be considered as one kind of structural property of organisations developing and/or using technology. That is technology embodies and hence is an instantiation of some of the rules and resources constituting the structure of organisations.

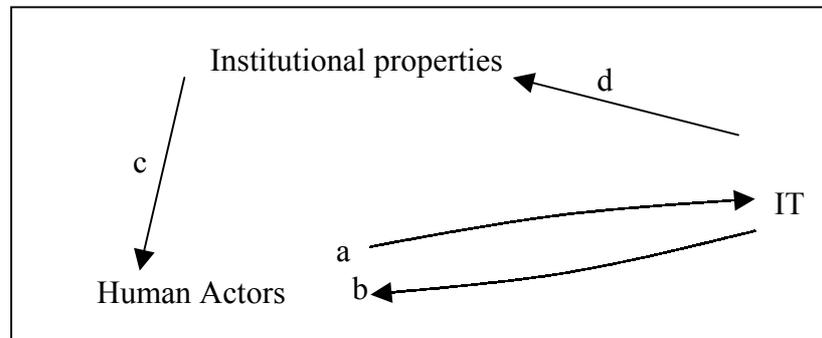


Figure 2.2: Structural model (source: Orlikowski, 1992)

a) IT as a product of human action

Technology is an outcome of such human action as design, development, appropriation and modification. Thus, the claim that IT is a product of human action does not limit itself to the simple fact that designers often play a crucial part in the creation of IT. It also includes the production that takes place in use.

b) IT as a medium of human action

Technology facilitates and constrains human action through the provision of interpretative schemes, facilities and norms. IT, thus, can function as a resource for, as well as a restriction upon human action. This is, in essence, the duality of technology. IT can not only enable and simplify certain actions, but can also restrict and hinder certain patterns of action.

c) Institutional conditions of interaction with technology

Institutional properties affect the human actors in their interaction with IT. The rules, norms and procedures that, taken together, create a specific culture in an organisation are institutionalised over time. This affects the human actors and is also reflected in the use of technology.

d) Institutional consequences of interaction with technology

IT affects the institutional properties, either by reinforcing them or by changing them. As was seen above, the construction and use of IT is conditioned by the organisational stock of knowledge, resources and norms that constitute an organisation's systems of signification, domination and legitimisation.

These four relationships between IT and organisational dimensions that constitute the structurational model of technology operate simultaneously, not sequentially. The model of technology integrates the micro and macro-levels of social analysis by demonstrating the relationship between human agency and institutional properties. Examining selected relationships (e.g., studying how IT influences users, without understanding how users appropriate the IT, or the conditions within which the mediation occurs) can only result in a partial understanding of how IT interacts with organisations.

The contribution of Orlikowski's structurational model is that the model allows us to understand the interaction between technology and organisations at various levels such as inter-organisational, group and individual level. For this research the ST will contribute to the macro-level of analysis of the developmental issues in the Mozambican context. In doing so the following question will be addressed in detail: 'How do the various Mozambican actors (mainly Government, but also other categories, e.g., managers, community leaders, etc.) perceive the role of ICT in the country's development in the context of global integration?'

Analysing

Analysing involves applying theory in order to gain insight into an empirical situation. Barely (1986) described the introduction of computer tomography (CT) scanners into the radiology departments of two different community hospitals in Massachusetts, USA. The research study conducted by Barely was aimed at exploring how the actions of the actors and institutionalised traditions within the organisations influenced each other as 'occasions for structuration'. Although Barely, in his description of the cases does not refer directly to the terms of the duality of structure, its three dimensions can be discerned in the case study where Barely explains aspects

of communication/signification, power/domination and sanction/legitimation. Another example of the use of ST occurs in Karsten, (1995) where Lotus Notes implementation in three organisations is analysed. Brooks (1997) adds the Orlikowski and Robey (1991) structuration framework of systems of development to the analytical armoury in reporting upon CAD (Computer-aided design) systems. Jones and Nandhakumar (1993) go further in their analysis of the development of an Executive IS by reflecting upon the theory. Jones (1994) uses ST in the analysis of the process of the IS strategy formation and implementation in a UK District Health Authority.

Walsham (1993) offers a sustained longitudinal case study analysis covering issues related to IS strategy, development, implementation and evaluation in three different organisations. Walsham's book can be considered as research that provides an explicit theory base, a well-developed case study analysis and well-justified conclusions.

Drawing on Giddens' concept of the duality of structure, Walsham (1993) states that information systems and organisations are both constrained by the context, but at the same time they can change it. In Walsham's model, context plays the role of the structures and information systems the role of actions. Structuration theory, especially its modalities, interpretative schemes, facilities and norms, is adopted by Walsham to conceptualise the linkage between context and process in social systems. For Walsham (1993:64) the contribution of structuration theory in the field of IS can be seen as follows:

A theoretical view of computer-based information systems in contemporary organisations, which arises from structuration theory, is that they embody interpretative schemes, provide coordination and control facilities, and encapsulate norms. They are thus deeply implicated in the modalities that link social action and structure, and are drawn on in interaction, thus reinforcing or changing social structures of signification, domination and legitimation.

Walsham and Sahay (1999) used structuration theory with actor-network theory to investigate problems in developing Geographical Information Systems (GIS) in an Indian government department. Their focus was analytical, and they took care to specify the relationship between the two theoretical bases, with Giddens providing

meta-theory and actor-network theory providing ‘a more detailed methodological and analytical device.’

In this research ST is only one of a number of theoretical ideas employed. A mix of ideas ranging from actor-network theory, the human environment model, structuration theory and the contextualist perspective will be used in Chapter 5 to conceptualise an ‘analytical framework’ mainly drawn from Giddens (1984), Pettigrew (1985), Callon (1986,1999), Du Plooy (1998), Latour (1999) and Law and Hassard (1999).

Operationalizing

Information systems being an applied discipline, it is reasonable to expect that researchers should attempt to distil their theoretical and analytical expertise into forms that a practitioner in the IS field might adopt as guidance for practice (Mumford and Henshall 1979; Checkland, 1991). From the literature, it seems that there are some research works that have been done in this regard, based on Giddens’ work. Walsham (1993) offers an overview of the future of IS which sums up what has been learned from the research projects and presents it as guidance for practitioners, researchers and educators.

2.3.1.3. Structuration theory critique

Some criticisms levelled against structuration theory have been addressed by other social theorists. Barely and Tolbert (1988) claim to have many reservations about ST regarding the conflation of structure and agency or *vice versa*. For them conflation creates a problem of reducing structure to action or *vice versa* and it is consequently difficult to document an institution dissociated from action. Archer (1982) argues that conflating structure and agency weakens their analytical power.

Orlikowski (1993c:8) in her tutorial on how ST can inform the social study of IT, summarises the criticisms of ST as follows:

- No conventional program of cumulative research
- Few guidelines for empirical research

- Obscure language and ambiguous concepts
- Uneven exposition and incomplete work
- No universal generalisations
- Recursiveness of agency and structure is a vicious circle and cannot be studied
- Individuals are so influenced by their social context that the notion of human agency is untenable.

Other criticisms regarding the use of structuration theory in the IS field concern subjectivism. Monteiro and Hanseth (1996) criticise the application of structuration theory in IS, particularly the works of Orlikowski (1991) and Walsham (1993). They acknowledge the insights from structuration theory, especially regarding the duality of technology. However, they argue that it does not go far enough towards explaining how organisations relate to information systems. Despite being very convincing, there is a ‘lack in precision regarding the specifics of the IS’ (Monteiro and Hanseth, 1996:326); and the explanations ‘are not fine-grained enough with respect to the technology to form an appropriate basis for understanding’ (ibid.: 328). They consider a major problem related to structuration theory being used in the field of information systems, to be the fact that those proposing structuration theory do not describe in detail the characteristics of the information systems they are studying. For example, Orlikowski (1991, 1993b) does not describe the productivity tool introduced for developing systems, despite the fact that such tools vary greatly. Walsham (1993) does not go into detail in one of his cases where discrepancies arose as a result of two competing architectures: centralised and decentralised *vis-à-vis* IBM and non-IBM systems. Without describing information technology and information systems in detail, it seems difficult to establish which aspects of them affect organisations. Monteiro and Hanseth (ibid.) also disagree with Orlikowski’s claim that the distance between designer and users is directly proportional to interpretive flexibility. They claim that the fact that designers of tools are close to users makes it easier for the former to control the latter (distance also constitutes a difficulty in controlling discretion in the use of technology, as is illustrated by Law (1991)). Walsham

(1993:70) also recognises the limitations of structuration theory in doing research on information systems:

Structuration theory offers a subtle and detailed view of the constitution of social life, but the analytic dimensions of the duality of structure and its associated modalities could be considered as detailed and complex for empirical analysis in some instances.

2.3.2.4. Information system, actor-network theory and structuration theory

Walsham (1997) acknowledges that Latour's extreme position is useful in forcing us to rethink issues and is a valuable analytical device, and that describing the network in detail is a good contribution of actor-network theory to building an empirical base. However, he thinks that it does not contribute directly to the debate on moral and political issues. He asks the question: 'where do the moral judgements come from if not from ideas that transcend the situation?' and adds that political and ethical theories cannot come from the basis of the network alone (Walsham 1997:475). He suggests complementing actor-network theory with Giddens's structuration theory which, he asserts, offers sophisticated models of social action and structure from individual to global levels: structure constrains actions, but at the same time, human action serves to establish structure; while modalities link action and structure.

Monteiro and Hanseth (1996) claim that actor-network theory is more effective for describing how minute, technical design decisions are interwoven with organisational issues. In their study of information infrastructure standards, actor-network theory proved useful in 'accounting for how standards acquire stability, how they become increasingly 'irreversible'.' (ibid.:327). Another important aspect of actor-network theory for Monteiro and Hanseth is its 'potential to account for how restricted interpretative flexibility across great distances can be obtained' (ibid.:332). Nevertheless, they believe that the superiority of actor-network theory over structuration theory only applies to the issue of 'being specific about the technology' (ibid.:330) and they conclude that actor-network theory cannot properly deal with institutions (ibid.:339). More recently, Hanseth and Monteiro (1998) have coupled actor-network theory with new institutionalism, after Powell and DiMaggio (1991), in

order to understand how institutions become stable and reproduce themselves. They have also coupled it with Bourdieu's theory of practice (Bourdieu, 1977) and his notion of '*habitus*' to account for the stability of action, in order to examine the design and use of electronic patient records in Norwegian hospitals.

One of the difficulties anticipated in using actor-network theory to analyse the BM, EDM and Telecentre case studies, is how to deal with not only one, but large numbers of actor-networks and how they connect and interact.

After this review of social theories, which will form the basis of this study, the next section discusses different context-based approaches in the IS field.

2.4. Context-based approaches

The increasing emphasis on the organisational context of IS has been accompanied by a change in focus from the use of computers within a specific organisation to a broader perspective analysing inter-organisational factors that influence IT use (Reekers and Smithson, 1996) and more recently to a focus on national and international factors that influence the use of ICT in organisations (Barrett, et.al., 1997; Walsham, 1998; Chriysochos, 1999; Bada, 2000; Avgerou and Walsham 2000). These developments reflect an increased understanding of the diverse factors that influence the use of ICT and the appropriate approach required for studying them. Two such approaches that are increasingly being adopted are the contextualist approach and situated analysis.

2.4.1. Pettigrew's contextualist approach

Pettigrew's contextualist approach is a research approach that studies the interaction between a particular phenomenon and the context within which it takes place. In 1985, Pettigrew introduced the contextualist approach when studying organisational change and explained its usefulness over earlier approaches to organisational change.

According to him, a contextualist study focuses on two levels of analysis - vertical and horizontal levels - and the interconnections between the two levels over time. The vertical level refers to the environment - i.e. the national environment or the international environment within which the change is taking place. The horizontal level refers to the successive interconnections of events in historical, present and future time. Thus a useful way to think about ICT and organisational change is Pettigrew's contextualist approach, and it has been employed in studies considering the consequences of introducing ICT-related initiatives in organisations (Madon, 1992, 1994; Madon and Walsham, 1995; Nelson and Dowling, 1998; Bada, 2000).

The central message of the contextualist framework is to provide a theory for research into change, which can also guide practice. This theory must help to examine change as a process in a historical and contextual way. This approach makes a distinction between the object of change (the content – 'the what of change'), factors or issues in the environment in which the change occurs (the context – 'the why of change') and how the change process unfolds in a temporal manner (the process – 'the how of change'). As Walsham (1993: 53) stated:

It is important to see organisational change as linked to both intra-organisational and broader contexts, and not to try to understand projects as episodes divorced from the historical, organisational or economic circumstances from which they emerge. The management of organisational change is not seen as a straightforward, rational process but as a jointly analytical, educational and political process.

A contextualist approach to the study of ICT-based initiatives and organisational change focuses on the interaction of multi-level structures and systems within which ICT is implanted and the process of change that takes place over time (Walsham, 1993; Braa, 1997). However, this approach lacks an adequate theoretical underpinning and a conceptual model for linking the external context and the internal organisational context (Walsham, 1993).

2.4.2. Change as an emergent process

Planned change initiatives in the form of ICT-enabled organisational change can be viewed as strategic change (DeCock, 1996). In the literature on strategic management literature, some strategic views question the extent to which change can be planned in advance and carried out in a rational linear fashion. They point to the emergent nature and hence, the subjective character of change which technical/rational models are unable to account for.

Emergent change is the realisation of a new pattern of organising in the absence of explicit, *a priori* intentions. Such emergent change only realises in action and cannot completely be anticipated or planned. Because they are abstracted from the ongoing and grounded activities of organisational actors, the planned and technological imperative approaches do not easily account for emergent change. Nowadays, the notion of emergence is particularly relevant as unprecedented environmental, technological and organisational developments facilitate patterns of organising which cannot be explained or prescribed by appealing to *a priori* detailed plans and intentions.

The important tenet of the emergent perspectives is that change is a function of the interaction or combination of a number of factors that often produces some unintended consequences (Mintzberg and Waters, 1985). In other words, change cannot always be planned in advance but occurs in an emergent fashion and the result is not always what was intended. According to Mintzberg and Westley (1992), change mostly occurs through inductive learning within organisations, which means that ideas for change can also evolve in a bottom-up approach from within the lower level of the organisation and not always from the top management (Quinn, 1980; Westley, 1990).

The emergent change view might be particularly useful in the study of change, because it allows us to focus not only on the planned initiatives relating to change, but also on the various patterns of action, some deliberate as a result of the intentions and

others emergent, arising outside of the deliberate plans. In addition, the distinction between intended and realised change helps us to consider the gap between the two as an opportunity to understand what ICT and organisational transformation has shown: that planned and deliberated approaches do not capture the true reality of how organisations function. The ‘object’ of organisational change consists of both the deliberated initiatives of management as well as the realised decisions and actions that may differ from what was intended.

2.4.3. The situated change perspective

The situated change perspective is an additional perspective that provides a method of examining and explaining technology-based organisational change. Situated analysis or the situated change perspective can be viewed as a change to the practice of organising and hence as enacted through the situated practices of organisational actors as they improvise, innovate and adjust their work routines over time. Within this perspective, change is emergent from everyday practice and inseparable from the ongoing actions of the members of the organisation (Orlikowski, 1996; Monteiro and Hespo, 1998).

According to Ciborra (1999) improvisation is situated performance where thinking and action occur simultaneously and on the spur of the moment. It is purposeful human behaviour, which seems to be ruled at the same time by chance, institution, competence and outright design. Improvisation is intentional, but looks extemporaneous and without known causes or relationships.

In the situated change perspective, organisational change can be seen as an ongoing improvisation enacted by organisational actors trying to make sense of and act coherently in the world. The improvisation metaphor is used to view organisational change as a continuous activity with different and varied origins, multiple actors with multiple interpretations and actions, which combine to make up the change process (Weick, 1993).

In the notion of situated change each variation of a given form is not an abrupt or discrete event, neither is it, by itself, discontinuous. Rather, through a series of ongoing and situated accommodations, adaptations and alterations (that draw on previous variations and mediate future ones), sufficient modifications may be enacted over time so that fundamental changes are achieved (Orlikowski and Gash, 1994; Orlikowski, 1996; Orlikowski and Hofman, 1997).

A view of organisational change as situated change is grounded in assumptions of action, not stability. Organisations are enacted. Orlikowski (1996) outlines a situated change perspective as inherent in everyday practice and as inseparable from the ongoing and situated actions of organisational members. Such a perspective emerged as central to the analysis of an organisation implementing and using new information technology.

From the improvisation perspective organisational change is situated in the history and tradition of doing things within the organisation. The importance of history and tradition in shaping the organisational process is illustrated by seeing change as a 'bricolage' and change agents as 'bricoleurs'. A 'bricoleur' is someone who makes use of whatever resources are available to perform any task at hand (Weick, 1993). The concept of bricolage has implications for the management of change as such tasks are not limited to a set of predefined tools and materials. The management of change relies on an understanding of established ways of doing things and how this can be deployed innovatively to facilitate the change process.

There are different models of technological-based organisational transformation, planned change and technological imperative. Each makes a number of assumptions about the nature of agency, context, technology and change, which are appropriate to an organising practice premised on stability (Orlikowski and Gash, 1994). Current demands on organisations require them to be flexible, responsive and capable of learning required practices to deal with an ongoing change. Thus the situated change perspective has to be seen as an additional perspective on organisational change that avoids the strong assumptions that have characterised previous change perspectives. It

focuses on the situated micro-level changes that actors enact over time as they make sense of and act in the world (Orlikowski, 1996).

Based on this view, the main aim of this thesis is to attempt the development of a conceptual framework that can guide the analysis of the implementation of ICT-related initiatives for development shaped by globalisation trends in the context of a developing country. A situated perspective helps to analyse the conditions under which ICT-related initiatives lead to organisational changes and support broader development of the country.

While local improvisations are necessary to enable the fruitful transfer of technology to take place in the context of a developing country, they need to be integrated within a planned change perspective. An effective balance between the local actions and global visions can help to achieve more optimal utilization of resources, which is of particular concern in a poor country like Mozambique.

The next part of this chapter introduces the initial framework for the analysis of the results of the case studies in Chapter Five.

Part III: Framework for the analysis of the field results.

2.5. Initial framework for the analysis of the results of the case studies

The initial framework for this research work is based on the research questions given in from the previous chapter and also on the literature review on the various aspects of the problem. Figure 2.3 shows the main aspects of the problem pertaining to the adoption and use of ICT in organisations and communities. From the figure it can be seen that the process of ICT innovation is interrelated with different aspects, ranging from people and organisations to local and global environments.

The ICT innovation should be seen as an outcome of human action in terms of its design, development, appropriation, modification and use. Human action is also influenced by ICT innovation, i.e., ICT innovation influences organisational properties through the interaction of human actors with the ICT innovation. The organisational rules and procedures affect the way in which the ICT-related initiative will be institutionalised. The local context within which the ICT innovation takes place also influences the whole process of ICT innovation. This means that there is a need to accommodate the local context of the ICT innovation. ICT innovation is part of the global market. The global context should therefore also be considered in the process of studying ICT innovation.

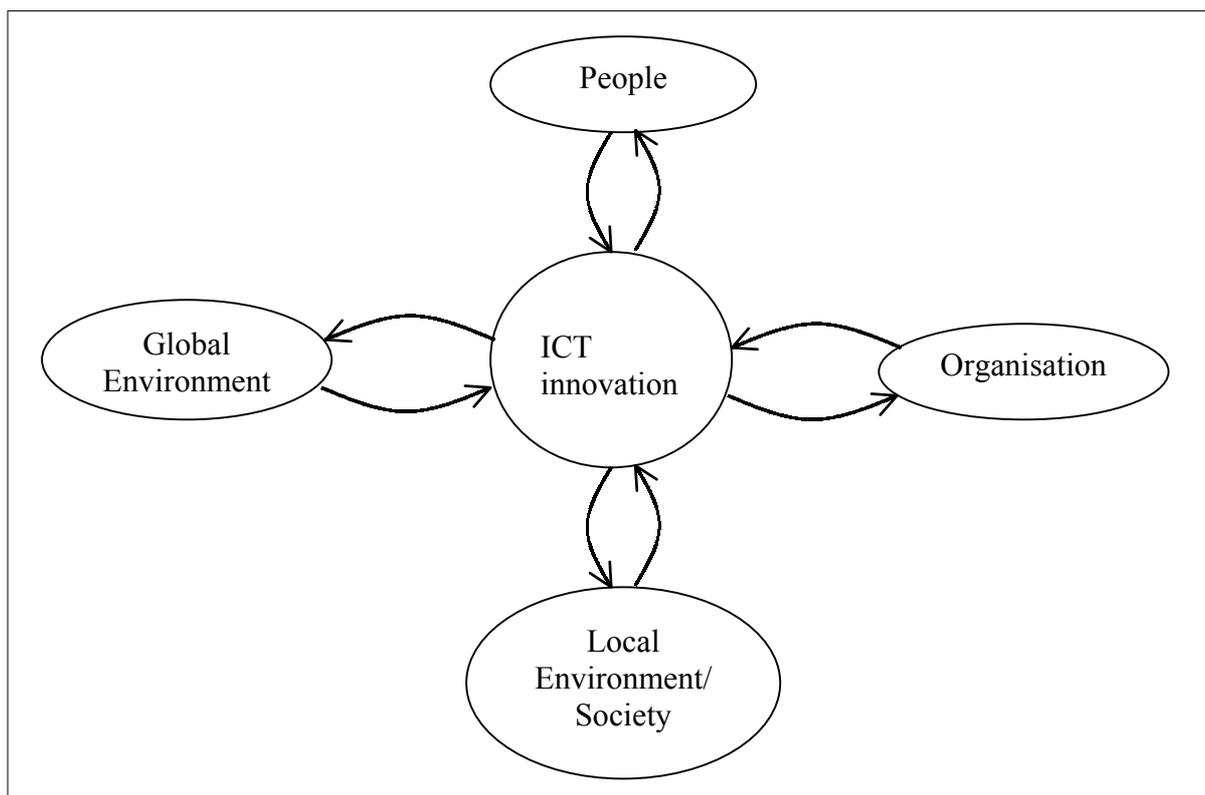


Figure 2.3 Aspects of the research problem

The point of departure for the development of the framework for the analysis of the results of the case studies is the Human Environment Model (HEM) for the adoption and use of ICT, which was developed by Du Plooy (1998). The human environment model for ICT adoption and use must be seen as an integration of the social contexts of people, organisations, groups, tasks, environment and technology. The mixture of human and non-human actors has to be viewed as a collective network, which is tied by the notion of a human environment consisting of their social contexts. In the HEM there is no distinction between humans and their artefacts, or between humans and their structure. Instead they are viewed as ‘two sides of the same coin’. The HEM represents the local context within which the ICT-related initiative is introduced, adopted and used, i.e., institutionalised.

Figure 2.4 presents the human environment model of ICT adoption and use. In this model the six characteristics portray the full social context for adoption and use. All

of them together constitute the essence and the substance of information and communication technology adoption and use.

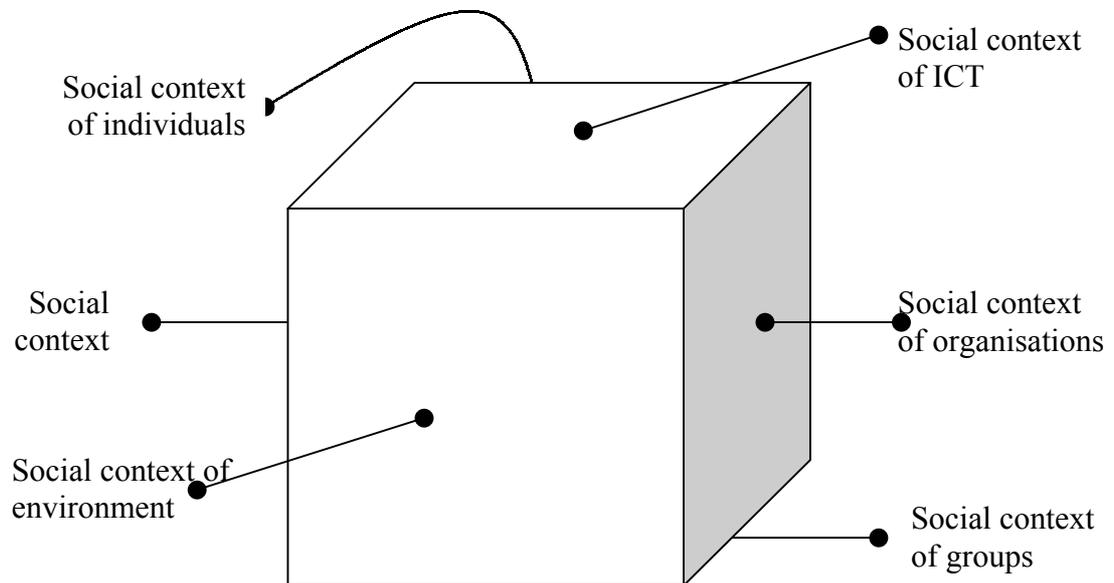


Figure 2.4: The human environment of information technology adoption and use (source: Du Plooy, 1998)

Bearing in mind that, on the one hand, ICT-related initiatives influence an organisation in different ways, and on the other hand that an organisation determines and shapes the ICT-related initiatives, it is important to have the relationship between organisation and ICT-related initiative encapsulated within the human environment model for the adoption and use of ICT-related initiatives. In this research work, it is assumed that the influence of the ICT-related initiative on organisations and communities takes place in different social contexts of the HEM. The ICT-related initiatives and organisations and communities are intertwined. Figure 2.5 illustrates the idea of encapsulating the ICT-related initiatives within the HEM.

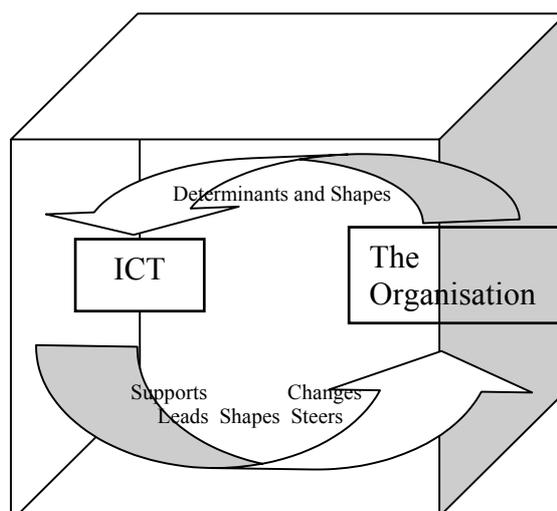


Figure 2.5: The human environment encapsulating information adoption and use (source: Du Plooy, 1998)

The contexts of organisational change include the internal organisational context, which consists of a resource-based organisation, its history and culture, operational procedures and rules. Such influences could either be in the form of enabling changes to take place or inhibiting the change process. Besides the internal contexts that influence organisational change, there are also the outer contexts, which include the social and cultural expectations of the wider societal sector. In contemporary times, as a result of the globalisation of economic and social relations, this wider context includes influences from both the national contexts and the global (international) contexts.

In this work, cultivating and nurturing a receptive human environment means that information technology must be perceived by all actors to be a means of achieving empowerment and partnership, both functionally and democratically. The process of cultivating and nurturing the human environment needs to take into account the inner and outer context of the local site at which the ICT institutionalisation (adoption and use) takes place.

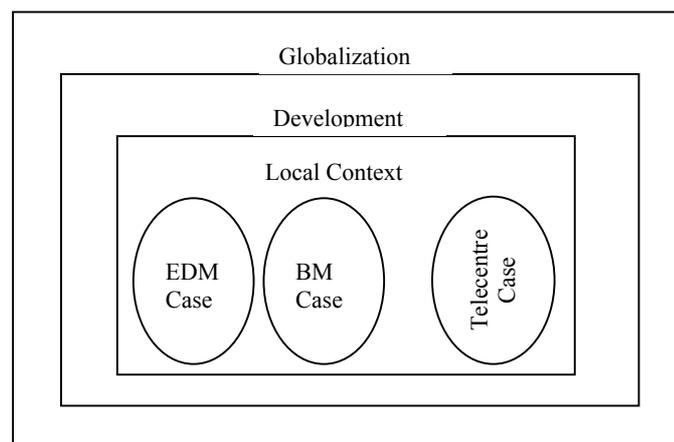


Figure 2.6: A multi-level initial framework for analysis

The first level of analysis examines the case studies, in Chapter 5, in the light of ANT in order to understand the process of building, growing and stabilising the network in the course of the adoption and use of the ICT-related initiatives described in Chapter 4. The second level of analysis interprets the process of adoption and use of ICT initiatives in the three case studies by considering the social and local context in which the process is taking place, and is based on the HEM. The final level of analysis interprets the results in terms of the contributions made by the adoption and use of these ICT initiatives to the sustainable development of the country within the context of global integration. This level of analysis will be theoretically guided by structuration theory.

2.6. Summary

This chapter presented the background information on Mozambique, reviewed theories and also described a framework for the interpretation of the results of the case studies. The background of the country clearly shows that Mozambique is a country with many basic human development problems. In terms of its participation in the creation and diffusion of technology in the network age, Mozambique belongs to the list of marginalised countries. The Government and other national and international organisational bodies are trying to change this situation by establishing ICT programmes that are aligned to the country's development programmes.

The development perspective assumed in this thesis is based on the view that development must encompass not only economic growth but also the social and human components of well-being. This implies that there is a need to have a perspective of horizontal interdependence of development projects at the local level, and that these should be vertically complementary with others at a higher level.

The theories reviewed in this chapter will be used in Chapters 4 and 5. The next chapter introduces the research methodology applied in the research work.

Chapter 3
Research methodology
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Research methodology

3.1. Introduction

The purpose of this chapter is to present the philosophical assumptions underpinning this research, as well as to introduce the research strategy and the empirical techniques applied. The chapter defines the scope and limitations of the research design, and situates the research amongst existing research traditions in information systems.

The philosophical assumptions underlying this research come from the interpretive tradition. This implies a subjective epistemology and the ontological belief that reality is socially constructed. The research strategy adopted was to conduct multiple case studies in two organisations and in a community. The fieldwork was conducted at the sites during the period from February 2000 to April 2001 and a steady correspondence has been maintained with the different informants at the sites. The main data collection techniques used in this research study were semi-structured interviews, participant observation, group discussion, documentation analysis and questionnaires.

This chapter is divided into three sections. In the first, the interpretive stance in the field of information systems is examined. The next section is about the research strategy. It describes the research approach followed in case study research. Finally, section three deals with the research design and covers the reasons for selecting organisations, data sources, research analysis sub-units, data collection and analysis, and a brief summary of the expectations from the theoretical framework adopted.

3.2. The interpretive research approach

Based on the philosophical assumptions adopted, research can be classified as positivist, interpretive and critical (Myers et. *al.*, 1998). Different research methods such as case study, and action research, can be positivist, or interpretive or critical, though often this distribution is extremely contentious (Walsham, 1995a).

An IS research project can be considered positivist if there is evidence of formal propositions, quantifiable measures of variables, hypothesis testing, deducing the inferences concerning the phenomena from the representative sample to a stated population (Orlikowski and Baroudi, 1991). Positivist approaches assume that the relationship between social reality and humans is independent, objective of the cause-and-effect type. This approach has, however, been criticised in the literature on IS for its treatment of organisational reality, which is regarded as complex and not easily amenable to statistical deduction. It is also regarded as being too deeply rooted in functionalism and too concerned with causal analysis at the expense of getting close to the phenomenon being studied (Galliers, 1991). Examples of case studies done from the positivist philosophical viewpoint are to be found in Benbasat *et al.*, (1987) and Yin (1994).

IS research may be categorised as critical if its main task is seen as being one of social critique, whereby the restrictive and alienating conditions of the status quo are brought to light (Klein and Myers, 1999). In critical research, the investigation is classified as emancipative if it aims to help eliminate the causes of unwarranted alienation and domination, and thereby enhance the opportunities for the realisation of human potential (Alvesson and Wilmott, 1992; Hirschheim and Klein, 1994). Critical theorists assume that people can consciously act to change their social and economic conditions. They also assume that social reality is historically constituted and that it is produced and reproduced by people. Examples of critical research can be found in Forster (1992), Ngwenyama (1991), Ngwenyama and Lee (1997).

The epistemological stance on interpretive approaches is that knowledge of reality is gained only through social constructions such as language, shared meanings, tools, documents, etc. (Walsham, 1993). In an interpretive research project there are no predefined dependent and independent variables, but a focus on the complexity of human sense-making as the situation emerges (Kaplan and Maxwell, 1994). Those who espouse the interpretive approach, claim that social phenomena must be understood in the social contexts in which they are constructed and reproduced through their activities. In other words, the understanding of social action must

include the meaning that social actors give to their deeds (performance/actions). Furthermore, the advocates of the interpretive stance consider that social reality is constructed as a result of intentional actions (Burrell and Morgan, 1979). Interpretive approaches to research in IS are 'aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context' (Walsham 1993, pp 4-5). Examples of interpretive research include the work of Orlikowski (1991), Walsham (1993) and Myers (1994).

From the philosophical basis of interpretive research, four categories of interpretive approaches can be identified: phenomenology, ethno-methodology, philosophy of language and hermeneutics (Myers, 1997). An example of research based on phenomenology can be found in the research work of Zuboff (1988). Zuboff (1988), in her research work, discussed how the role of IT has not only been to automate procedures and approaches but also at the same time to produce new information. An example of ethno-methodology is found in the research work of Suchman (1987) and an example of hermeneutics can be found in the research work of Boland (1991) and of Lee (1994).

Using the interpretive perspective will enable us to increase our understanding of the critical, social and organisational issues related to the adaptation and adoption of ICT/IS in organisations or communities. The interpretive approach operates under the assumption that access to reality is only possible through social constructions such as language and shared meanings. It has its philosophical base in hermeneutics and phenomenology. Walsham (1993) asserts that the purpose of the interpretive approach in IS is to produce an understanding of the context of IS and the process whereby IS influences and is influenced by the context. Interpretive approaches give the research greater scope to address issues of influence and impact, and to ask questions such as 'why' and 'how' particular technological trajectories are created (Boland, 1985, 1991; Orlikowski and Baroudi, 1991; Deetz, 1996).

As a way of improving the quality of research conducted from the interpretive perspective, Klein and Myers (1999) proposed a set of principles based on the

hermeneutic orientation. The set of principles is as follows: (i) the hermeneutic circle, (ii) contextualisation, (iii) interaction between the researcher and the subject, (iv) abstraction and generalisation, (v) dialogical reasoning, (vi) multiple interpretations and (vii) suspicion.

Klein and Myers (*ibid.*) show us how these principles are interrelated - they consider that a researcher decides what relevant context(s) should be explored - Principle 2 is in use in this case. When it comes to how the data are going to be created in relation to the subjects, Principle 3 plays its role. In deciding which theories or concepts and which research will be abstracted and generalised, it is Principle 4 that is being used. When the researcher's own intellectual history is at issue, Principle 5 is in use. Different versions of interpretations may come into play and if they require the researcher to examine the influences of the social context and document the multiple views of 'stories', the use of Principle 6 is advisable. Finally, when the aspects of reality are presented in order to formulate research questions critically, Principle 7 is in use. It is clear that it is not possible to describe all aspects of the context. The researcher has to decide what to say depending on the audience and story that he or she wants to tell.

Klein and Myers (1999) recommend that researchers must work out for themselves 'how' and 'which' principle may be applied in any particular situation. They also believe that this set of principles may not be used mechanically, since the importance and relevance of each principle is partly derived from the manner in which the others are applied to the collection and interpretation of the field material.

If this set of seven principles is used, the research work can become more plausible and convincing to its target audience. Hence the main aim of this set of principles is to improve the plausibility and cogency of the research.

3.3 The case study strategy

It is recognised that not all case studies are interpretive. Case studies are normally associated with qualitative research, but can also be used as a method of inquiry employing a positivist epistemology and ontology.

Yin (1994) warns against confusing case studies with qualitative methods using the ethnographic method. Ethnographic methods are derived from cultural anthropology. In studying organisations these methods might help the researchers to extract cultural knowledge, and identify actions and instruments that participants utilise in their everyday life (Schwartzman, 1993; Prasad, 1997). Yin (1994) distinguishes ethnographies from case studies in that the former take a long period of time to conduct and require very detailed observational evidence. Case studies, by contrast, are conducted within a defined time frame and do not necessarily imply the use of ethnographic techniques. Researchers conducting case studies may not even need to visit the organisation under study; they could collect their data by consulting secondary sources or interviewing respondents telephonically or by e-mail (ibid.). Yin (1994) defines a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined. Yin (1994:13) argues that ‘The case study allows an investigation to retain the holistic and meaningful characteristics of real-life events such as individual life cycles, organisational and managerial processes, neighbourhood change, international relations and the maturation of industries.’ Therefore, the case study approach is especially useful in situations where contextual conditions of the events being studied are critical and where the researcher has no control over the events as they unfold. The case study, as a research strategy, should encompass specific techniques for collecting and analysing data, directed by clearly stated theoretical assumptions. Furthermore, data should be collected from different sources and its integrity should be ensured. A classification of the different types of case study is shown in Table 3.1.

Stake (1993) distinguishes three types of case studies: intrinsic, instrumental and collective. An intrinsic case study is done when the case is unique and is therefore not representative of others. The purpose of conducting this type of case study is not mainly to build a theory, but because of its intrinsic interest. An instrumental case study is selected to provide insights or to develop an existing theory: 'The case is often looked at in depth, its contexts scrutinised, its ordinary activities detailed because it helps us pursue the external interest' (Stake, 1993:237). Finally, the collective case study is instrumental and extends to more than one instance.

Yin (1993) also distinguishes three types of case studies: exploratory, causal and descriptive case studies. In an exploratory case study, the collection of data occurs before theories or specific research questions are formulated: it is followed up by analysis of data and leads to more systemic case studies. The first stage in this type of case study is to define the issues to be researched. The causal case study will look for cause-and-effect relationships, and search for explanatory theories of the phenomena. For Yin (ibid.) this situation offers the most suitable conditions for adopting the case study as the research strategy of choice. The descriptive case study will require a theory to guide the collection of data and 'this theory should be openly stated in advance and be the subject of review and debate and later serve as the 'design' for the descriptive case study. The more thoughtful the theory, the better the descriptive case study will be.' (Yin, 1993:22). Case studies can also be single or multiple according to their numbers. Case studies can be embedded as well as holistic. An embedded case study is one in which there is more than one sub-unit, whilst in a holistic case study a global programme of organisation is contemplated (Yin, 1994).

Table 3.1: Types of case studies

| Criteria | Type of case study |
|---------------------------|--|
| Nature of the case | Intrinsic: unique and extraordinary Instrumental: developing theories and insights Collective: more than one instrumental case |
| Theoretical aims | Descriptive: requires theory to guide data collection Causal: search for causal and explanatory theories Explanatory: data collected before theory |
| Number | Single Multiple |
| Units | Embedded: more than one sub-unit Holistic: global |

The case study as a research approach in IS

The case study is a widely accepted research strategy in the field of IS. A study conducted by Scott and Ives (1992) reveals that the case study approach was the most common research strategy from 1970 to 1979 from a universe of 532 journal papers. In a similar research study, Farhoomand (1992) shows how from 1977 to 1985 the case study was one of the most popular research methods (25.4%) from 636 papers surveyed from journals focused on or related to information systems. According to Walsham, (1993:14), 'case studies provide the main vehicle for research in the interpretive tradition.' The case study strategy has been argued to be particularly useful for practice-based problems where the experience of the actors is important and the context of action is critical (Lee, 1989; Galliers, 1991).

In information systems, case studies might be classified as positivist, critical or interpretive according to the epistemological and ontological assumptions adopted. Yin (1993) provides a positivist definition when he argues that evidence should link up research questions arising from rival theories. The design should include clearly stated objectives linked to the research questions and basic sub-units of analysis. This research should identify the critical evidence, interviews and documents that support the hypotheses, (including rival hypotheses) and analysis of techniques. Following this stream of thought, Benbasat *et al.* (1987) emphasises the importance of testing hypotheses when conducting case studies. This might be the reason why Walsham

(1993, 1995b) classifies the views on case studies of Benbasat and his colleagues (ibid.) along with those of Yin as positivist. In this thesis it is assumed that the difference between an interpretive and a positivist case study resides in epistemological and ontological positions. The positivist position maintains that scientific knowledge consists of facts while its ontology considers the reality as independent of social construction (Walsham, 1995b). This contrasts with the inter-subjective and socially constructed epistemology and ontology of the interpretive position. However, in this research, it is considered that using case study strategy from an interpretive point of view can benefit from incorporating the rigours in designing and collecting data discussed by Benbasat *et al.* (1987) and Yin (1994).

This approach is not radically opposed to positivist research. Nevertheless, it is recognised that the research is strongly influenced by the epistemological and ontological stance of the researcher. In this case, it is recognised that the researcher believes that reality is socially constructed and that (we) can learn about it through the interplay between the subject and object of this study. This is also recognised by Galliers (1987) and by Zuboff (1988:423) in clarifying the rationale of her epistemological and ontological stances:

Behind every method lies a belief. Researchers must have a theory of reality and how reality must surrender itself to their knowledge-seeking efforts. These epistemological fundamentals are subject to debate but not to ultimate proof. Each epistemology implies a set of methods uniquely suited to it...My own commitment to understand social phenomena has been fundamentally shaped by the study of phenomenology and, in particular, its application to sociology and psychology.

Paré and Elam (1997) argue that case study research strategy makes the capture and understanding of context possible and can be used to achieve a variety of research aims using diverse data collection and analysis methods. Montealegre (1995) says that case studies (in particular, in-depth case studies) permit a comprehensive approach to the historical and social analysis of complex phenomena. The interpretive researcher attempts to derive his or her constructs from the field by an in-depth examination of exposure to the phenomenon of interest. Through this approach, categories and

themes emerge that hopefully are closely linked to the experiences of the relevant study's participants (Orlikowski and Baroudi, 1991).

Case study research has been subject to criticism on the grounds of non-representativeness and a lack of statistical generalisability. Moreover, the richness and complexity of the data collected means that the data is often open to different interpretations, and potential 'researcher bias' (Conford and Smithson, 1996). Despite the lack of a detailed step-by-step data analysis of case study data (Miles and Huberman, 1994), and especially the problem of not being able to provide generalisability in a statistical sense, Pettigrew (1985) still believes that case studies are useful in developing and refining generalisable concepts and that multiple case studies can lead to generalisations in terms of propositions. Walsham (1993:15) argues that the validity of the case study approach derived from an interpretive epistemological stance is based on the 'plausibility and cogency of the logical reasoning applied in describing and presenting the results from the cases and in drawing conclusions from them.' Similarly, Yin (1994) argues that case studies are used for analytical generalisations, where the researcher's aim is to generalise a particular set of results to some broader theoretical propositions.

In addition, the case study approach allows for 'thick descriptions' of the phenomena under study (Yin, 1994). Such 'thick descriptions' give the researcher access to the subtleties of changing and multiple interpretations (Walsham, 1995b), which would have been lost in quantitative or experimental strategies (Yin, 1994). The case study approach has also been suggested for projects of a procedural nature extending over a long period of time (Benbast et. al 1987; Yin, 1994; Walsham, 1993; Mitev, 2000b). In studying events in their natural setting, the case study makes use of multiple methods of data collection such as interviews, documentary reviews, archival records, and direct and participant observations (Yin, 1994).

Given the interpretive stance adopted in this research and the nature of the research question of understanding how Mozambican organisations are adopting ICT initiatives, it is believed that the case study approach is the appropriate research

strategy for this topic. The same research questions could have been approached using surveys designed to examine changing patterns in organisations and communities, showing, for instance, the rate of adopting a particular ICT or technique over others implementing some other type of technology. However, this might not reveal in detail the unique experiences of individual organisations and the layers of factors influencing the change. The case study method was chosen because of its advantages in creating novel and profound insights and its focus on examining the rich social and cultural influences of local adaptations to the adoption of ICT initiatives in the context of Mozambique as a developing country.

3.4. Research design

3.4.1. The selection of the case study sites

As stated, the purpose of this thesis is to create a better understanding of the interplay between development and ICT dynamics at the organisational and community level in the social context of Mozambique. This entails a detailed study of the wider and local context factors influencing such ICT/IS, the processes of implementation at the local level and ensuing change resulting from the implementation process. Such a focus led to the adoption of an interpretive stance, which seeks to uncover truth by understanding the phenomena in their real-life context (Walsham, 1995b). A case study approach is, therefore, used to describe the implementation of ICT-related initiatives in two organisations (an electricity company and the Central Bank) and a community ICT-based project (Telecentre). Over a 14-month period beginning in February 2000, three case studies were conducted. The first was in the Electricity Company of Mozambique (EDM) which was in the process of adopting (implementing) an invoicing system (*Galatee*). The second was in the Central Bank of Mozambique (BM), which was implementing a BPR initiative. The third case study concerned the implementation of an ICT-based project (Telecentre) in two districts in the southern part of Mozambique.

The selection of these cases was based on two issues. The first is that the two organisations are part of the organisations that were established just after the country gained independence in 1975 or formed during the period of transitional government. In addition, they are unique in the country in terms of their duties. The Telecentre is the first experience in the country of implementing an ICT-based project in a rural community environment. The second reason for the selection of these three case studies was a matter of access.

Research access was not easy to obtain. Flowers (1996) stresses the difficulties in obtaining access to private companies, particularly banks, when investigating organisational and internal issues, as this could undermine 'the interests of the powerful' (Lee 1993:129). For instance, in the course of this research, seven organisations were approached, but only the above-mentioned two (EDM and BM) responded positively. Another organisation made its involvement in this study conditional upon the completion of a consulting project, which was planned to commence in March 2000 and to last approximately six months. However, up to the time of the completion of the fieldwork for this research, the consulting company was still working in the organisation. The fourth organisation asked for the fieldwork plan and after a response to this request, never replied. The last three organisations never replied to the initial letter asking for permission to conduct this study.

Buchanan *et al.* (1988:55) recommend a pragmatic, almost opportunistic approach to fieldwork in organisations.

This pragmatic approach is supported by wider trends. Research access has become more difficult to obtain, for at least two reasons. First, further education has widely recognised the value of project work across a range of courses and many organisations have been deluged with requests for research access. We have been denied in some cases only because someone else got there first, second, as the economic climate has become harsher, in the private and public sectors, managers increasingly feel that they and their staff have little time to devote to non-productive academic research activities. These trends encourage the organisational researcher to become more innovative, devious and opportunistic in the research for sites and data.

When the researcher was offered an opportunity to conduct case studies at these three sites, she accepted without hesitation.

3.4.2. The sub-units of analysis

This research study adopts a multiple–case design containing several units of analysis. The units of analysis consist of ICT-related initiatives from a national (Mozambican) perspective, followed by banking and electricity industries in the country, and then the use of ICT in rural communities (Telecentre) with the emphasis on the adoption and use of ICT/IS. It is expected that the analysis of these units will provide a context for describing and analysing the case studies, and reconstructing the initiatives of the three case studies. At EDM, the sub-unit of analysis is the implementation of an invoicing system as part of a project, expected to modernise the management of EDM. For the BM case study, the sub-unit of analysis is related to a BPR initiative aimed at developing a new organisational structure and an IT Master Plan. The case study of the Telecentres is concerned with the implementation of ICT-related projects in rural areas.

3.4.3. Data sources

Data collection was done through both secondary and primary sources. Primary data sources included key informants for each case study. Secondary data sources mainly covered government publications, technical document, and annual reports of the companies. Valuable insight was also gained from the analysis of research studies conducted by the National ICT Policy Commission (CPI) on ICT projects in the country. Secondary data covered different sources and provided an essential preparation for the interviews. Secondary data helped to cross-check official information, learn about major events, technical details, historical decisions and main organisational players and roles. They also supported the exploring of particular responses during interviews.

Mitev (2000a, 2000b), and Silva and Backhouse (1997) have illustrated through the *Socrate* and London Ambulance Services case studies the benefit of examining written secondary sources as research material, which provides a multitude of interpretations. For this study it was possible to conduct the data collection and analysis in an iterative manner.

3.4.4. Data collection and analysis

The main data techniques used in this research study were semi-structured interviews, participant observation, group discussion, secondary source analysis and questionnaires. Personal interviews constituted one of the most important and valuable sources of information

The social nature of information systems has led many IS researchers to adopt research approaches that focus primarily on human interpretations and meaning (Walsham, 1995b). Interpretive studies advocate a relativistic understanding of the phenomena being studied (Orlikowski and Baroudi, 1991). Interpretive researchers see the pursuit of meaning and understanding as subjective and knowledge as a social construction (Walsham, 1993). They examine the social reality and subjective meanings held by people by eliciting and observing what is significant and important to them. They are not reporting facts, but their interpretations of other people's interpretations (Walsham, 1995b). There is no rigid separation between data collection and analysis, and the process is an iterative cycle of data collection and analysis, with the intention that the results of the analysis will help guide the subsequent collection of data. The cycle is repeated and theory is elaborated and checked as the process continues. When conducting interpretive research it is generally accepted that researchers should interact directly and intensively with the subjects of their research over a period of time.

The interviewees were chosen for their relevance to the conceptual questions rather than their representativeness. Initial participants (at the first group interview) were asked to suggest names of other actors involved in the topic of the case study (for

example, in the case of EDM the *Galatee* project) or people who are using it, and general networking through personal contacts expanded the sample. The total number of respondents to interview was reached heuristically, i.e., the decision to stop adding respondents was taken when nothing new was being learnt from the interviews and a state of theoretical saturation was achieved. The interviewees were selected on the basis of their closeness to the topics of the study project and their levels of experience in management and organisational issues. It was deemed essential not to limit interviewees to IS/IT staff. The way in which the data collection was organised is described in detail in Chapter 4.

All the interviews were conducted in Portuguese and for the purpose of this thesis were translated into English by the researcher herself. All interviews were transcribed in 'word' format (in Portuguese) and extensive notes were also taken during the fieldwork. The information gathered from these interviews was subjective, although an attempt was made to present an account from various perspectives and levels within the organisation. Interview transcripts and written notes were analysed systematically through iterative and repeated re-reading of them. This made it possible to gain an increasingly profound understanding of each interviewee's viewpoint and perspective, of links and contradictions within and across interviews, of complex contextual factors emerging from the aforesaid interviews and of the many relationships between the relevant concepts.

In the three case studies, a total of 121 interviews (38 - EDM; 26 - Telecentre and 57 - BM (4 individual and 53 groups)) were conducted with directors, senior managers, managers, users and IT staff. The data about the companies and their ICT-related projects were gathered from company reports, books and Internet web pages.

There is a multitude of different data collection techniques and these vary according to the extent of interaction (the 'distance') between the researcher and the phenomena under scrutiny. Until quite recently, much of the reported interpretive IS research (Walsham, 1995a) only involved relatively distant data collection methods such as analysis of published data, textual analysis or surveys. Document analysis was used in

the fieldwork conducted for this study, together with less distant methods such as interviews, meetings and participation observation, which provided face-to-face contact with the social actors in order to explore and probe responses. The case study method necessitates the collection of a large amount of rich, 'thick' qualitative information from a number of sources in order to address the complexity of the organisational processes and of the context studied.

During the fieldwork, the cross-checking mechanisms for the data pertaining to each case study were of an evolutionary nature, i.e., the questions were clarified and also refined during the process of gathering data. The key informants have checked the results of the analysis by reviewing transcriptions of the interviews, and meetings were also held with some key participants in order to give them a chance to reflect on the case in a big and rich picture.

A presentable formal documentation of the field material for each case study was created, which consists of all the data or pieces of evidence, data collection instruments, interviews transcriptions and field notes. This will enable other investigators to review the evidence directly and not be limited to the written reports.

The analysis of data was done by following the trends in the patterns that emerged in the course of the research that explain past data. One fundamental tenet of the sociology of technology is that there is no one inevitable way of developing technological artefacts. Therefore, when interviewing respondents, one is listening for narratives about why things happened in the way they did *or not*, in the case of adoption. Hence one is collecting multiple interpretations with all their contradictions, rather than finding the 'correct' interpretation (Yin, 1994).

The analysis of data firstly dealt with the description of each case based on the data collected via the different instruments. Secondly, an analysis was done of similar and different patterns in each case study. It is the author's contention that the descriptions of the case studies allow one to gain insights into the specific context. Finally, considering that this research study is composed of three different case sites, it was

necessary to search for patterns in all the cases. This enabled the researcher to develop a strong body of evidence from the cases.

3.4.5. Theoretical Framework

The conceptual framework contains the key factors, the variables and presumed relationships amongst them (Miles and Huberman, 1994). Walsham (1993) maintains that in the interpretive tradition there are no ‘correct’ or ‘incorrect’ theories. Instead, they should be judged according to how ‘interesting’ they are. Thus interpretive researchers can only claim that the theories presented are interesting to them and expect them to be interesting to those involved in the same areas. Interpretive theories will be made public and people will judge, evaluate and alter the theories. The result is not the generation of a new theory, but the generation of an inter-subjective one, that is, a theory built on by people working in the field. Walsham (1995b) presents three different uses of theory in interpretive case studies: theory guiding the design and collection of data; theory as an iterative process of data collection and analysis; and theory as an outcome of a case study. The use of theory as an iterative process between data collection and analysis has been applied in this research study. Yin (1993) emphasises that the theoretical propositions before the case study should be formulated very carefully because they contribute to the design of the case. The formulation of the theoretical propositions will also, according to Yin, indicate what analytical generalisations are expected as an outcome of the case study.

The main aim of this research is to understand the interplay between development and ICT dynamics at the organisational and community levels in the context of Mozambique under the globalisation trend; and to demonstrate that this can be achieved through understanding the particular ICT-related initiatives in organisations and communities within the social contexts in which the process of adoption and use of ICT-related initiatives is taking place. Moreover, it is argued that all of the ICT dynamics implemented in organisations or communities are part of the national network for development. To support this argument, an initial framework based on the human environment model (HEM) and actor-network theory (ANT) perspective was

drawn up in the previous chapter. This framework is used to interpret the three sub-units of analysis. In doing so, three questions are raised, which are to be the subject of research:

- How do we understand the dynamics of the ICT-related innovations (Applications) within organisations and rural communities?
- What can be done in order to make the use of ICT more effective?
- To what extent is ICT contributing to the development in Developing Countries in general and in Mozambique in particular?

The rest of the thesis is aimed at answering these questions. This study will consist of an interaction between theoretical foundations and empirical evidence. On the one hand, the results of the empirical investigation contribute to the refinement of the research questions, methodology and theory. On the other hand, the empirical study is shaped by the theoretical basis of the study.

3.5. Summary

In this chapter the theoretical and philosophical assumptions underlying the research methodology in the IS field were reviewed. In addition, a discussion of the research design for this study was made. A summary of this chapter is presented in Table 3.2 through highlighting the major decisions made in order to conduct this research work.

Table 3.2: Summary of the research design

| Level of decision | Choice |
|---|---|
| Epistemological and ontological assumptions | Interpretive |
| Research strategy | Multiple case studies |
| Research Techniques | Participant observation, semi-structured interviews (individuals and groups), group discussion, documentation analysis, questionnaires. |
| Organisations | BM, EDM, Telecentre |
| Sub-units of Analysis | BM: BPR initiative EDM: Invoice system (<i>Galatee</i>) Telecentre: ICT project in rural areas |
| Timeline | BM: February - May 2000 EDM: June 2000 - April 2001 Telecentre: August 2000 |
| Subject | Adoption and use of ICT in organisations and communities |
| Theoretical Framework | ANT (translation: problematisation, ' <i>interressement</i> ', enrolment and mobilization) for micro-level analysis, social context (human environment model) for meso-level analysis and ST for the macro-level analysis |

Chapter 4

Empirical investigation into the implementation of information and communication technology-based initiatives

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Empirical investigation into the implementation of information and communication technology-based initiatives

4.1. Introduction

In this chapter, three case studies concerned with the implementation of ICT-related initiatives in Mozambique are described. The first case study analyses an IS adoption in the Electricity Company in Mozambique (EDM). The information system described, which relates to the invoicing of electricity in Mozambique, is called *Galatee* meaning *the* 'God of Water'. *Galatee* is being implemented in five EDM operational areas, namely, Maputo City (south), Beira, Chimoio, (centre) Nampula and Nacala in the northern part of Mozambique. A French company called *SAUR* was contracted by EDM to design and implement this system.

The second case study concerns the introduction of a business process re-engineering (BPR) initiative in the banking sector of Mozambique, more specifically in the Central Bank of Mozambique (BM). This initiative consisted of two subprojects, including the organisational restructuring of the bank and the development of its IT Master Plan.

The third case study describes the initial experiences during the introduction of ICT in rural communities in Mozambique through 'Telecentres'. The case study examines the events and issues experienced by different actors in two rural districts, namely Manhiça and Namaacha, during the course of the initiation and implementation of the Telecentre project. This study helps to examine the role of ICT in rural development.

This chapter has four main sections. The first section describes the fieldwork. The second section describes the two organisation case studies including a historical perspective on the organisation and its structure, the role of the IT Department and details of ICT implementation. The third section describes the Telecentre case. The final section sums up the chapter.

4.2. Fieldwork

The case studies approach is based on the research methodology described in Chapter 3. In this section, the individual research sites and the data-gathering process are highlighted.

The fieldwork for the three case studies took place in Mozambique during the period from February 2000 to April 2001. For the EDM case study, the eight months of fieldwork from May 2000 was conducted in the five operational areas and at the Head Office. In the banking case study, BM, data gathering took place at the Head Office of the central bank, and also at the regional branches of Nampula and Beira in the northern and central regions of the country respectively. The BM research commenced in February 2000 and lasted for approximately four months. For the Telecentre project, data gathering took place in Manhiça and Namaacha from 14 August 2000 to 26 August 2000. In addition to this, data was also gathered at CIUEM (Eduardo Mondlane University Informatics Centre) in Maputo, and at other offices in various places within the districts (e.g., Palmeira and Maragra located some kilometres away from the Manhiça district village).

Data gathering involved individual and group interviews, group discussions, questionnaires, workshops, secondary sources, as well as formal and informal conversations. In all three case studies the interviews were pre-arranged and conducted at the premises of the key informants. The researcher adhered to specific interview guidelines for each case (details are given in Appendix 4.1).

In each organisation, at the departmental level, or in each regional branch or operational area, an initial group interview was conducted with the manager of the area and his/her management team to introduce the objective of the study and provide necessary clarifications. The interview sessions typically began with the introduction of the study objectives and the key expected results. This was followed by an invitation to give a detailed description of the major organisational functions, problems, opinions and suggestions regarding the process of adopting new ICT-based systems. This introductory session was followed by subsequent interviews with

employees directly responsible for different functions in each department, regional branch or operational area. In general, the interviews provided explanations about the functioning of each department, challenges being experienced in the IT initiation and how these are being addressed.

For purposes of cross-checking, the interview transcripts, when prepared, were sent to the interviewees for their confirmation, rectification and suggestions regarding changes or improvements.

In general, the individual interviews were aimed at obtaining a description of the demographic and educational background of the informant, the size and duties of the unit to which the interviewee belonged, and also the nature of the interaction between the individual and the ICT initiative.

The researcher gave a formal and written undertaking to preserve the anonymity of the interviewees and to refer only to the titles, not names. At the start of each session, permission to use a tape-recorder was requested. In general, they did not feel comfortable being recorded, and so no tape recorder was used.

All ‘formal’ interviews were transcribed in *Word* and these constituted the field materials documentation. In the group interviews, the interviewees appeared in the same reference box and when their comments are used in this thesis, the following reference abbreviation format is used: Initials of the organisational unit (department) to which they belong, company branch abbreviation, interview number and the page in the field materials on which the extract from the interview is located, e.g. [DE_BM_HO_ Interview 1, p. 2] or [DT_BM_BE_ Interview 5, p. 3] or [IT_EDM_CH_ Interview 4, p. 10]. In the case of individual interviewees, the professional or management position is indicated, company and branch abbreviations are used in the beginning of the interview identification, followed by the interview number and page from where the quotation is extracted e.g., [System Analyst_BM_HO_ Interview 1, p. 3]. Quotes from Portuguese interviewees and from other sources are translated throughout the thesis by the researcher. However, some

text is also left in Portuguese, for instance job titles and names of departments. The materials of the fieldwork are also in Portuguese.

In addition, secondary sources were also used as research material. Therefore, documents such as public reports (government publications), annual reports, and consultancy reports, project proposals and other documents were included in the case studies.

The secondary material was used to develop background information on the social, political and economic context of the sites, which helped to reconstruct the history of each ICT initiative (*Galatee*, BPR and Telecentre). During the one-year stay at the field sites it was possible to have informal discussions with many of the staff, as well as to make general observations. Through being present at the sites, frequent conversations and casual remarks (especially during the trip to the regional branches and operational areas) provided insights into the organisational climate. A summary of the informal conversations and observations was maintained in a diary as part of the field notes.

At EDM, the fieldwork began in May 2000, six months after the *Galatee* implementation, and lasted for eight months. The historical reconstruction of the story of *Galatee*, its implementation and use was possible through interviews with key people involved in the project, system users and the analysis of secondary documents and observations.

Additionally, a meeting with the IT Department at the head office in Maputo took place after the completion of the fieldwork to present and discuss issues concerning the *Galatee* implementation.

Interviewees appeared to welcome an opportunity to re-examine events six months after the *Galatee* implementation with a person from outside EDM. In general, the interviewees found this to be a unique opportunity to revisit and analyse the events. This was evident at the end of several interview sessions when an interviewee said:

I hope that you can help us this time to get our reported problems to the right people who can solve them on time, because when we inform the people from SAUR it takes a long time to get a solution. [Cashier_EDM_CH_ Interview 35, p.32]

Problems such as the one above that were highlighted by interviewees were reported by the researcher to the IT Department in a memorandum. For example, after an interview with a cashier in Maputo, a memorandum was sent to the IT Department, explaining the problem of a difference between the electricity receipt and client account, which the cashier had to resolve by paying from his own pocket. This was creating an unpleasant situation between the user (cashier) and the *Galatee* system.

Thus, the empirical component consisted of approximately 38 individual and group interviews, and one group meeting. Interviews typically lasted about 2 hours. The *Galatee* system demonstration took about 3 hours and much time was spent on informal discussions with many staff members as well as making general observations.

Many of the *Galatee's* project members were interviewed. Unfortunately, it was impossible to interview foreign experts from SAUR involved in this project. Interviews took place at the EDM head office and various other locations in the country (Nampula, Maputo, Nacala, Chimoio and Beira) with:

- EDM senior managers
- ICT/IS specialists
- Invoice managers
- Cashiers
- The New Image Project members (*Nova imagem*).

Secondary source materials for this thesis included:

- Commercial reports
- Internal EDM memos and documents (e.g. *Problemas do Galatee* 2000, IT report)
- Technical documentation (e.g. *Galatee* training procedures)
- EDM contract programme with the Government

- Annual EDM reports.

A detailed list of interviewees (only IT staff), their department's positions and roles are described in Appendix 4.2. In terms of time coverage, the interviews and internal documents concentrated mainly on the duration of the *Galatee* project, from its initiation in 1998 to its implementation in 2001.

At the BM, the fieldwork was initiated in February 2000 and lasted for approximately four months. The second subproject (the IT Master Plan development) of the BPR project at the central Bank of Mozambique had just started. The aim of the research study was to understand the developmental process of the IT Master Plan and to reconstruct the organisational re-structuring subproject.

In 1999, the executive board of BM decided to embark on the development of an IT Master Plan for the organisation. For this purpose BM decided to hire a firm of consultants called *Perago*, a South African IT company consisting mainly of former IT staff of the South African Reserve Bank. In addition, this company had experience of working with central banks in the Southern African Region (SADC – Southern African Development Community) such as in Malawi and in Namibia (<http://www.perago.com>).

Perago initiated the project in early 2000. For the development of the IT Master Plan, *Perago* decided to conduct group interviews with each of the BM departments. The purpose was to elicit opinions and perceptions about the main functions they were performing, the level of technical support they received from the IT Department and what they expected in the future.

The interviews of managers, staff and the IT group took place at the BM head office and in the regional branches of Nampula and Beira. In total, 53 group interviews were conducted with more than 100 people. Each group interview lasted between one and two hours.

In the initial phase, data gathering by *Perago* basically took place through the medium of group interviews. *Perago* staff, BM IT staff, the researcher of this work and a translator formed the data collection team. A translator was necessary because the *Perago* staff could not speak Portuguese. These interviews were directly translated into both Portuguese and English and it was possible to display all interview notes taken by using a data video projector to display all information being collected in the interview process. '*Inspirator*' software was used to draw data flow diagrams (DFD) for levels one and two, and to depict the organisational structure of each department.

All BM departments were involved in the group interviews, including the regional branches of Beira and Nampula. The direct display of the interview notes during the interview process served as an initial confirmation of the data gathered during the interview.

On completion of the group interviews, a one-day workshop was organised by *Perago* for the BM IT Master Plan project team, in order to consolidate data collection and the BM rich picture in order to produce the IT Master Plan. This workshop took place outside the BM head office so that the participants could give the workshop their undivided attention. *Perago* staff, the IT Department and the researcher participated in this workshop. A translator was not necessary as all the IT staff were fluent in English. The document produced by *Perago* after this workshop was then also presented at another workshop in which all BM's heads of departments participated. Based on the insights and contributions made by the participants, further refinements to the IT Master Plan document were made. The IT Master Plan was then presented by the consultant company to the executive board of directors of the BM, which approved it in December 2000.

The subproject of restructuring the organisation had been conducted in 1999, before the fieldwork started. The reconstruction of this subproject was possible through interviews with key people involved in it. For the purpose of gaining a thorough understanding of the role of the IT Department at the BM, it was necessary to conduct

some interviews with the IT staff. Five interviews were conducted, each lasting about one to one and a half hours.

IT staff interviewees appeared to welcome an opportunity to re-examine events related to their department, particularly the BPR project, the BM restructuring and IT Master Plan formulation. In general, the interviewees found this a good opportunity to re-analyse the events with someone outside BM. In general, BM employees expressed high expectations concerning the future of BM in terms of ICT-based systems, as compared to their earlier rather unsatisfactory experience with proposed new systems. Also contributing to the high expectations was the fact that the proposed computer-based information systems at that time were aimed at addressing commercial bank and not central bank issues. Some BM employees had a feeling that if the BPR project was going to fail, then the credibility of the IT Department within the bank would be decreased considerably. One interviewee commented:

This project gives us a big opportunity to show what we are capable of doing for the benefit of the BM. We know that many people here are waiting to see what benefits this project will bring to the BM [Acting IT Manager_BM_HO_ Interview 1, pp. 3-4]

The Telecentre case study fieldwork was conducted intensively from 14 to 26 August 2000 in the Manhiça and Namaacha districts, the sites of two Telecentre projects. During the data collection process the researcher stayed at the field sites. Twenty-four semi-structured interviews were undertaken in all the large and medium-size companies in each district, as well as in governmental and public bodies. These public and private organisations were identified as potential users of the Telecentre. A typical interview lasted between an hour and an hour and a half. In addition two individual interviews were undertaken with the manager of the CIUEM and the Telecentre project manager.

Interviews were facilitated by the use of questionnaires developed during the course of another study on the evaluation of the Telecentres (Macome and Cumbana, 2001). For more details about the questionnaires, see Appendix 4.3. The researcher also had informal and formal conversations with potential users in order to gain an

understanding of their expectations regarding quality of services and usage patterns of e-mail.

In addition, two group discussions took place (one in each Telecentre) to help identify the key issues as seen by the Local Advisory Committee (CAL) for their respective Telecentre. These group discussions promoted insights into shared understanding and beliefs, while still allowing individual differences of opinion to be voiced.

The Local Advisory Committee (CAL), the managers, the researcher and other colleagues participated in all group discussion meetings (normally 12-14 people). To give the discussion a sharper focus, the key aspects were defined as: necessary information for the Telecentre, priority services, new services, the prices charged, available human resources, benefits of the Telecentre, and a reflection on the future of the Telecentres at the end of the project. Guidelines for the meetings were prepared, and each CAL member and the Telecentre managers received the guide *prior* to the meetings (details are given in Appendix 4.4). The minutes of these group discussion meetings were also transcribed and analysed after the sessions with the project team.

A further data source was an afternoon workshop held in Maputo in April 2001, jointly organised by the researcher and the project team. In the workshop, the results of the Telecentre study were presented and discussed among different stakeholders. This also served as a vehicle to validate collected data.

Table 4.1 below summarises the data-gathering process used in each case study.

Table 4.1: Summary of data-gathering process in each case study

| | EDM | BM | Telecentre |
|------------------------|---|---|--|
| Location of the study | Maputo, Beira, Chimoio, Nampula and Nacala | Maputo, Beira and Nampula | Manhiça and Namaacha |
| Period of the study | May 2000- April 2001 | February 2000 May 2000 | August 2000 |
| Data source (quantity) | Primary sources: Individual interview (38) Meeting (1) System demo (1) Secondary Sources: Decree laws Annual reports Contract programme Internal memos Technical documentation of <i>Galatee</i> Web page | Primary sources: Group interview (53) Individual interview (4) Workshops (2) Secondary sources: Annual reports Decree laws, laws Organisational structure manual BPR project proposal Web Page | Primary sources: Individual interview (26) Group discussion meeting (2) Workshop (1) Questionnaire (2) Secondary sources: Project proposal CAL procedures Monthly reports Minutes of meetings Web page |

4.3. Organisational case study

4.3.1. *The EDM case study*

4.3.1.1. *Organisational background*

Historical Context

The historical context of EDM is divided into two main periods, from its creation/inception in 1977 to 1995 as a parastatal company and subsequent to 1995, a public enterprise.

EDM as a parastatal company

EDM is a Mozambican public company and deals essentially with the production and distribution of electrical power to the whole country. The company was created in 1977, two years after national independence, as a result of the nationalisation programme implemented by the new government (Conselho de Ministros, 1977 - decreto lei 38/77). It was formed as a parastatal company that was known as EDM_E.E., for the purpose of integrating all the electrical power generation centres that existed in the country. This was expected to make a major contribution towards satisfying the basic needs of the country in terms of electricity, particularly in relation to the development of agriculture, industry, services and the public sector. The exodus of skilled persons after independence in the country also affected EDM.

Widespread socio-political instability and a breakdown of infrastructure occurred in the country as a result of the civil war, and EDM was one of the companies directly affected. Moreover, many of the employees had lost their lives in the process of trying to protect electricity infrastructure. Despite the war, EDM concentrated their rehabilitation efforts on the destroyed infrastructure and tried to guarantee electric power in the country. It received a recognition award in 1989 from the central government for these efforts.

During the period when a centralised economic policy held sway, EDM was responsible for providing low cost electric power to all. As a result, the company suffered financially because power tariffs did not reflect the production, transportation and distribution costs. In general, the government relied on external donors and financial investors to support the electric power production costs.

EDM as a public enterprise

With the liberalisation of the economy, in 1995 EDM was transformed into a public company, its mission being to improve the quality of customer service, maximise revenues, introduce new management practices, and promote the autonomy and decentralisation of regional and operational offices (Conselho de Ministros – decreto lei 28/95). To help achieve these goals, EDM identified the following tasks: (a)

improvement of the aesthetics of the physical infrastructure; (b) rehabilitation and expansion of the electricity infrastructure; (c) institutional development with particular emphasis on human resources; (d) participation in the exploration of hydro energy; (e) institutional reorganisation and promotion of good competencies and better management practices; (f) establishment of commercial areas and expansion of the implementation of a computerised invoicing system in all operational areas; and (h) outsourcing of some EDM services.

In order to achieve these goals, EDM entered into a contractual agreement with the government to influence the following:

- **Tariff policy:** to ensure the economic and financial sustainability of the company, while also providing a social tariff for those with low-income capacity and to promote agriculture and industry. In addition, EDM needed to be able to adjust the electricity tariff to bring it into line with monetary inflation.
- **Commercial policy:** EDM needed to orient its activities towards improving all its customer's related services.
- **Financial policy:** to ensure the company's financial revenue and establish an adequate financial system.

Human resource policy: to increase productivity by having highly motivated and skilled employees. Optimise the number of employees.

Investment policy: the investment must be mostly oriented towards rehabilitation and expansion of electricity to rural areas, better conditions for the customers, improvement of the physical infrastructure, computerisation of the vital systems of the company and improvement of the communication infrastructure within the company.

EDM structure

Currently, EDM has approximately 2 860 employees distributed in different locations of the company. Of these, 123 have university degrees while 496 have had no formal schooling (EDM, 2000a). EDM has about 186 208 customers in the whole country. Table 4.2 gives the spread of customers in the five different operational areas where *Galatee* was being implemented.

Table 4.2: Number of customers in operational areas (source: EDM, 2000a)

| Operational area | Number of customers |
|------------------|---------------------|
| Maputo | 93 613 |
| Beira | 14 588 |
| Chimoio | 4 084 |
| Nampula | 15 030 |
| Nacala | 10 802 |

EDM's organisational structure reflects its mission and its linkage with the government. The structure of EDM can be summarised as follows: (a) Board of Directors, chaired by a President of the company nominated by the government, and 6 Administrators, one each for Infrastructure and Engineering, Finance, Human Resources, Commercial, representing EDM employees, and representing the Government through the Ministry of Planning and Finance (b) Four directorates: Commercial, Economic and Financial, Engineering and Networking, and Human Resources Management (c) Five divisions, consisting of Support Services (including the IT Department), Planning, Auditing, Engineering of Electrical Centres, and Stocks and Materials. The whole organisational structure can be found in Appendix 4.5. In addition to this central structure, EDM also has Regional Branches (North, Centre and South), Operational Areas and Zones of Distribution.

With the transformation of EDM into a public enterprise and a new strategic vision of customer-orientation, a new concept of *Agência* was introduced within EDM's management style as compared to the earlier *Dependencia*, where only electricity bills could be paid. In the *Agência* framework, EDM attempted to provide the customers with better services and a more comfortable environment by opening new contracts

and systems to deal with complaints. The new physical place with good aesthetics helped to encourage contacts between EDM and its customers. A Maputo *Agência* interviewee commented:

The behaviour of our customers and also of the employees changed completely when we opened this *Agencia*. Previously, when people came here to pay or complain about something they were already bored and spoke too loudly. Now it is quiet, people speak in an orderly manner. It seems that they find it a most pleasant place and they are more confident about finding solutions to their queries. [*Agência* Manager_EDM_MAPjardim_Interview 17, p.20].

The New tariff policy

A new electricity tariff policy was introduced by EDM in November 1999. This new policy consists of: (a) a fixed amount for electricity supply; (b) definition of social tariff from 0 to 50 KWh, where the consumer pays 468.00 MT (MT - Mozambican currency *Metical*) for one KWh and in this interval there is no charge for the availability of electricity; (c) definition of the interval of consumption of electricity and each interval has its price per electricity unit. The price of each unit increases in each interval of consumption (see Table 4.3 for the tariff trends).

Under the previous policy the price of electricity was relatively low, and price variations depended on the availability of electricity and not electricity consumption intervals. In general, the price of electricity increased for the customers.

In cases where it was not possible to register the customer's electricity consumption, EDM estimated the cost of electricity consumed. For example, during and just after the big floods in 2000, it was not easy to read the electricity consumption for many residences and the owners were also often unavailable to EDM inspectors. The tariff policy gave three alternatives for estimating the electricity consumed. First, this amount was calculated based on the last six months' electricity consumption. However, many customers did not agree with this method of calculating their consumption. Secondly, there was the possibility of estimating consumption based on electrical equipment installed at the customer's location. This system was also problematic because with the oscillation of energy, the same equipment might not be

in use during certain periods. The last alternative, which was more applicable in rural areas, was to pay a fixed price corresponding to 100KWh. However, this is also problematic because many people in rural areas usually use electricity for only one or two lamps, and the amount stipulated under this policy was far too high, compared to their real consumption.

Table 4.3: Domestic electricity and general tariff (low voltage) (source: EDM, 1999)

| Registered consumption (KWh) | Sale Price Domestic (MT/KWh) | Sale Price General (MT/KWh) | Fixed charge for availability of electricity (MT) |
|---|---|--|--|
| 0 - 85 | 466 | 606 | 30.000 |
| 86 - 165 | 886 | 1.152 | 30.000 |
| 166 - 330 | 1.061 | 1.379 | 30.000 |
| 331- 495 | 1.227 | 1.595 | 30.000 |
| 496 - 990 | 1.289 | 1.676 | 30.000 |
| 991 - 1485 | 1.375 | 1.788 | 30.000 |
| 1486 - 1980 | 1.414 | 1.838 | 30.000 |
| 1981 - 2475 | 1.464 | 1.903 | 30.000 |
| Higher than 2476 | 1.581 | 2.055 | 30.000 |

Organisation of the IT function at EDM

The IT Department at EDM was established in the late eighties through the data-processing (DP) unit: In 1968, the EDM already had a UNIVAC computer-based information system for the production of the customer invoices. However, other activities within the electricity company had been operating manually. On its creation, the DP unit was charged with the task of computerising the operations of EDM. In 1994, EDM transformed its DP unit into an IT Department headed by a networking Engineer who had graduated abroad. Since May 2001 the IT Department has had a new head of Department (HD) – a systems analyst who is a graduate of Eduardo Mondlane University in Maputo, and who had been working at the EDM since 1986. The HD reports directly to an Executive Director in charge of the Support Services at EDM. The IT Department consists of four sections: hardware management,

networking and communications; database management, software and applications; analysis and development of information system projects; administrative services and help desk. In total, the department has 16 staff members, most of them with a higher qualification in ICT or in related areas. An IT staff member is allocated to each of the corporate departments of finance, human resources and stock control.

The systems analysis and development section is involved in the development of in-house systems and the implementation and operation of all IS projects, as well as the design and maintenance of the EDM Internet home page. The section of hardware and communication deals with networks, communication infrastructure and maintenance of hardware at the head office and in operational areas.

Essentially, when the department (as DP) was first established, the majority of the staff were not from an IT background. Given this lack of expertise, the main IT activities were outsourced by EDM to vendors or IT companies. However, with the increased focus on computerisation at the head office, it was decided to have an IT Department with highly qualified staff who are able to respond more quickly to the IT demands in EDM. Therefore, in 1994, EDM initiated a program of recruitment of new university graduates to help create a new IT structure to easily handle major software, hardware and network-related problems. Although the IT Department is located at the head office, it is responsible for providing assistance to the local IT units in the operational areas within the country.

An IT steering committee headed by the Executive Director in charge of Support Services is responsible for selecting and implementing new ICT-based systems and services within EDM. This committee consists of the head of the IT Department, sectional heads within the department, the head or director of the unit, which will directly benefit from the new ICT facility or system, and key operational staff in other departments. However, the present situation is that each organisational unit that will be a direct beneficiary of the new ICT-related facility or system is leading the procurement and acquisition process and the IT Department is acting as an adviser. EDM has neither an IT strategic plan nor clear procedures for ICT procurement and

acquisition. During the fieldwork, it became clear to the IT Department that there is a need to design an ICT strategic plan and also to define proper procedures for the selection, procurement and implementation of ICT-based initiatives in the company.

At EDM, besides the invoicing system for the operational areas, there is another in-house developed invoicing system for the zones of distribution. This system is based on the Microsoft Access database system. Moreover, the company has other computerised information systems for human resource management, finance, control of the prepaid electricity system and stock control. EDM is also implementing a wireless system to connect all operational areas and regional branches. In the Maputo operational area, the *Galatee* system is already on-line with the Head Office. The plan is to have on-line linkage with all five operational areas for the human resources and invoicing systems.

Table 4.4 highlights the important events that have occurred in the company since its creation.

Table 4.4: EDM summary of important dates/events

| Year | Events | Source |
|------|---|---|
| 1968 | First IT-based system (batch mode) already existed before EDM establishment | System Analyst 2_EDM_HO_Interview 10, pp.11-12 New IT Manager information |
| 1977 | Establishment of EDM as a parastatal enterprise | Decree law (<i>drecreto lei</i>) 38/77 |
| 1984 | First interactive IT-based system | System Analyst 2_EDM_HO_Interview 10, pp. 11-12 |
| 1989 | Award recognition from the Government | System Analyst 1_EDM_HO_Interview 9, pp.10-11 |
| 1994 | Establishment of IT Department | IT Manager_EDM_HO_Interview 8, pp.6-8 |
| 1995 | EDM as a public enterprise | Decree law (<i>drecreto lei</i>) 28/95 |
| 1997 | <i>Agencia</i> Concept | <i>Nova Imagem</i> project proposal document |
| 1999 | New tariff Policy | EDM, 1999 www.mozambique/electricity.mz (new page address www.edm.co.mz) |
| 2000 | <i>Galatee</i> | IT Manager EDM_HO_Interview8, pp. 6-8 |

4.3.1.2. History of Galatee

The actors and the story

The *Galatee* project introduction at EDM can be traced back to 1998. The aim was to prepare the company for the Y2K problem and also to offer a better quality service and support to the commercial area through the improvement of the existing invoicing system (*Ingress*) implemented in the early nineties by ICL (International Computers Limited) Mozambique. For this purpose a project team was set up, consisting of staff representing the following departments in the company: Commercial area, Human Resources (Training) and IT. The director of the Commercial Department was the project leader.

EDM introduced *Galatee* (God of Water), a computer-based invoicing system, in all five operational areas between October and December 1999. EDM bought *Galatee* from a French Company called *SAUR* in 1999 and an independent team based in

Abidjan, Ivory Coast, developed the system. The *SAUR* staff integrated the project team.

Several problems with *Galatee* were identified during the course of the interviews. Those problems range from its analysis and design, development and implementation, consultation, ergonomics, training and project management, to a very poor data communication infrastructure in the country. Table 4.5 presents a summary of most of the problems referred to during the interviews in different operational areas.

Although the IT Department was part of the implementation team, its role was insignificant in the beginning of this project, due to the new perspective that the company was consciously trying to introduce concerning the acquisition of IT-based systems. It was only in respect of the selection and implementation of the system that the IT Department's contribution ran smoothly.

The initiator of the project (the Commercial Department) explicitly emphasised the importance of an appropriate policy for maximising revenue, since EDM had been established as a public enterprise in 1995. The process of adaptation of *Galatee* to the Mozambican context was done in a short time and this led to problems.

When first implemented, EDM staff found it difficult to use the new technical tool with its underlying tariff price, particularly relating to the estimation of price procedures, printing and other technical problems. These implementation problems were reported and examined by both *SAUR* and EDM (EDM, 2000b). Technical malfunctions, poor management and user resistance led to a problematic implementation (EDM, 2001a). The project team attributed the technical problem to the fact that many of the project members were not technically skilled, and the IT Department had not been directly involved in the adaptation process. Staff training had been inadequate and did not prepare the cashiers to deal with real-life problems such as tariff inconsistencies and printing problems. The language dialogue in some menus was in French or English, making it hard for the Portuguese speakers. Unfortunately the new electricity tariff procedures were not disseminated effectively to the public before the change occurred. While this information was presented on the

EDM web page, it was inaccessible to most users who did not have Internet access. There were frequent customer complaints about the amount they had to pay for the electricity bill, and long lines of angry complainants were often to be seen at the Head Office or at the Operational Area. Most complaints reported related to a misunderstanding of the electricity invoice. As the invoicing manager stated:

More than 80% of complaints reported here at the head office are related to the new tariff policy. Many people do not know it and, in addition, people here do not like to pay their invoice. [Invoice Manager_EDM_HO_Interview 12, p.16]

In 2000, based on the EDM statistics, the company distributed about 1211.9 KWh, 1013.3KWh of which was invoiced, but only 801.4 KWh was paid for (EDM, 2001b). This data emphasises the need to improve collection procedures for the electricity invoicing.

The technology

To help improve the invoicing system and increase EDM's income, the previous *Ingress* invoicing system had been implemented in the early nineties by a private IT company, ICL. The system needed to be improved and extended and made Y2K compliant. *Galatee* was implemented at EDM as a solution to these problems. *Galatee* was based on Sybase in a Unisys environment.

At the head office, there are two powerful Solaris servers for use and backup systems. Data stored in the servers were also backed up on discs (albeit in the same building as the server). In each operational area there were at least two servers linked to the work stations located in the cashier's and client management's offices. The system was designed in such a way that the cashier can use an electronic pen to enter the invoice details at the moment of payment.

The *Galatee* system had previously been used in various countries such as the Ivory Coast, Brazil, France and Poland. There was a need to make certain changes in order to include the local context, for instance, the Portuguese language. By the time of the research, the process of adapting changes was still in progress.

A French financial body (French Cashier) supported the cost of *Galatee*. Designing and programming was carried out in Abidjan, where the development team was based. For the implementation in Mozambique all adaptation occurred at the head office where supercomputer mainframes are centralised and control the network of sales work stations in all five operational areas. They are also connected to the EDM server accessible via a wireless data communications network.

Galatee was developed as a technical tool that could also manage, control and invoice the customers in order to maximise profits. The *Galatee* system has the following modules:

- Production of the electricity invoice and handling its payment
- Management of electricity cut-off for those who are not paying their invoices
- Control of partial payment of invoices
- Client management
- Management of off-line cashier.

4.3.1.3. Organisational and political conflicts

The new strategy is that *Galatee* belongs to the invoicing sector, but its operation and data communication form part of the IT Department's function. Based on this strategy, some technical staff from the IT Department were transferred to the Commercial Department, so as to work closely with the *Galatee* system.

Some staff from the operational areas felt that the involvement of local technical people in some IT-based projects in the company was poor. One of the interviewees expressed the following opinion:

I cannot understand why the Mozambican IT staff are not leading this (*Galatee*) project. This lack of involvement of local IT staff is creating some problems. For instance, all our problems must be reported to SAUR and we are not sure if the language translation of our concerns is well done or not. [IT staff_EDM_BE_ Interview 30, p. 29-30].

Another difficulty relating to the lack of involvement of indigenous people in this project will have to be faced when the *SAUR* team is no longer at EDM (during the writing up of this thesis the *SAUR* team was still at EDM but later on they will go back). Since IT staff were not directly involved in the initial development phase of the system, and assuming that the IT Department will be responsible for maintenance of *Galatee*, there is clearly an urgent need to address the issue of IT Department involvement. This problem of lack of involvement of IT staff in the project had already been identified by EDM, but needs to be readdressed. It is important to bear in mind that the IT Department is an official part of the *Galatee* project team, but its involvement in the analysis and selection process of the software was minimal due to different organisational issues within EDM.

In anticipation of the problems caused by *SAUR* withdrawal, EDM has been requesting greater and more formal involvement of IT staff. To support this technology (transfer), a team from the IT Department recently (May 2001) visited the Ivory Coast in order to make a detailed study of *Galatee* with the development team, and a visit to Poland and Brazil, where the system is running, has also been planned.

Under the previous invoicing system, the responsibility for managing the system in the northern and central branches rested with the IT staff. Within the new management perspective, responsibility is transferred to the Commercial Department. Conflicts arose since *Galatee* concentrated on commercial issues and was separated from IT. Regional IT staff were unhappy with this situation since they perceived it as a loss of power. These problems were exacerbated by poor communication, since no one from the management informed them about the new situation.

When the team from *SAUR* comes here it just makes changes to the system, changes configurations at the server, installs new equipment and does not inform us about anything (the IT staff). Maybe they inform other units here ... for us this meant that they are not considering our work here. And then when strange problems happen with the server, we have to solve the problems. [IT staff_BE_Interview 30, pp. 29-30].

The organisational climate, particularly in one of the operational areas, became tense and fraught with conflict, with rivalries between divisions, and so the staff became demotivated.

In terms of training, two categories of training were organised, one for IT personnel at the operational area and the other for the billing staff (cashiers). In general, all participants considered that the training was too short and that it did not help them much. One of the interviewees commented ‘ For me it was not real training; it was a demonstration of the *Galatee*’ [Cashier_EDM_CH_Interview 35, p.34].

The training sessions for the invoicing staff lasted 3 days, which were spent explaining the new commercial policies and the rationale for the new pricing structures. Staff judged it inadequate, since it did not provide enough information on the user-computer interface aspects, and it was therefore seen as merely a system demonstration. This added to the stress levels experienced by invoicing staff who had to deal with large queues of angry and confused customers on the payment deadline dates. At the same time, with the new computerised system, EDM also implemented a monitoring system, to keep track of the number of transactions, the time taken for each transaction, and the types and amount of invoices dealt with by each cashier. The *Galatee* system did not differentiate between two cashiers working at the same work station at different times. This made it difficult to identify the number of invoices dealt with by each cashier. The first cashier who used the work station was simply considered to have handled all the transactions. The invoicing staff were therefore subjected to a change of computer system and its user interface together with changes in training, role and qualifications, working conditions, handling of performance monitoring and reporting.

There are different opinions regarding the *Galatee* invoicing system project. During the interviews, different users presented the practical problems that they were currently facing. These problems were similar in all operational areas. The problems presented can be grouped into different categories such as: (a) technical, (b) organisational and managerial and (c) people-related. Table 4 .5 gives a summary of

the problems most frequently articulated by the interviewees in relation to the *Galatee* project.

Table 4.5 Summary of the major problems experienced with Galatee in each operational area

| Locality | Technical | Organisational and management | People |
|-----------------|--|--|--|
| Maputo | Frequent telecommunication interruptions; Data on the customer account is not always correct, sometimes the invoice paid is not registered in the account; Use of French and English as dialogue languages | Lack of system documentation in Portuguese; Data on the customer account is not always correct, sometimes the invoice paid is not registered in the account | Difficulty in accessing clients' houses to read the meter electricity consumption; Low quality meter reading |
| Beira | Use of French and English as dialogue languages; Deficient security system | Lack of system documentation in Portuguese; The conversion of the system was too quick | Lack of involvement of local staff in the implementation phase; Difficulty in accessing clients' houses to read the meter; Low quality meter reading |
| Chimoio | Use of French and English as dialogue languages; Deficient security system No differentiation of invoice in USD and MT currency; System does not register cheque details | Lack of system documentation in Portuguese; The training process was too short | Lack of involvement of local staff in the implementation phase; Difficulty in accessing clients' houses to read the meter; Low quality meter reading |

| | | | |
|---------|--|---|---|
| Nampula | Use of French and English as dialogue languages; Deficient security system | Slow updating process of the off-line cashiers; Difficulty with estimation of electricity price procedure; Lack of equipment to register consumption; Lack of billing paper | Lack of IT staff Difficulty in accessing clients' houses to read the meter; Low quality meter reading |
| Nacala | Use of French and English as a dialogue language; System does not register cheque details | Lack of system documentation in Portuguese; Difficulty with estimation of electricity price procedure; Lack of equipment to register consumption; Lack of billing paper; Shortage of equipment to register electricity consumption; Shortage of materials such as billing paper, toner | Lack of staff, particularly IT |

During the empirical study it was also found that EDM does not have an overall strategic plan for its business. However, based on its objectives defined by the new position of the company, it is addressing different strategic issues separately through different projects. Through these projects EDM aims to achieve efficiency within the company. Some problems have cropped up during the implementation of *Galatee*, but based on the improvisation approach, improvements are being introduced in the process.

4.3.2. The BM case study

4.3.2.1. Organisational background

This section covers two main parts, including the historical background of the Central Bank of Mozambique (BM) and its organisational structure. The background of BM is presented over two main periods. The first period was from its inception until the

establishment of the commercial bank of Mozambique (BCM) when the Central Bank separated its commercial function. The second period extends from the separation of commercial functions up to the present.

Bank of Mozambique as a central and commercial bank

The Bank of Mozambique is a Mozambican financial institution which deals essentially with the issue of coins and notes for the whole country, as well as for the supervision of banking and monetary activities within the country.

The history of the Bank of Mozambique is directly linked to the history of the country, monetary and foreign exchange policies and the reform of financial systems. On 7 September 1974, during the signing of the Lusaka Agreement between Mozambique's Freedom Front (Frelimo) and the Portuguese Government for the independence of Mozambique, one of the issues agreed upon was the establishment of a Central Bank in Mozambique. This is illustrated below by the extract from the agreement signed on that day.

A Central Bank, which will also operate as an Issuing Bank, shall be created in Mozambique in order to guarantee that the Transition Government has the means to carry out an independent financial policy. In order to achieve this objective, the Portuguese State commits itself to transfer the attributions, assets and liabilities of the department of *Banco Nacional Ultramarino* to the Bank. A joint commission shall immediately be empowered to study the conditions of that transfer [extract from the Lusaka Agreement, 1974: 10-11 – Frelimo e Governo Português, 1974].

It is under this agreement that on 17 May 1975, just before the Independence of Mozambique, the Bank of Mozambique was created, assuming functions as a central and commercial bank. The main aim was to ensure the value of the national currency and to provide banking services to the entire population and institutions in the country. The main task for the BM in its first years of existence was to develop an integrated banking system within the economic and financial policy of the country. The following is an extract from the decree that created the BM at that time:

In conformity with the government policy, the bank has to promote the implementation of correct monetary policy, supervise the internal and external stability of the currency value through credit criteria and control the economy, the

provision of financial resources to the state, the disciplining of the banking activity and the guidance to the country's credit policy with a view to its development and implementation of the people's interests as its main objective [extract from the decree law 2/75 - Governo de Transição de Moçambique, 1975].

In 1977, as the government had decided on a centralised economy based on a socialist political perspective, some of the banks were closed and their activities transferred to the BM such as the *Casa Bancária de Moçambique* and the departments of the *Banco de Crédito Comercial e Industrial* and of the *Banco Comercial de Angola em Moçambique*. The *Banco de Fomento Nacional* and *Banco Pinto & Sotto Mayor* were dissolved. This was considered to be a way of controlling the financial and monetary issues of the young country which was experiencing a shortage of skilled human resources to run the major banking activities, as well as a means of ensuring the supply of quality banking services to the government institutions in particular, and the population in general (Comissão Permanente da Assembleia Popular, 1977a - lei 5/77).

Based on its desire to offer better services to the public and also to be an actor within the development of the country, BM decided to establish a new bank called *Banco Popular de Desenvolvimento* (BPD) through merging the already existing banking institutions *Instituto de Crédito de Moçambique* and *Montepio de Moçambique*. This new Mozambican Bank was oriented towards supporting the country's development with an emphasis on rural areas and agriculture (Comissão Permanente da Assembleia Popular, 1977b - lei 6/77). In 1993, the BPD was privatised under the management of a Malaysian financial institution and it was named *Banco Austral*. Recently (2002), due to some management problems, this bank was sold in its entirety to ABSA, a South African Bank.

In 1980, five years after the country gained independence, BM, using its competence as an issuing bank, created the national monetary unit, the *Metical* (Comissão Permanente da Assembleia Popular, 1980 - lei 2/80). The *Escudo* notes issued for Mozambique by the Colonial Administration (*Banco Nacional Ultramarino*), as well as the notes with the surcharge which circulated legally in the People's Republic of

Mozambique, stopped having payment value. Then the terms on the basis of which the exchange of notes could be carried out were established. The Governor of the BM commented while speaking on the occasion of the creation of the national currency, said:

... in 1975, we did not have control of the national economy. The creation of a coin would have had little significance at that time. Now we have economic growth and development, which form the basis for monetary stability. The currency must correspond to a balance between consumption and production (Prakashi, 1980).

In 1984, BM introduced foreign exchange management aimed at increasing the revenue in foreign exchange through the participation of various economic actors and, particularly, those generating foreign exchange.

As part of the Structural Adjustment Programme (SAF) framework, Mozambique joined the International Monetary Fund and the World Bank. As a consequence of this, BM, based on its central bank responsibilities, represented the Government when it participated in those international financial bodies.

In the early nineties, BM came to understand that in order to increase the central bank activities, a new specific organisational structure would be necessary to respond to the banking needs of the moment. This was based on the notion that a new organisational structure for the Central Bank function should be developed in the Bank of Mozambique. As a result of this, central bank directors were appointed.

The introduction of overall economic reform in the country and the increasing of the central bank functions of BM, led the Government to decide to split the central and commercial functions within BM. Thus, the commercial duties were transferred to the Commercial Bank of Mozambique (BCM), effective from January 1992, while BM started acting exclusively as a central bank (Conselho de Ministros, 1992 – decree law 1/92). BCM was later privatised in 1996.

BM as the Central Bank of Mozambique

In 1992, the Central Bank of Mozambique (without commercial functions) was established as a corporate body with administrative and financial autonomy. Its main objective was to preserve the value of the national currency. In order to achieve this objective, it defined the following policies and guidelines: (a) having a correct monetary policy; (b) having a credit policy aimed at promoting the country's economic and social growth and development; (c) managing foreign cash assets to maintain an adequate volume as a means of payment necessary for international trade.

As a central bank, BM plays the following roles:

- Adviser and consultant of the Government in monetary and financial issues.
- Manager of the monetary policy.
- Banker of the state and of the institutions of credit.
- Manager of the foreign reserves.
- Supervisor of the financial sector and exchange authority.
- Representative of the Government in international monetary relationships.

In the mid-nineties, based on the notion of decentralisation of the central bank activities in the different parts of the country, BM created regional branches in Beira for the central region and in Nampula to cover the northern region of Mozambique.

With the liberalisation of the economy in the country, the transfer of commercial functions to BCM and the political and social stabilisation of the country, conditions were created which offered BM an opportunity to strengthen its role within the process of recovery and development of the country. BM's mission was to improve the quality of the services offered to its clients, maximise the revenue of the bank and introduce new management practices which could promote autonomy and decentralisation of the decision-making levels through the establishment of regional branches. To achieve these goals, BM identified the following tasks: (a) improvement of its aesthetic infrastructure; (b) strengthening of the banking system; (c) institutional development, with particular emphasis on human resources; (d) improving ICT facilities to support banking management; (e) institutional re-

organisation and promotion of good competencies and better management practices; and (f) establishment of new banking areas.

BM structure

Currently, BM has about 600 employees at the head office and at two regional branches [Training Divion_BM_HO_Interview 7, pp.18-26]. The major clients of the central bank are about twelve commercial banks existing in the country and also the government. It is important to recognise that the majority of these banks were established in the late nineties as a consequence of the stabilisation of the country and liberalisation of the financial market as mechanisms to support the economic and social development of the country (BM, 2000).

Prior to the re-engineering project, BM reflected highly structured organizational structure along functional lines with significant overlap (see Appendix 4.6). The new organisational structure of BM reflects its mission and can be summarised as follows: (a) executive board, chaired by the Governor of the bank and co-chaired by the Deputy Governor, both nominated by the Government, and four Administrators for the areas of: Maintenance, Regional Branches and Audit; Operations, Treasury and Judicial Issues; Foreign Exchange, Organisation and Information Technology; and Studies, Administration and Finance; (b) Two offices and six departments: Audit office, Private Notary Office, Banking Supervision, Research and Statistics, Foreign Exchange, Money Market, Organisation Methods and Information Technology, Banking Operation and Treasury, and Building Maintenance. (The new organisational structure is presented in Appendix 4.7.) In addition to this central structure, BM has two regional branches, namely the Nampula branch for the northern part of the country and Beira for the central.

Table 4.6 summarises the most important dates/events that occurred in the BM.

Table 4.6: BM summary of important dates/events

| Year | Events | Source |
|------|--|--|
| 1975 | Establishment of BM as a central and commercial bank | Lusaka Agreement 1974 and decree law 2/75 |
| 1977 | Establishment of BPD | Law (<i>Lei</i>) 6/77 |
| 1980 | Creation of <i>Metical</i> (Mozambican National Currency) MT | Law (<i>Lei</i>) 2/80 |
| 1992 | Separation of the commercial and central functions within BM | Decree law 1/92 |
| 1994 | Establishment of an IT Department (CSDIPAU) | Service order 41/94 |
| 1999 | Re-engineering project | Interview with Acting IT Manager [Acting IT Manager_BM_HO_Interview 1, pp. 1-3] |
| 1999 | Organisational Restructuring | [Acting IT Manager_BM_HO_Interview 1, pp. 1-3], [System Analyst_BM_HO_Interview 3, pp. 6-7]. |
| 2000 | IT Master Plan | [Acting IT Manager_BM_HO_Interview 1, pp. 1-3] |

Organisation of IT function at BM

BM's IT Department was formally established in 1994 as a Computer System Development and Implementation Project Administration Unit (CSDIPAU). Before that time many information systems at the BM operated manually or outside the bank through request of service from the CPD (Government centre of data processing). Since its creation, the CSDIPAU has had the main objective of developing and implementing computer-based information systems for the banking activities. With a better understanding of the role of IT within BM, this unit was transformed into a Department of Organisation Methods and Information Technology (DOI). Between 1997 and 2000 the DOI functioned under the leadership of an acting director. Since December 2000 the Information Technology Department has been headed by a Director of the Department (DD) – a systems analyst who is a graduate of Eduardo Mondlane University in Maputo, who has also been working at BM since 1994. The DD reports directly to an Administrator in charge of Foreign Exchange, Organisation

and Information Technology at BM. In this new organisational structure the position of IT has grown in importance from just being a support unit to a more strategic unit within the framework of BM.

DOI consists of five units, namely: organisation and methods; hardware management, networking and communications; systems exploration; analysis and development of information system projects and administrative services and help desk. In total, this department has 20 staff members, the majority of them graduates of the local university, EMU, in the areas of informatics or electronic engineering.

The systems analysis and development unit is involved in the development of in-house systems and the implementation and operation of all IS projects, design and maintenance of the BM home page, and maintaining help desks. The hardware management unit deals with networks, communication infrastructures and their maintenance at the head office and in the regional branches. The organisation and methods unit deals with issues concerning the definition and implementation of organizational structure and methods. The systems exploration unit controls the functionality and maintenance of all computerised systems within BM. The administration services unit deals with administrative assistance to all units within the IT Department.

Basically, when the IT Department was first established, the majority of its staff members did not have any IT background. The first Director of DOI was a BM staff member with no degree in IT or related fields. Given this lack of expertise in BM, the main IT activities were outsourced to vendors or IT companies. However, due to the increased focus on computing at the head office, it was decided to have an IT Department with highly qualified staff so as to be able to respond more quickly to the IT demands. Therefore, BM has, since 1987, been programming the training of its staff through giving them scholarships for further IT education at the university, and has also started a recruitment programme of new graduates from the university. Moreover, a new IT structure was set up to handle major software, hardware and network-related problems in BM. The IT team within BM is relatively young and is in

the process of being built up. The IT Department is directly located at the Head Office and provides assistance to the local IT units in the regional branches within the country.

The major computing programme was initiated in 1990 when BM was also responsible for commercial banking duties. Thus, the majority of IT systems identified at that time were oriented more towards the commercial role and not to the central role of the bank. The system specification requirements were made during 1990, and they had not been updated before the delivery of the systems, which only occurred after the separation of the two bank functions. Most of those systems were acquired from abroad (England and Portugal). The IT equipment was purchased through a national IT company. However, this company subcontracted to others. There was a delay in providing equipment and computerised information systems, with most of them only being delivered after the separation of the two bank functions. In the process of managing this project, two major problems were faced by BM. First, most of the systems installed did not reflect the actual situation of the bank. Second, the control of the subcontracts was very difficult. As a result, in terms of computerised information systems, it was necessary to adapt them to the real situation in BM, which was very complex since the developers were based outside the country. It was this situation that gave rise to the BPR project.

4.3.2.2. The BPR initiative

After presenting BM's historical background and IT infrastructure, a description of the two subprojects follows.

Restructuring of the organisational structure

The re-engineering project consisted of two subprojects: the reorganisation of the bank structure and the development of an IT Master Plan. The sub-project for the restructuring of the organisation was carried out by the internal team, basically consisting of staff of the Organisation and Methods Unit within the DOI and the Human Resources Department. The Unit of Organisation and Methods was

responsible for proposing new organisational structures and also alterations to the existing organisational structures in the bank. The team carried out the project during 1999 and at the end of 1999, at the annual meeting of the Executive Board, a new structure was presented to, and approved by, the Board.

It is important to bear in mind that this project of restructuring the organisational structure of BM began in 1996. In this year, a study was carried out of BM documents in order to verify the departmental functions as defined in the organisational procedure manual. One of the results found in the documentation study was that one in four employees at the bank had a leadership position within the organisational structure. After presenting their results, the study was interrupted. This could imply that top management felt that it was not the proper time to make changes in the organisational structure, since some management positions were going to disappear, with serious consequences for people's lives (in terms of salary and fringe benefits). This view is illustrated in the interview with a senior staff member of the department responsible for the designing of the new organisational structure:

Some users departments' managers had the idea that this process might contribute to them losing their power. They do not understand the role that IT can play for their work. They do not see IT as an enabler but as a barrier [Business System Analyst _BM_HO_Interview 3, pp. 6-7].

In 1999, the study was restarted as part of the re-engineering project managed by DOI. At that time the top management was very committed to running such a project and they considered that it was a suitable time to reinitiate the project of defining a new structure for BM. Some interviewees commented on the difficulties they faced during the interviews for the restructuring process.

Unfortunately, many employees feel insecure about losing their jobs and being replaced by machines. This might be related to what has been happening in many organisations here in the country during the privatisation in general and also it occurred in the privatisation process of the Commercial Bank of Mozambique, where some people lost their jobs [System Analyst 1_BM_HO_Interview 2, pp. 3-6].

In addition, some managers have the idea that through IT they are going to lose

their power instead of regarding IT as a facilitator of their work [Business System Analyst_BM_HO_Interview 3, pp. 6-7].

In early 1990, many employees of BM were involved in data gathering in connection with the development of computerised information systems. Unfortunately, most of these systems at the time of delivery were more related to the commercial function of the bank. Therefore, the employees who remained at the central bank did not see any direct results of the interview process at that time. As a consequence some employees are not sure if the results of this project will be in place soon or will be delayed again. [System Analyst 2_BM_HO_Interview 4, pp. 7-8].

Based on these comments, it can be said that the process of restructuring the organisation was sensitive owing to three facts. (a) In general, many BM employees were afraid of losing their jobs through this process; (b) some employees were afraid of losing power within the existing structure and (c) in general, employees were not open to being interviewed, because just before the separation of the two functions there were many interviews conducted on banking activities in order to identify the IT needs.

This study of the restructuring of the organisation was carried out in a tense environment. It was quite evident that some people in the DOI were uncomfortable about the process of reorganisation, mostly because they were preoccupied with the consequences of the implementation process. They were particularly concerned about the fact that the new organisational structure was not aligned with the human resource policy and there was also a lack of clarity on how the two subprojects were going to be interlinked. This was due to the fact that at BM there is a large salary structure difference between the management and professional positions, and those who are already in management positions are afraid of losing them. Another issue that cropped up during this study was the cultural aspects of leadership positions. Usually people who assume positions as professionals are not prepared to change their status, in line with a popular saying in Mozambique: ‘once a boss always a boss’. The fact that BM does not have an explicitly defined strategic plan, made it difficult to define the organisational structure based on the mission and vision of BM.

Organisation and Methods Unit staff were of the opinion that in the beginning of such a process of change, the executive board must be clear about the implications, clearly state for all employees what the process of change will be and be committed to conducting this process of change. This means that the Board has to monitor the whole process from beginning to end to ensure that top management is involved and committed to the process and that repetitions are minimised. For one project team member, the difficulties faced during the process were basically due to the fact that the department, which was responsible for this important change within the organisation, was structurally in a very low position [Business Analystist_BM_HO_Interview 3, pp. 6-7].

The results of the process of redesigning the new organisational structure were very confidential. In general, the majority of the bank employees did not know what the targeted structure was until it was published some months after its approval by the executive board. In fact, through the organisational restructuring subproject there was a reduction of the number of departments (from 18 to 12).

IT Master Plan development

In 1999, the Executive Board approved the appointment of the consulting company to develop the IT Master Plan as a second subproject within the re-engineering project. The project team, consisting of *Perago* consultants and members of DOI, was set up in February 2000 and by the end of May 2000 the team came up with the first IT Master Plan for the bank. The IT Master Plan produced for BM consists of two main components: the principles and the business function support. A description of each of the components is given below.

The main principles of the plan consist of:

- Technical and data integration within BM
- Training of users in applications and tools
 - Integration of various functions into an end-to-end business process
 - Standardisation of systems, data and processes
 - Visible impact within a short period of time (one year)

Establishment of sound IT discipline

All information received from an institution must enter BM through a single point.

These strategies and actions were aimed at guiding BM in the area of IT throughout the 2001-2005 period. The major features of this master plan were based on achieving a substantial level of change in respect of three issues: computerisation of the major functions of the BM, inter-connectivity and networking of the branches and counter parties, and integration of systems. Table 4.7 below summarises the other areas in which the IT Master Plan provides support for the achievement of the BM business objectives.

Table 4.7 Summary of areas for which the IT plan is expected to provide support (source: Perago, 2000)

| Support areas for IT plan | Details |
|------------------------------|--|
| Line functions | Bank supervision; systematic credit risk monitoring; monetary policy; management of liquidity; market operations; external debt management; loan and donor funds administration; economic analysis and national payment systems. |
| Line support functions | Accounting and legal services. |
| Support functions | Human resources management systems and payroll; library management systems; logistic and general administration, and building management. |
| Information dissemination | Communication within BM through e-mail and Internet services; use of Internet for internal information; MIS for the Governors and Board, and publishing BM information. |
| Tools | Work flow management systems; access to external information services (e.g. Reuters, Blommbergs); office tools; centralised time series database for monitoring historical information. |
| Communication Infrastructure | To facilitate the communication between BM and counter parties (government, commercial banks, non-monetary intermediaries, central banks of other countries, etc.). |

The IT Master Plan presents a range of recommendations on different issues on which BM needed to take action. In terms of computerisation, it was recommended that the BM should strive to make more effective use of IT in the business function lines, as well as in the support activities. Also recommended was the improvement of inter-connectivity within BM through the use of the Internet for internal communication, and the adoption of a MIS (Management Information System) for the Governors and the Board. In relation to the national payment systems, it was recommended that the BM work closely with the Ministry of Planning and Finance in order to establish a modern client payment mechanism for Government. Presently the payment between Government and BM is made through a mechanism called *Titulos*, which is based on

a colonial regulation dating from 1901. It is clear that this mechanism is inadequate for modern needs.

4.4. Rural development - Telecentre case study

4.4.1. Overview of the case history

The genesis of the project can be traced back to May 1996 when the Information Society Africa Development Conference (ISAD) was held in South Africa. This was the first ISAD conference held in a developing country where it was recommended that International Agencies should assist developing countries with the application of ICTs to boost their developmental activities.

In response to this appeal, in 1996, the Canadian Government's International Development Research Centre (IDRC) decided to launch a programme called *Acacia*. This programme supports Canada's contribution to the goals of the African Information Society Initiative, and was endorsed by African governments in 1996 as an action framework to build up Africa's information and communication infrastructure.

Acacia is an international initiative for communities and societies in Africa. Its mandate is to increase the value of local knowledge and understanding in community-based decision-making and empowerment through various approaches, including the use of ICTs (IDRC, 1997). *Acacia* is a major IDRC initiative for Sub-Saharan Africa that is expected to invest \$60m (Canadian dollars) over the 1998-2002 period in research and use of IT in communities in Africa through pilot projects (Yahaga, 2000).

Mozambique was the first country designated to benefit from this programme (June 1997, followed by South Africa (July 1997), Senegal (December 1997) and Uganda (June 1999). In Mozambique, three projects are running under this initiative - the IT

policy project (finished and approved by the government in December 2000), the Telecentre project and Internet access in schools (SchoolsNET). The latter two are the first to be run as pilot projects. The Telecentre project has a budget of US\$ 483 508, the IDRC contribution being US\$ 346 756 and the local about US\$ 136 852 (Gaster *et al.*, 1998).

The history of the Telecentre project in Mozambique is analysed in three phases; August 1997 to 1999 as the initiation phase, from 1999 to 2000 as the implementation phase and from 2000 to 2002 as the phase of consolidation of the project (the latter part is not the object of this study).

4.4.2 Initiation Phase

The Mozambican *Acacia* National Strategy was initiated at a workshop with different stakeholders, held in February 1997 in Maputo. The Government of Mozambique and the IDRC signed a Memorandum of Understanding setting out the broad parameters of the *Acacia* programme in Mozambique during the Global Knowledge '97 conference in Toronto in June 1997.

The Telecentre idea for Mozambique was first introduced in 1997 at the above-mentioned workshop organised by the Informatics Centre of Eduardo Mondlane University (CIUEM) and the IDRC (CIUEM, 1997). The Telecentre project is the fruit of a joint initiative between the Government of Mozambique, CIUEM and IDRC, developed within the framework of *Acacia* to encourage development in the rural areas through providing the communities with easy access to new ICTs.

One of the results of this workshop was a task entrusted to the CIUEM to conduct a feasibility study for a Telecentre project in Mozambique. It was also intended that the Telecentre project would not only develop a methodology for locating such centres, but also identify pilot sites that would channel *Acacia* support to the Telecentre programme. Thus, a project team that included social scientists as well as information

communication technology specialists was established. The Telecentre project would examine different technical models of connectivity including wireless, radio and telephones. This project would also identify tools that could facilitate the use of ICT by non-literate and semi-illiterate populations in the areas of the projects.

The starting point for the detailed project was a general feasibility study carried out in 1997 by a multidisciplinary team co-ordinated by CIUEM. The study decided on the locations for the pilot Telecentres, on the grounds of interest and demand on the part of the local communities (Gaster *et al.*, 1998). The results of this study were presented at a workshop organised by CIUEM in 1998. Based on the results of this study, the Government of Mozambique informed IDRC that favourable conditions existed for piloting the idea of a Telecentre in two districts of Maputo Province, namely Manhiça and Namaacha.

The selection of the districts was not an easy task. It was based on a number of criteria:

- Local interest and firm commitment from the district administration
- Level of socio-economic development
- Existence of a pool of potential users
- Current means of communication
- Technical and economic viability
- Easy access to support/advice and maintenance.

Objectives of the Pilot Project

The project was designed so as to increase the use of information technology in rural community areas, through the establishment of Telecentres in selected districts. The project had the following objectives:

- To contribute to the development of Manhiça and Namaacha, providing improved conditions of access to communications, information and education.
- To study and test the usefulness and viability of the Telecentre.

- To reduce the existing imbalance between the big cities and the rest of the country with regard to access to knowledge and the capacity to produce and disseminate information.
- To contribute towards consolidating the local community and stabilising the population, in particular with regard to young people.
- To improve the quality of the services provided by the public administration and the private sector, and contribute to the decentralisation of public services.

These objectives were translated into the following specific objectives:

To establish and start up two Telecentres in Manhiça and Namaacha, respectively, providing access to telephone, fax, e-mail, Internet, computer use, printing and photocopying.

To train the clients in computer use, giving priority to teachers and students from upper secondary schools, representatives of civil society and men and women from the most marginalized groups.

To support the Telecentre management over 4 years, seeking progressive sustainability.

To measure the quality and relevance of the Telecentre's services. To evaluate the Telecentre's impact within the target groups - education sector, public administration, civil society bodies, economic agents - and the community in general.

To test equipment, systems, programmes and other materials from the user's point of view and for quality and durability.

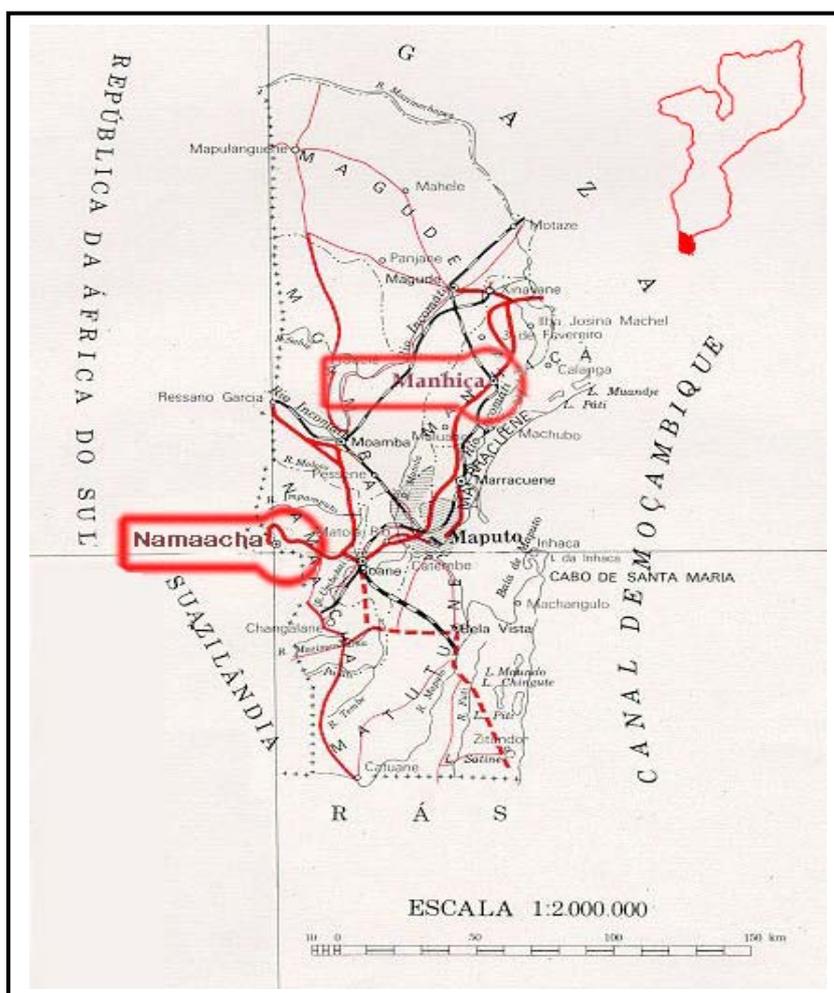
To create a body of Web content that meets the needs and desires of the users.

During assessment, it became clear that achieving some of the objectives by the end of the pilot project in 2002 was too ambitious an undertaking. For example, although one of the objectives of the Telecentre in Mozambique was to contribute towards consolidating the local community and stabilising the population, in particular with

regard to younger people, such an objective cannot easily be achieved within the relatively short duration of the pilot project (1999-2002).

Basic information concerning Telecentre's districts

The field study took place in the two districts of Maputo Province where the first Telecentres were implemented in Manhica and Namaacha. The Manhica district is located in the northern part of Maputo province, and borders on the Bilene district, in Gaza province. It is located 78 kilometres from the capital of the country, Maputo, and has about 130,000 inhabitants. The Namaacha district is in the southern part of Maputo province, and borders on Swaziland. This district is situated 70 kilometres from the city of Maputo and has 31,259 inhabitants, with some tourist potential (INE, 1999).



Map 4.1: Map of Telecentre's districts

In both districts, the majority of the inhabitants are rural. They speak the local languages (Shangana and Ronga), and Portuguese (the official language). In Manhiça, the population is characterised by the migration of men to the South African mines for employment.

In these districts there are different public and private institutions. The Manhiça district has some industrial potential in the areas of Maragra, Xinavane and Palmeira. In total, Manhiça currently has about 39 institutions, enterprises and non-governmental organisations. It also has 1 secondary school, one middle-level teacher training institute and a number of primary schools. In Namaacha, there are around 28 institutions, enterprises and non-governmental organisations. There is also one secondary school, one basic-level teacher training centre and a number of primary schools.

In both districts, the Telecentres do not have premises of their own. Instead, Manhiça rents space at a private institution. The installation of the Manhiça Telecentre covers an area of about 75 square metres, with no physical divisions between the areas of the various services. The Namaacha Telecentre is on the premises of the Namaacha Secondary School, in the district capital. It covers an area of about 120 square metres, and is organised in such a way that the spaces for the different services are separate.

Table 4.8 below presents a summary of the basic data related to each Telecentre.

Table 4.8 Telecentre basic data (() during the first year of implementation)*

| Data item | Manhiça | Namaacha |
|---|----------------|-----------------|
| Population in the district | 130 000 | 31 259 |
| Population in the village where the Telecentre is located | 22 000 | 10 000 |
| Number of public and private institutions | 39 | 28 |
| Number of people trained in Basic computer skills (*) | 64 | 65 |
| Number of visitors (including users) in the Telecentre(*) | 73 928 | 15 912 |

4.4.3. The implementation phase

The Telecentres offer various services, from e-mail and Internet access to printing, photocopying and public telephones, and place heavy emphasis on an educational role. The project team started the implementation of the project by preparing the site for the Telecentre and also by training the managers of these centres. The selection of the managers was based on their skills and academic qualifications and on being part of the local community. This preparation process took place late in 1998 and went on until August 1999, when the Telecentres were officially opened.

On 7 August 1999, the inauguration ceremony of both Telecentres took place in Manhiça. This ceremony was chaired by the Minister of Economic and Social Affairs, representing the central Mozambican Government, the Director of the *Acacia* programme representing the IDRC in Africa and the Rector of Eduardo Mondlane University. Different people representing NGOs, public and private institutions, the local community and others, participated in the official ceremony held at the Telecentre of Manhiça. Photographs 4.1 and 4.2 below show scenes from the opening ceremony. It is important to consider that, in some places within the country, this type of ceremony is accompanied by different events connected with the local culture of the community. In addition to this ceremony there was also a traditional ‘blessing’ by the local traditional leader of Manhiça district (the traditional leader informed the deceased leaders about the event and asked them to grant the initiative their protection in order to assure its success). Finally, a party with the whole community took place as a way of commemorating the opening of the first Telecentre in the country.



Photo 4.1 Traditional 'blessing' event during the Opening Ceremony



Photo 4.2 Community Party during the Opening Ceremony

As a way of implementing the objectives defined for this project, it was necessary to identify the main components and how they contribute to the achievement of the goals of the project. This project has the following specific components:

Training

One of the major components of the project is capacity building. Training is a critical element of capacity building to ensure the sustainability of the project. The project will provide training for various categories of ICT-related training, ranging from simple use of the computer to the use of Internet facilities and web page design.

Implementation of Internet and e-mail services in both Telecentres

Implementation of Internet and e-mail services in both Telecentres

The project was designed to establish and strengthen the local Internet service to foster Internet access by schools, hospitals, public and private institutions and the community in general, particularly for young people and teachers.

Promotion of enabling mechanisms for the use of ICT at district level

The project was designed to promote an enabling regulatory and environmental policy for Internet use and growth in rural areas in the country. This embraces two issues. The first is the promotion of universal access to information through the appropriate deployment of the Internet infrastructure, particularly in schools and in the rural areas. The second is to encourage the adoption of a reasonable fee structure for access to the national telecommunication network infrastructure, including leased lines and dial-up services, for the purpose of accessing the Internet.

Creation of Library facilities in the Districts

Since libraries do not exist in the rural areas, the project was also designed to create library facilities within the Telecentre, so that the education process for the young generation can be enhanced in the districts.

Besides the above specific components, the project was also designed to establish a range of services including photocopying, telephone and fax.

The main Telecentre events are summarised in Table 4.9.

Table 4.9: Summary of Telecentre events

| Year | Event | Source |
|-------------|--|--------------------------|
| 1996 | Launch of <i>Acacia</i> programme in Mozambique | www.IDRC.org |
| 1997 | Workshop at the Cardoso hotel in Maputo | CIUEM, 1997 |
| 1998 | Workshop for the presentation of the feasibility study results | Gaster et. al. , 1998 |
| 1999 | Opening of the first Telecentres in Mozambique | www.Telecentre.mz |
| 2000 | Evaluation study of the Telecentre a year after implementation | Macome and Cumbana, 2001 |

On the strength of the data gathered, it was possible to identify the different actors and their influence on the operation of the Telecentre. Collectively, the users of the Telecentre are the most important actors within the Telecentre. The initiation of the implementation of the Telecentre was influenced by the process of convergence of the interests of three major groups, namely CIUEM, IDRC and the Mozambican Government. The main actors involved in the implementation of the Telecentre initiative and their influences are summarised in Table 4.10.

Table 4.10: Main actors and their role and influence on the implementation of Telecentres in Mozambique

| Actors | Spheres of influence | Degree of influence |
|----------------------|--|----------------------------|
| CIUEM | Implementing and managing the Telecentre Technical support | High |
| Project co-ordinator | Responsible for the whole project, representing the CIUEM in the field | High |
| Telecentre Manager | Day-to-day operational management, implementing activities plan, accounts. Reports to CIUEM through project co-ordinator. Works closely with CAL | High |
| CAL | Consultative local body Works closely with the CIUEM | Medium |
| MAAC | Supervision of the Project and represents the IDRC and the Government | Medium |
| IDRC | Provision of financial and technical support | Medium |
| Government | Regulation of policy and provision of financial and political support | Medium |



Photo 4.3 Telecentre Namaacha



Photo 4.4 Telecentre Manhica

Viewpoints of different actors involved in the Telecentre initiative

The opinions expressed by different people who were interviewed during the fieldwork are presented next. These people can be categorised into different groups, such as public and private institutions, educational community, public users and potential users, CAL and the project team.

Public and private institutions

The interviews were carried out at various institutions and enterprises operating in the Manhica and Namaacha districts. A summary of the characterisation of the interviewees' institutions per district is presented in Appendix 4.8. The lowest level of schooling ranges from illiterate to 6th grade. It should be pointed out that there are more illiterates in the agricultural and industrial companies. The highest educational level is that of "licenciatura" (university degree in Mozambique), though in many companies the most qualified workers have only a secondary school education.

All 24 interviewees representing the different sectors (public and private) in both districts had a positive reaction to the project. When this field study was in progress,

one NGO and one business company were connected to the Internet, two businesses organisations had formerly had access to the Internet but were no longer connected due to the high telephone fee, and the rest of the 22 interviewees' institutions had never been electronically connected. The initiative of having a Telecentre with an Internet facility was welcomed. All interviewees were of the opinion that the Telecentre is helping to enhance the access and use of ICT by the communities.

The quotes below reflect the views of some of the Telecentre's users in Manhiça and Namaacha concerning the role of the Telecentre in their local context. These words provide glimpses of their vision, concerns, hopes and perceptions of the role that Telecentres may play in the local context.

The challenge is to make the ICT infrastructure serve local people's needs and legitimate interests, especially those living in rural areas. In order to exercise the responsibilities and rights of citizenship, people need to use information. This implies the necessity to acquire knowledge and information to improve the performance of their activities (e.g. support to public administration sector). [Senior officer_DAdm_Manhiça_Interview11, pp.17-18].

...We are living in the 21st century and information and communication have become a need for organisations, and also in general for the society as a whole [Manager of ISousa Company_Manhiça_Interview 4, pp. 5-7].

... Improving local capacity to obtain and use information properly for basic needs is one of our objectives within these Telecentre initiatives [Senior Manager_Political Party_Namaacha_Interview 15, p. 23-25].

In terms of the strengths of the project, all the interviewees highlighted the improvement and increase in computer facilities within both Telecentres. In the case of Manhiça, the opinion was expressed that the area now seems to be too small for the large number of users that the Telecentre has. In addition, it was also suggested that in order to increase the number of users of Internet-related services, the CIUEM should transform the Telecentres into Internet service providers as a matter of urgency, so that the local institutions would only be charged for local calls, which would lower the costs of Internet use. The other issue that captured the attention of the

interviewees, was training. Training has to be considered as an important element in ensuring the sustainability of the project, and as a means of introducing local people to ICT. There is a chronic shortage of human resources in the field of ICT in the country in general, and in those districts in particular.

The interviewed organisations recognised that through the Telecentre they could benefit in different ways such as:

- Training of their employees in computer use;
- typing, photocopying and binding their documentation at relatively low prices;
- reducing postal and travel costs by sending messages by e-mail;
- accessing the different information related to their business at regional and world level, e.g., the value of goods and services;
- facilitating the exchange of information between commercial partners and similar bodies.

In terms of project weaknesses, some interviewees expressed their concerns about the aesthetic aspects of the Telecentres' infrastructure. This occurred more frequently in Manhiça where the Telecentre operates in very small premises without divisions, and hence people have to be packed together in the same physical space in order to be served. This situation is even worse during training sessions, when some users might be using telephones while others would be engaged in training. They considered the costs of computer training courses to be high as compared with the purchasing power of the local population. Another problem presented was related to the poor quality of electricity offered by EDM in the district, this being more critical in Namaacha. One interviewee commented:

Frequently it is just impossible to work with a computer here in Namaacha because of continuous power cuts. At the moment I am attending a computer course at the Telecentre, but most of the time we have to interrupt the course because of power cuts or energy oscillation. It is a problem in the whole village.
[Teacher_CMA_Namaacha_Interview 19, pp.28- 30]

Education community

In this sector, the opinions were derived from interviews and from the last part of the two questionnaires conducted at the same time as this study, for the evaluation of the first year of the Telecentres' existence. The educational institutions involved were:

Secondary School of Manhiça

Primary Teacher Training Institute of Manhiça (IMAP)

Secondary School of Namaacha

Primary Teacher Training Centre of Namaacha (CFP).

The education community interviewed for this study felt that the Telecentre concept was an innovative approach to helping solve some of their educational problems, particularly relating to the availability of information. However, they expressed their concern about the small number of people who were to be trained during the project. As reasons for this, they basically referred to the long waiting list for taking part in the training programme, the shortage of computers for the users (just 3 in each Telecentre) and the costs of basic computer skills training courses. The interviewees welcomed the idea of having a library at the Telecentre because that did not exist in schools. The interviewees also expressed concern about the amount of paper and types of books. Another issue raised by the interviewees was that in the communities, the project did not seem to have made provision for publicising the facilities provided by the Telecentres.

The overall opinion of the educational interviewees was that, in the short term, the education sector in these districts would benefit from the Telecentre service. In terms of Internet use, they believed that the telecommunication and electricity infrastructure would be improved and more students would use this service. They were also confident that in the long term, this project could have a positive impact on the development of rural communities.

Public Users

During the fieldwork period it was also important to solicit the opinions of those who are using the Telecentre facilities. In general, this category of interviewees is

interested in all services currently available at both Telecentres. The Telecentre's users expressed great satisfaction with the implementation of the initiative because they could now use facilities that previously had only been available in the major cities. The majority of them came to the Telecentre to use services related to photocopying, telephone, fax and computer use.

Although a considerable number of users were utilising the computers within the Telecentre for their typing needs, it was stated by this group that not all the users could pay the current fee for attending computer courses and using the computers. The main reasons for not being able to pay were related to the low household income of the residents of the Manhiça and Namaacha districts. Likewise, there was almost no use of the Internet service because the cost of the telephone calls was high, since the connection is with the CIUEM server, with a poor quality of telecommunication and electricity infrastructure. Therefore the users suggested an evaluation of the possibility of the Telecentres becoming Internet and e-mail service providers for the residents of their respective districts.

The quality of Internet service was poor due to the slow connection. The other services met the users' needs. The users considered the Telecentres to be extremely important for their daily activities, as previously they had only had access to public photocopying services in the two districts. Moreover these services, which were available in a bank in Manhiça and in a hotel in Namaacha, cost five times the price charged in the Telecentres. This also applied to the public telephone, which was only available at the TDM shop.

Most of the Telecentre users who used e-mail said they did so in a personal capacity. Some of them used it with the help of others. There were several reasons for this, notably that they were not familiar with e-mail technology or computers. One user said he did not in fact know how to write using a word processor. One of the weaknesses pointed out by the users was related to the Telecentre infrastructure, i.e. the small physical size of the Manhiça Telecentre and the fact that no separate spaces

were allocated to the different services. One of the interviewees gave an example to illustrate the situation:

For example, while you are reading in the library, there might be people having a conversation on the phone. And usually the people here have a tendency to speak loudly on the phone [Student_IMAP_Manhiça – extract from the questionnaire].

Potential users

The category of potential users refers to those who for various reasons are not Telecentre users but who, by the nature of their activities, could potentially use some of the services in the future.

There were different reasons for not using the Telecentre. Some were unaware of its existence, others had such a low household income that it did not permit them to have access to the services offered by the Telecentre. Thus, it was suggested by this group of interviewees that the different activities being undertaken in the Telecentres should be publicised in the districts.

Although this group of interviewees was not currently using the Telecentre, one of the aims of the fieldwork was to glean more information about their expectations of the Telecentre. It was found that almost all potential users contacted stated that they needed to use the Telecentre, but could not for various reasons.

CAL and Telecentre Managers

The opinions of CAL members were canvassed through group discussion meetings. A list of the participants and the minutes of the meetings are part of the fieldwork materials, in which 12 - 14 people participated in the group discussion meetings held in Manhiça and Namaacha, respectively. Each meeting lasted approximately two and a half hours. The Telecentre managers took part in the CAL meeting and they were also individually interviewed about management issues.

In general, all participants welcomed the Telecentre initiative as a way of introducing ICT in rural communities. An old man who participated in the meeting, commented that:

I saw a computer for first time in life here at the Telecentre. I had only heard from the radio that such a kind of machine existed, but I had never seen it before. Now I can even use it. It is a great thing for me [Extract from the minutes of the CAL meeting Manhiça, p.41].



Photo 4.5: A CAL meeting in Namaacha

During the meetings with CAL in each Telecentre, different issues were raised. The following can be considered as the most important ones:

Training

The participants generally felt that training was very important and needed to be considered as a strategic issue within the Telecentre framework. This was essential if the number of Telecentre users was to increase, and would also contribute to the sustainability of the Telecentre. It was also observed that to date, only a small number of people had been involved in training activities, owing to the poor quality of electricity, the prices of training courses, and the limited number of computers available to the public, etc. The participants suggested that the training programme at the Telecentre could be organised in modules ranging from basic to advanced computer skills. It was deemed important that through this project, local people could be introduced to the use of ICT. There is a chronic shortage of human resources in the field of ICT in the country in general, and in those districts in particular.

...If in the Telecentre we do not have users of ICT-related facilities, and the quality of these facilities is so poor that nobody uses them, we will have a big problem, because in our concept of the Telecentre these are the two main services that make this centre different from a telephone, or a photocopying shop. [Project Manager_CIUEM_Interview 21, pp. 38-39].

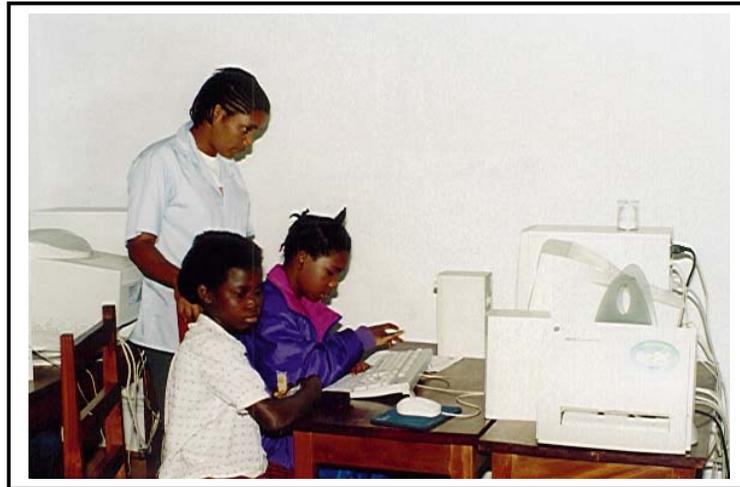


Photo 4.6: Younger users at the computers in the Namaacha Telecentre

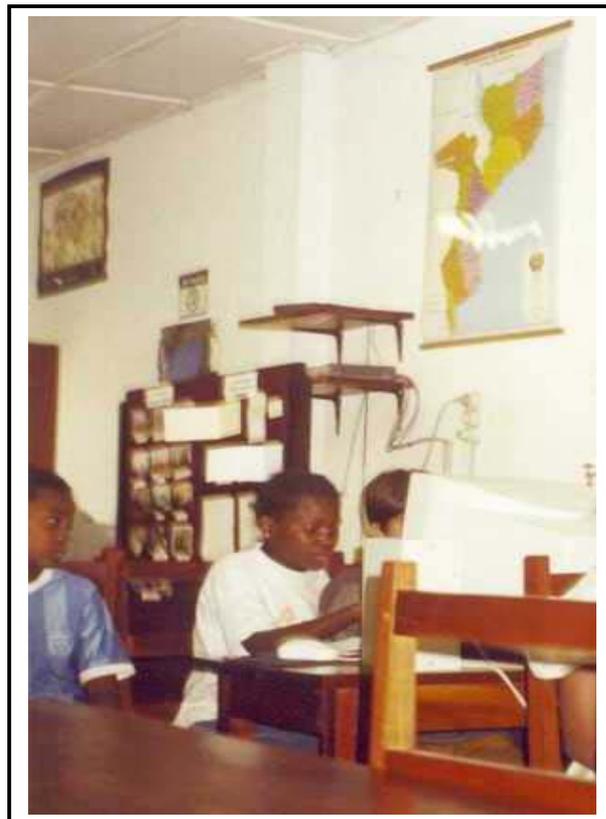


Photo 4.7: Younger users at the computers in the Manhiça Telecentre

Management

The CIUEM is one of the most active organisations in the area of ICT in the country, having pioneered the use of electronic networking in the country in 1992. Since the Telecentres were opened, the CIUEM has guaranteed their operation through technical, financial and management support. The participants recognised the work done by the Telecentre managers as good. The Telecentre managers were able to deal with technical aspects in order to offer a basic level of maintenance of the computer equipment. They also had training in financial management. For the project team, the management of the Telecentre initiative is not an easy task.

The Telecentres faced problems with the workload, particularly if one manager was absent from the Telecentre. It was very difficult for one person to cope with all the users coming to the centre for different purposes. It was suggested that the number of staff be increased, so that they can work in shifts and in that way the opening hours of the centre could be extended. Another issue addressed during the group discussion meetings was the role of CAL, which was seen to be slightly passive, especially in Namaacha. It was suggested that the CAL should rethink its activities so that it would know exactly what was going on with the Telecentre and also contribute to publicising the Telecentre initiative within the community.

Services

In terms of access to the Telecentre services, users of all age groups and both sexes were found in both Telecentres. There was a striking predominance of the 17-25 year-old age group and males. Most users in Namaacha were from the villages, due to the topography of the land around the villages, which is unsuitable for constructing houses. In Manhiça, the users came from the town and from some neighbouring villages and districts, located some 10-30 kms away.

The use of the Internet service was very low at both Telecentres, relative to the use of other services. The reasons for that were similar to the training constraints (price, number of computers, poor quality of electricity and slow telecommunication). By

contrast there were a considerable number of users of other services such as the telephone and photocopying. This was due to the fact that these technologies are not completely new to most of the users.

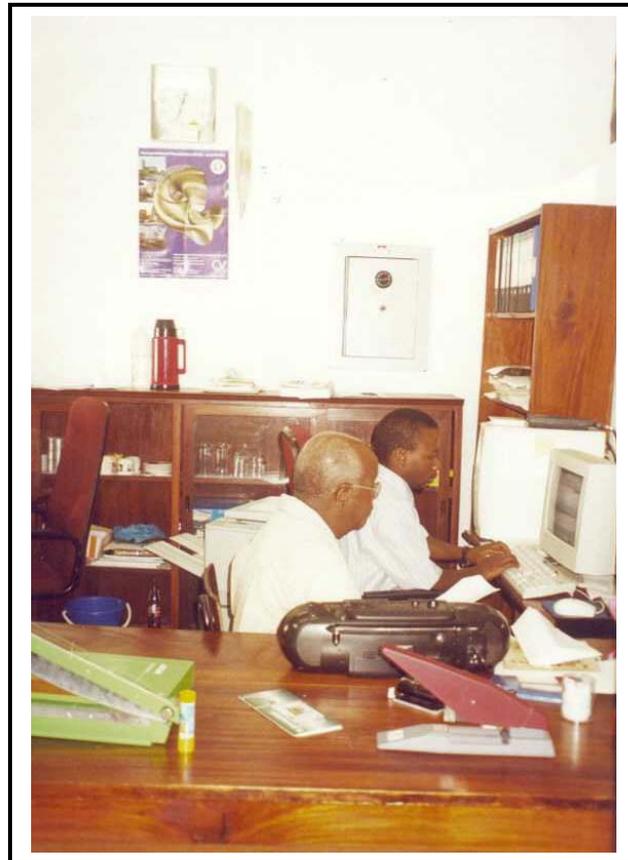


Photo 4.8: An old man using one of the Telecentre's services (Manager typing a document for him)

Sustainability

For the interviewees in general, and in particular the members of CAL and the project team, the issue of sustainability of the Telecentres after the termination of the project was very important and had to be analysed critically. One factor that might contribute to the sustainability of the Telecentres relates to the physical space for the installations. This had to be appropriately organised to enable the different services to be made available. It was therefore considered important and useful to identify an independent space and building to fulfil the needs and not to rely on renting space. The current sites had clearly shown certain deficiencies in terms of divisions and facilities.

Another key factor concerned revenues. Part of the Telecentres' activities was financed from their own revenue. It was deemed important to carry out a financial analysis in order to know exactly what the real revenue and operating costs were, so as to be able to determine whether the Telecentre was financially sustainable or not.

A further consideration that received particular attention was the identification of the management team for the period after the pilot phase. The CAL members were of the opinion that a candidate (individual or institutional) who could provide continuity to this initiative should be identified, so as to increase the benefits to the area covered by the current Telecentre. One member of CAL expressed his opinion, saying:

We must have our eyes very open and be attentive, so that this initiative does not fall into the hands of bad business people. In this country we have experienced different companies that were privatised and today they have closed down and thousands of people are now unemployed [extract from the minutes of the CAL meeting Manhiça, p. 43].

It was a hope of the CAL members and of the project team that the IT Policy being formulated and approved in December 2001 would enable the State to subsidise telecommunications services and further reduce the cost of buying computer equipment. These steps would contribute to universal access for the information initiative.

Publicity

The participants also addressed the issue related to the publicising of the Telecentre services. For participants of this study, publicity was an important issue if the implementation of Telecentre in their community was to be successful. They stated that many people from the community were still unaware of the existence of the Telecentre, especially those who were neither students nor teachers. In order to increase the number of users by transforming potential users into real ones, an intensive publicity programme needed to be designed to promote awareness of the Telecentre's activities in the regions.

CIUEM and Project team

Through its management and the project team, the CIUEM expressed its opinion of the Telecentre experience. Both groups of interviewees expressed favourable opinions about the project, which had contributed to the success of activities undertaken in the Manhiça and Namaacha districts, and also led to the introduction of some new services, such as e-mail. The Telecentres had a positive impact on the organisations that operate in the Manhiça and Namaacha districts, and on the community in general. The use of Internet-related services, photocopying and other facilities at the Telecentre had reduced the need for travel to Maputo City to obtain services and to communicate with relatives, business partners and others.

In terms of strengths, they highlighted the extension of the Telecentre initiative to other rural areas within the country as an important way of solving the lack of infrastructure relating to information technology in the rural areas. This could contribute to the achievement of one of the Telecentre's objectives, namely 'to reduce the existing imbalance between big cities and the rest of the country with regard to the access to knowledge and the capacity to produce and disseminate information.' Other issues considered important were training in the use of computers and in using Internet-related services. They believed that training needed to be improved in terms of course material, course organisation in well-defined modules and also the capacity of the trainers.

The opinion of the project team and the CIUEM was that it was important during this project phase to identify the constraints and factors that contributed positively and to enhance them; and to be open to learning from this first experience in the country. In this way other similar projects would benefit from the lessons acquired from this experience. The feeling that the implementation of the Telecentre concept was not an easy task, was expressed by one of the interviewees:

The success of the Telecentre initiative does not reside in installation of equipment but its contribution for the development in the rural in medium and long term. Since the beginning of this project we have been sure that this is a big

challenge and not an easy task, but we want to challenge this [Project Manager__CIUEM__Interview 25, pp. 33-39].

In terms of constraints, the project co-ordinator and the Director of the CIUEM considered the poor quality of electricity and the high cost of telephone calls as serious impediments. Currently, the members of the project team are identifying short-term solutions to both problems. The project manager specified the solutions to the problem:

For the telephone cost we are going to try a dedicated line system and for the electricity in Namaacha we are going to change the whole system and get electricity from another source, directly from the school, because it has good quality electricity compared to the whole village. [Project Manager__CIUEM__Interview 25, p. 38-39].

Some internal weaknesses were also identified, such as a lack of management skills on the part of the manager, in particular as regards issues of financial control and accountability.

The issue of sustainability was addressed during interviews with these groups, who felt that the Telecentre had to become an integral part of the local community. The role of CIEUM was seen as an experiment that would prepare the local people to manage the initiative in the future. Another aspect concerned the revenues of the Telecentre. It was observed that the Telecentres were generating revenues, and the project co-ordinator stated that 'now part of their running costs are being paid by themselves'. However, 'in financial terms, we have controlled the whole process so that by the end of the project (2002) we can say something conclusive about revenues'. The project team, together with CAL, is planning to discuss the future of the Telecentre after the completion of the pilot projects.

4.4.4. Telecentre summary

Based on the information gathered from the interviews, group discussions, observation, formal and informal conversations, it can be stated that the initiative to set up Telecentres in Mozambique has responded to the desires of the rural population through the use of new information and communication technologies. This has contributed to the success of activities undertaken in the Manhiça and Namaacha districts, since some services were introduced in these districts for the first time through the Telecentres.

Constraints on the running of the Telecentres and their suggestions for lessening their impact, as identified through the interviews, are summarised in Table 4.11 below. These help to provide a framework for action.

Table 4.11: Summary of Telecentres' constraints and suggestions to overcome them

| Categories | Constraining Factors | Suggestions for lessening the constraints |
|---------------------|--|--|
| Sustainability | Funding for running such initiatives, (particularly of external support stops); community preparation in terms of understanding of the Telecentre concept, use and local involvement and raising awareness (publicity) and continuous staff training. | Raise awareness and foster community interest in the Telecentre and its service; local mobilisation of efforts; increase the yearly number of people trained in the use the ICT-related services, particularly young people; and achieve self-sufficiency by operating other services such as bookshops. |
| Infrastructure | Inadequate training resources; Internet connectivity (high cost and low quality); inadequate electricity supply; lack of own Telecentre installation; and need for appropriate educational resources and pedagogical materials | Create conditions to get own proper installation; and improve electricity and telecommunication infrastructures, by looking at other alternatives for service provision. |
| Strategic alliances | Need for local content relevant to local issues; and development of its partnerships (e.g., with private sector, community groups, educators, various level of Government, NGOs, etc.) | Developing the Telecentre must assume a key role in community development efforts; becoming a central focal point for coalitions and contacts of civic organisations; assisting in the development of a well-trained local workforce and also helping to create job opportunities; Improve local management e.g. through training of district administration officials; and Establish, local, national and international linkages, contacts and funding schemas. |
| Policy and politics | Appropriate pricing level for low-income users and lack of national universal access and other policies to support Telecentres. | Increase government support and awareness; revise telecommunication pricing as a way to reduce the rural isolation; design ICT policies that contribute to the universal access to information; and raise awareness for change in the educational culture through use of other methods and tools based on ICT. |
| Staff | Need for ICT intermediaries (to organise and find information for people); information literacy; lack of training of ICT staff at the national and local level; and finding, attracting and keeping staff (e.g. intermediaries, managers, and technicians who become well trained and then move on to better paid jobs). | Contribute to skills development of employees and community members; prepare younger generation in ICT skills as an opportunity to gain employment; train users in computer literacy, Internet use and information literacy; and introduce new training programmes directly related to local needs. |

4.5. Summary

In this chapter three case studies were described which illustrate different experiences of the adoption and use of ICT-related initiatives in organisations and communities. All three experiences were planned beforehand and had support in the implementation process from other organisations such as international and national agencies, and consulting companies. Table 4. 12 is a comparative summary of the three case studies described in this chapter.

Table 4.12: comparative summary of the case studies

| | EDM | BM | Telecentres |
|---------------------------------|---|--|--|
| Type of study | Organisational | Organisational | Community |
| Object of study | Information system <i>Galatee</i> | Management techniques - BPR | ICT facilities in rural areas - Telecentre |
| Initiation of the initiative | Inside | Inside | Outside |
| Change approach | Planned Based on existing system - adaptation | Planned First experience in the BM | Planned and emergent Completely new initiative in these two districts |
| Support – external agency | Consultant (<i>SAUR</i>) | Consultant (<i>Perago</i>) | Intermediary institution (<i>CIUEM</i>) |

This description will be used in the next chapter for the interpretation of the field results, based on the initial framework for analysis conceptualised in Chapter 2.

Chapter 5

Interpretation of the case studies

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Interpretation of the case studies

5.1. Introduction

The objective of this chapter is to provide an interpretation of an analysis of the three case studies described in Chapter 4. This analysis is done from the ANT perspective and described through the re-examination of the interplay between the dynamics of the ICT-related initiatives and development in the context of Mozambique. As described in Chapter 1, the process of adoption and use is studied through the lens of ‘translation’, which has been elaborated on in Chapter 2 of this thesis. The first level of the analysis is made using the ANT perspective to understand the processes of building, growth and stabilisation of the network around the ICT-related initiatives. The purpose of the second level of analysis is to interpret the process of adoption and use by taking into consideration the social context in which the ICT initiatives operate. The third level of analysis relates the ICT initiatives to the development of Mozambique.

This chapter is organised into 4 sections. It commences with the analysis of the case studies as viewed through the ANT lens. The next two sections then cover the second and third level of analysis of the case studies, respectively. The last section seeks to identify implications for the theoretical framework for the analysis of the process of adoption and use of ICT-related initiatives for development.

5.2. First level of analysis: the ANT perspective

This section analyses the case studies from the ANT perspective by drawing upon the sociology of translation. The focus is on how ‘the actor-networks’ grow, change and stabilise during the process of adoption and use of ICT-based initiatives, examined in particular in organisational and societal contexts. Each case study is analysed on the basis of the four elements (‘moments’) of translation: problematisation, *interessement*, enrolment and mobilisation.

5.2.1. The EDM case as viewed through the ANT lens: translation phases

5.2.1.1. Problematization

As described in Chapter 2, where actor-network theory was discussed, problematization is the first ‘moment’ of translation where actors seek to identify and define the obligatory point of passage and attempt to impose their definition of the problem on others. Problematization is an indispensable moment as it implies that the problem resolution can only be negotiated through the obligatory point of passage.

Identification of actors/agencies is a way to find out who the actors are and what they are doing. Using Latour’s language it was necessary to ‘follow them’ (Latour, 1987) in their daily interactions with *Galatee* and other actors in their attempts to enrol them. The initiators of the *Galatee* system at the EDM are the Commercial and Informatics departments. The key actors in *Galatee* at the EDM consist of five main organisational groups: the initiators, the Invoice unit, Cashiers, the Training Unit at the Human Resource Department and the consultant company – SAUR. Non-human actors included the data items, the technological infrastructure, organisational and management routines and procedures, external influences like the Mozambican ICT policy, French Cashier Agency financing support, management policy and the expectation of the EDM Customer. The characterisations of some of these actors formed part of the description of the case study in the previous chapter.

The role and interests of each actor

The Commercial Department: is responsible for all commercial issues involved in managing the sale of electricity; the basic product of EDM, to its customers throughout the country. One of the tasks of the Commercial Department is to collect data about electricity consumption, to produce invoices and collect payments. In addition, this department serves as the interface point between EDM and its clients.

The IT Department: is responsible for strategic and operational level IS/IT issues. The IT Department was marginally involved in the initial stage of the *Galatee*

project, but subsequently became crucial at the point of conversion of data from the *Ingress* system to *Galatee*.

Invoice unit (billing personnel): This unit introduces the raw data (electricity consumption units) into the system for the production of invoices, which are then distributed to the customer's residences.

Cashiers at the operational areas: This group uses the *Galatee* system to collect payments from the customers based on the invoice. In addition, it is responsible for receiving all payments made to the company, for example, payments concerning electricity contracts, overdue payments and others.

The Training Unit: This is part of the Human Resources Department and is responsible for internal training issues, including training provided for the use of the *Galatee* system. The training was conducted in close collaboration with the *SAUR*.

The *SAUR*: This French consultant company was contracted by EDM to develop and implement the invoice computer-based information system in all five operational areas.

The initiators of the *Galatee* system problematised the initiation of *Galatee* by pointing out that the *Ingress* system was not Y2K compliant and that there was also a need to have a customer-oriented integrated, computer-based information system. It was argued that *Galatee* would contribute to the efficiency and extension of control of EDM through improved payments collections. These arguments constituted the rationale behind EDM's decision to purchase the *Galatee* system.

How was Galatee made an obligatory point of passage for different departments?

The *Galatee* system included several main components: invoice generation and processing payments; management of electricity, including disconnecting non-paying customers; partial payment of invoices; client management and

management of off-line cashiers. *Galatee* became an OPP for the various departments, as it was only by using this system that electricity bills could be invoiced, and electricity sold to the public.

The Commercial Department: This department would achieve efficiency in invoicing and client services and would achieve the EDM objectives of customer satisfaction and improving collection revenues. The commercial manager from Nampula described their aims:

Since transformation of EDM into a public enterprise, we are becoming more and more committed to the improvement of quality service to our clients. So if we have an efficient information system, which supports us in this area, we think that we will change the EDM's present situation. This means that we will be able to collect more payments [Extract from the commercial report of the Operational Area Nampula, PP. 3-4].

Here at the operational area Nampula, as a way to respond to the Government Public Reform we have recently created conditions that permit us to offer personalised service to our customers. *Galatee* is a tool that we use to respond to many of our customers' inquiries, e.g. if a customer has an enquiry about electricity consumption in his/her house, we need the *Galatee* system to handle this situation. [Extract from the commercial report of the Operational Area Nampula, P. 6].

IT Department: Through *Galatee* the IT Department would achieve an integrated system for commercial issues and also improve ICT infrastructure.

We are seeing *Galatee* as an opportunity to have an integrated system for customers' issues, but at the same time through this project the EDM is also aiming to improve the ICT infrastructure, particularly in the area of telecommunication. We want to be on-line in all operational areas. In the near future our customers will be able to pay their invoices in any part of the five operational areas. [IT Manager_EDM_HO_Interview 8, pp. 7-9].

The Invoice Unit: This would ensure that the electricity invoice is produced and distributed on time to the customers.

The production of invoices is assured with this system. The problem is the quality of data collected by our colleagues. Sometimes there are a lot of inconsistencies we are able to correct during invoice production. With others, it is necessary to go back to the customer's domicile in order to record the electricity consumption again. This later leads to complaints by our customers. [Invoice team member_EDM_BE_Interview 29, pp. 28-29].

Cashiers in operational areas: They would secure their jobs and improve their working conditions.

Here we try to do our job in a good way ... *Galatee* has improved our working conditions, e.g. we are now using an electronic pen for entering invoice data into the system. This greatly reduces the data entry errors. [Cashier_EDM_MAPjardim_Interview 18, pp. 20-21].

The speed of this system is high compared with the previous system. This helps us during the peak period for payments. The previous system used to be slow and this irritated our customers waiting in long queues [IT Staff_EDM_Nac_Interview 19, pp. 21-22].

The Training Unit: This would ensure that the users are able to perform their jobs through the *Galatee* systems.

We are responsible for organizing and executing training in different issues of the EDM. We are also involved in *Galatee* and we are working closely with SAUR and the Commercial Department. [Extract from the Training term of reference document, pp. 1-10].

The SAUR: This organisation would implement the *Galatee* system in all EDM operational areas, to reduce the problems identified during the implementation and ensure that those local conditions have been included in the system.

5.2.1.2. 'Interessement'

At present the system has been partially implemented in all the EDM operational areas. However, there is a need to ensure that all its modules are properly used, and also to interest other user departments in making better use of *Galatee*.

Being part of the Commercial Department, the Invoice Unit naturally sees the use of *Galatee* as integral to its functioning, and is therefore interested in increasing *Galatee's* role.

In order to perform our tasks we need necessarily to use *Galatee* as a basic tool for our work. However, this system is not completely implemented and also the parts already in use have some problems, e.g. the module for the management of debt [Customer Relations Officer_EDM_MAPJardim_Interview 17, p. 20].

There is a pervasive and accepted Mozambican cultural principle that dictates that subordinates must obey their managers, making it only a remote possibility that the cashiers (front-end users) might reject this system. The managers will try to ensure that the cashiers accept the system, and the latter will feel obliged to obey the decisions made by their managers. Therefore, there are few grounds for expecting any type of resistance from the personnel when it comes to using the new system. Administrative disciplinary techniques, such as the evaluation, monitoring system and control of transactions made by each cashier, were also introduced to ensure the staff's compliance. This institutionalised discipline of cashiers ensures the Commercial Department's successful *interessement*.

The process of monitoring and controlling transactions led to the involvement of the Finance and Audit Departments in using *Galatee* as a tool to control the collection of payments from the customers. For example, in Nampula we found the contracts of three cashiers with EDM being cancelled due to irregularities in the payment of electricity invoices (EDM, 2000c).

The IT Department used the opportunity presented by *Galatee* implementation to convince the EDM top management to upgrade the enterprise-wide ICT infrastructure and to define a new strategic role for ICT in rendering organisational change possible and improving efficiencies. In the words of a systems analyst:

Based on the main problems that we have experienced here at the EDM, it is clear for us (IT Department) that the company needs to revise the role of ICT in the whole business area. [Systems Analyst1 _EDM_HO_Interview 9, pp. 9-11].

The managers presented the system to the EDM employees as an opportunity to overcome the Y2K problem and as a means to increase efficiencies.

5.2.1.3. Enrolment

Enrolment requires the initiators to persuade and convince the other actors to join them. The motivation of all actors is of central importance to enrolment, since enrolment has to do with bonding elements together. On enrolment Callon (1986) says the following:

Why speak of enrolment? In using this term, we are not resorting to a functionalist or culturalist sociology, which defines society as an entity, made up of roles and holders of roles. Enrolment does not imply, nor does it exclude, pre-established roles. It designates the device by which a set of inter-related roles are defined and attributed to actors who accept them. '*Interessement*' achieves enrolment if it is successful. To describe enrolment is thus to describe the group of multilateral negotiations, trials of strength and tricks that accompany the '*interessements*' and enable them to succeed. (Callon, 1986:211).

The initiators of *Galatee* decided to acquire an integrated customer-oriented, computer-based invoicing information system from the international market based on the argument of lack of adequate in-house IT skills to develop the system and to comply with the conditions of the funding source market. As a result, the *SAUR* was contracted to undertake the development and implementation of the required system for EDM.

Here at the IT Department we have a shortage of skilled people who are able to develop a system within the short time period needed that we want for the improvement of EDM. In terms of technical skills for networking and telecommunication we think that we are able to do it by ourselves [IT Manager_EDM_HO_Interview 8, pp. 7-9].

As a consequence, the *SAUR* was enrolled to establish the *Galatee* system. The *SAUR* experienced many problems during the implementation, including some that inhibited communication, as well as the fact that not all EDM conditions were included the system. For example, the cashiers could not differentiate between currencies (MZM - *Metical* or US \$) in the invoices' payments. Presently the

customer, depending on his/her contract, can pay the electricity invoice in the national currency or in American dollars. In addition, the *Galatee* system did not permit the cashiering of the overdue amount, forcing the cashiers to make these transactions manually. This made it difficult to handle all customers using the same procedures.

There are still some problems with this new invoice system. For example, it is not possible to differentiate between the invoices paid in MZM or in US\$. [Cashier1_EDM_CH_Interview 35, p. 34].

The IT Department's involvement during the procurement of the system was not a smooth process. Despite this situation, the project manager achieved a high enrolment of IT Department members during the implementation by emphasising their role in the success of implementation of this system after the *SAUR* finished its work and left.

We need to change this situation that user departments sign contracts for the acquisition of computerised information systems with less direct involvement of IT staff. [System Analyst 1_EDM_HO_Interview 9, pp. 9-11].

We are involved in the implementation and at the same time we are facing problems related to a lack of knowledge concerning all the technical specifications of *Galatee*, a lack of documentation and the language problems. However, we are addressing this problem now; and soon we hope to have an IT team with the necessary insight into *Galatee*. [IT Manager_EDM_HO_Interview 8, pp. 7-9].

Cashiers in all operational areas are using *Galatee* and are trying to adapt to the new work conditions created by *Galatee*.

Although we feel that the training was too short, we are trying to adjust to the new work conditions. If we are facing problems with *Galatee* we first get support from the IT Unit here. If they are not able to solve the problems then they require help from the IT Department at the Head Office in Maputo. [Invoice Team Member1_EDM_NAM_Interview 2, pp. 2-3].

5.2.1.4. Mobilisation

The mobilisation of actors, according to Callon (1986: 216), results in rendering mobile agencies that were static beforehand in order to transit the defined OPP.

This mobilisation is made possible through the emergence of spokesmen and the displacement of agencies in time and space. This helps to strengthen the network of alliances and provides stable information systems, and renders possible the linking of agencies that were not linked before. For example, the cashiers who were not linked to the client management personnel earlier on (opening contract, etc.), now became linked. This implies that *Galatee* could only be stabilised when relations between these actors were established. Since not all modules of *Galatee* were implemented as yet, further and new relations between actants would need to be built up during the process of adopting and using other *Galatee* modules.

In summary, the initiators - the Commercial and IT Departments - proposed *Galatee* as the only solution to the Y2K problem and to improve invoicing efficiency. The implementation of *Galatee* helped to build a strong network of alliances between the Invoice Unit personnel, and the Finance and Auditing Departments. It seems that *Galatee* has become an indispensable resource in the commercial area of EDM, although the network for its implementation is not yet closed. The designers of this system are still in the process of adapting it to the EDM regulations and procedures. The personnel who are directly affected by *Galatee* are attempting to learn the required skills to use it. However, some personnel have showed dissatisfaction with project management practices, as well as with the level of *Galatee* adaptation and regarding the responsiveness of the development team in addressing their problems. This was due to the low level of consultation of the users in the adoption and use of *Galatee*. As a result, the new EDM network was not clearly defined and recognised by all users, thus influencing the level of institutionalisation of *Galatee* within EDM.

The above ANT analysis will guide the interpretation of the case study in sections 5.3. and 5.4.

5.2.2. The BM case viewed through the ANT lens: translation phases

5.2.2.1. Problematisation

In the late nineties, BM embarked on a BPR project, consisting of two subprojects: organisational restructuring and the IT master plan development.

The organisational restructuring subproject was launched in 1996 and owing to some problems (described in Chapter 4) it was temporarily halted from 1997 until 1999 when it was restarted. The design of the new structure was done confidentially outside of the business function revision. The key actors for the organisational re-structuring subproject were the IT and Human Resources Departments.

The IT Master Plan subproject was initiated in 2000 with support from a consulting company – *Perago*. The key actors in the subproject for developing the IT Master Plan at the Central Bank of Mozambique consisted of four main organisational groups: the IT Department, the Board of Directors, the users' departments and *Perago*, a consulting company. The process was influenced by other elements, such as data items, the translator (English-Portuguese language interpreter), organisational and management routines and procedures, IT infrastructure and the external authorities (e.g. commercial banks and other financial bodies). These elements are considered to influence the process of network building. Some of these actors were described in the previous chapter.

The role and interests of each actor

The IT Department initiated the BPR project with strong support from the Board of Directors.

Board of Directors: As the highest level of management of BM, the Board is responsible for strategic issues and their central coordination. The acting IT manager described the commitment of the executive board to the BPR project:

Since the initiation of the IT Master Plan subproject, in each meeting of the executive board, the BPR team has had to give a brief overview of the BPR project status [Acting IT Manager_BM_HO_Interview 1, pp.1-3].

The IT Department (DOI) is responsible for IS/ICT issues at the strategic level as well as at the operational level. As an initiator of the BPR project the DOI was closely involved and led the whole process.

The DOI has the responsibility to provide all ICT services within the bank such as establishing and maintaining the infrastructures, systems and services required to support these business processes and also of managing the social and organisational transition (change) process associated with the implementation of new business processes in the BM. [System analyst 2_BM_HO_Interview 4, pp. 7-8].

Based on our dissatisfaction with the low level of integration between our systems and also being willing to improve our service in order to contribute to efficient BM services (operations), we have decided that this is the moment that we have to think about the new role of ICT in the Bank. It is with this in mind that we proposed the BPR project to the executive board of directors [Acting IT Manager_BM_HO_Interview 1, pp. 1-3].

The HR Department: This department is responsible for personnel management in BM.

The User Departments: This group of actors represents all departments that are doing the BM business operations (except DOI). This group of actors ensures that the BM services are performed at an appropriate quality level in the organisation for BM customers and partners.

The User Departments are one of the agencies that will be affected and also will affect the way ICT is applied at the BM. There is no doubt that this group must be part of the process of building a network for the establishment of the IT master plan in the organisation. [Systems Analyst 1_BM_HO_Interview 2, pp.3-6].

We need to have an integrated system which permits us to communicate easily with other departments and also get information from them in good time. We

also would like to reduce paper work. [Training Division (HRD)_BM_HO_Interview8 , p. 21].

Perago: This is a consultant company contracted by BM in order to guide the DOI (IT department) in the process of the IT master plan development.

Because we know our limitations in terms of skills and shortage of personnel in this area, we have decided that we need a consultant company with experience in central bank issues and also in IT... This is why we have contracted *Perago*... they have experience of central bank business and they are also located in our region. [Acting IT Manager_BM_HO_Interview 1, pp. 1-3].

Definition of obligatory point of passage

Prior to the BPR project, BM had many different systems with limited integration and data sharing. In addition, these systems were developed around the organisational structures rather than being business-oriented. Moreover, the business functions within the BM were duplicated in different units that led to the launch of the business process re-engineering (BPR) project, to promote the development of the new BM organisational structure and the IT master plan. The BPR Project is considered as an OPP by its initiators, as a vehicle to ensure that BM achieves its business goals effectively.

How does BPR become an obligatory point of passage for the different departments?

The Board of Directors: was interested in the strategic question of how ICT solutions for central banking operations could contribute to the achievement of BM objectives. This was possible through a flexible organisational structure based on business functions, as reflected in the BM annual report (BM, 1998: *Preface*).

The international, regional and local contexts of banking and financial business have been experiencing different emerging challenges. As a central bank, the BM has to be prepared to accompany the development of its customers (central banks and other financial institutions). One of the priorities of the Central Bank continued to be the modernisation of the banking system, which with the privatisation of the last State-owned bank in 1997, gained new impetus, significantly changed the banking structure and inspired new management styles.

The introduction of new information technology is also contributing to an improvement of the quality of client service provision.

The IT Department: This department interested in efficiencies in BM operations through the design, development and implementation of ICT-based solutions.

Within our department, it is important to have a guiding framework to orient us in terms of IT systems infrastructure that we have to provide, maintain and manage for the BM. It is important that we have an IT master plan that guides us in the provision of ICT solutions enabling BM to operate efficiently [Acting IT Manager_BM_HO_Interview 1, pp. 1-3].

User Departments: Their aim is to execute their jobs with strong support of ICT facilities and to improve their work conditions.

For the dissemination of information between all BM units, we need to have Intranet facilities. We must also have ICT support for salary and personnel management [LAteam_BM_HO_interview 49, p. 145].

Perago: This organisation was charged with developing an IT Master Plan for the BM in order to fit the strategic business objectives.

5.2.2.2. 'Interessement'

The *interessement* of the user units was fundamental to the success of the IT Master Plan development. Firstly, the User Departments contributed with their expertise and information concerning the banking business. Secondly they would be the main beneficiaries of the IT Master Plan. The initiators assumed that the User Departments would agree to participate in the development of the IT Master Plan development which could provide them with the procedures and facilities to argue for more support to perform their business activities.

Our (DOI) existence at the BM has significance if we can contribute to the operation of the core business of the BM. Therefore, for us the major beneficiaries of this project are the User Departments. Without their engagement we will not have any IT Master Plan that corresponds to the BM goals [Systems Analyst 2_BM_HO_Interview 4, pp. 7-8].

In the case of the organisational re-structuring subproject, the initiators did not actively attempt to interest other actors, since only the initiators, together with the top management, were involved. There was limited consultation and debate among the BM employees about the issues related to BM restructuring.

5.2.2.3. Enrolment

The initiators convinced other departments to join them in the process of the IT Master Plan development through different negotiation loops. The first negotiation loop was between the executive board of directors and all departmental directors and regional branch managers. The aim was to raise awareness about the importance of the subproject for the achievement and improvement of banking performance. After these initial negotiations, the directors started to prepare their employees to join, to participate in and to be committed to this initiative. All departments of the BM participated in the process of the development of the IT Master Plan for their organisation.

In the organisational restructuring subproject there was a minimal involvement of other departments, for different reasons. One interviewee mentioned:

We decided not to involve all user departments. This was mainly for two reasons. One was related to the fact that prior to 1996, the BM made different situational analyses and the results of these studies were not visible to many employees. The other concerned the fact that we already had data from the study that we did in 1996. Basically the process of developing a new organisational structure was done based on a study of the formal documents, such as the procedure manual and structure. [Business System Analyst_BM_HO_Interview 3, pp.6-7].

An important effect that User Departments expected of the IT Master Plan subproject was the creation of a clear picture of ICT services and facilities that could be provided through the IT Department.

Through the IT Master Plan, we think that it will be easy for us to know what ICT services the IT Department can offer us for the provision of our duties, and also we hope that with this plan it will be easy to control budget. [DCO_BM_HO_Interview 35, pp. 97-98].

The managers at different levels expressed their vision of the strategic role of ICT in the organisation.

In general we think that through this IT Master Plan our work will be done in an efficient manner. Also we will be able to evaluate the ICT unit services and additionally have a view of the ICT expenditures at the BM. [System Analyst2_BM_HO_Interview 4, p. 9].

We would like to have on-line information on what each department in the BM has already spent and what is still available in the budget to be spent [DCO_BM_HO_Interview 35, 96-99].

5.2.2.4. Mobilisation

Mobilisation of actors concerns the process by which these actors/agencies end up being represented by delegates or spokespersons. This is relevant when a network of actors has been created and an OPP has been fixed. The stability of both the network and the OPP depends on the strength of the relationships between spokespersons and agencies.

In the case of the organisational re-structuring subproject, only the initiators were involved. As a result, new relationships with others actors were not formed. The executive board of directors approved the new organisational structure, so it became a BM resource. Therefore, the process of developing a new organisational structure for BM was closed.

In the case of the IT Master Plan development mobilisation was reached through direct involvement of the Governor who became a delegate for the executive board of directors in relation to ICT issues. His preoccupation with the subproject and willingness to be directly involved in it was perhaps due to this subproject being considered as an important starting point for change and for creating an ‘information epoch’ within the BM.

Some months ago the Governor asked to be informed about the progress of the project and other ICT issues. [Acting IT Manager_BM_HO_Interview 1, pp.1-3].

Each director represented his/her user department in the group's interviews and also different representatives of the user departments participated in the discussion of the first drafts of the IT master plan before its submission to the executive board of directors for approval. The approval of the plan helped to make the IT Master Plan a BM resource.

The IT Master Plan can be considered to be stable because all the identified actors were enrolled in the process of creating it. Moreover, the executive board approved the plan and allocated the necessary resources for its implementation.

In summary, the BPR can be seen in two different points. Firstly, it can be argued that the IT Master Plan was proposed as an OPP by its initiators, as it served as a mechanism to improve the efficiency of the BM operations through application of ICT-based solutions. Over time, many other actors joined the network and contributed to the achievement of the process and approval of the master plan. The IT Master Plan became part of the network for organisational change at the BM. In the IT master plan subproject, the project team with the help of the consulting company, tried to involve and consult the users in the process. At present the IT Master Plan is in its implementation phase, and here too there is a need to involve users and make them feel that they are an integral part of the whole process.

Secondly, it can be said that there was a low involvement of users during the design process of the restructuring subproject. This might lead to a low level of social integration and consequently to a low likelihood of the new structure being institutionalised within the BM. The new structure is now in place. However, it is important to find out to what extent this new structure is accepted by all employees, particularly in terms of new functions that they may be required to perform.

With the approval of the two main outcomes from the BPR project it can be said that the process of developing the IT Master Plan and the new organisational structure for the BM is closed.

The ANT analysis made in this section will guide the interpretation of the case study in sections 5.3 and 5.4.

5.2.3. The Telecentre case viewed through the ANT lens: translation phases

5.2.3.1. Problematisation

The initiators are those actors who proposed the idea of Telecentres and also those who implemented them at the field sites. For the Telecentre case the initiators consist of IDRC (*Acacia* programme), the Government of Mozambique, CIUEM and the project manager.

The key actors in the process of adoption and use of Telecentres in Manhiça and Namaacha in Mozambique consisted of five main groups: the initiators, Mozambican Advisory *Acacia* Committee (MAAC), Local Advisory Committee (CAL), public users and local administration authorities. The other actors in this process are as follows: Telecentre facilities (computers, Internet, e-mail, telephones, photocopiers), data items, the technological infrastructure, organisational and management routines and procedures, the external authorities (e.g. the Mozambican Government, the Canadian Government for financing support, Mozambican ICT infrastructures).

The role and interests of each actor

IDRC (*Acacia*): This is an international agency, which financed and supported the Telecentre initiative through the *Acacia* programme for Africa. This international initiative (*Acacia*) was aimed at introducing ICT-related initiatives in local communities in Sub-Saharan Africa to support socio-economic development.

The Government of Mozambique, which is one of the country's participants in the *Acacia* programme, provided political and financial support for the Telecentre initiative in Mozambique.

CIUEM: This is an Eduardo Mundane University unit, which is responsible for ICT/IS issues at the strategic level as well as at the operational level within the institution. In the Telecentre initiative, this unit has the task of identifying settings for the establishment of Telecentres, and of monitoring the implementation process and also providing technical support, expertise and knowledge (it is representing the Government in the application of the initiative).

The project manager is a staff member of the CIUEM. She leads the team, and has the responsibility of implementing and monitoring the Telecentre initiative in Manhiça and Namaacha.

The Telecentre initiative was problematised as the need to provide the communities in rural areas with easy access to new ICT-related facilities and services. The problem's solution, for them, was to establish experimental Telecentres in two districts - Manhiça and Namaacha.

Besides the initiators, MAAC, CAL, public users, public and private institutions, and local administration authorities were involved in the Telecentres project. MAAC is a national body entrusted with the task of implementing the *Acacia* programme in Mozambique. MAAC is composed of different people representing academic, public and private institutions involved in applying ICT. CAL is a local advisory committee in each Telecentre district. It is responsible for monitoring the Telecentre experiences and supporting the Telecentre managers in their operational activities.

Definition of obligatory point of passage

The introduction of the Telecentre initiative in rural communities brings new meanings and reconfigures social integration processes within the community. The Telecentre can be seen as an OPP, as it represents the solution to provide incentives in rural areas by improving access to ICT.

The initiators felt that the Telecentre initiative would make it possible for many Mozambicans living in these two districts to use ICT facilities for their needs. The

main components of the Telecentre are computer use, Internet-related services, photocopying, library and basic computer skills training.

Initiation of the Telecentre network was marked by negotiations between the Mozambican Government and the IDRC for financing, and between the IDRC, the Government and the CIUEM to help create infrastructure conditions to test the Telecentre initiative. As a result of these negotiations, the CIUEM became the key delegate responsible for implementing the Telecentre initiative, with the support of the Mozambican Government and IDRC funding. There were also negotiations between CIUEM represented by the project team and the local administration authorities to establish the required infrastructures.

How did the Telecentres become an obligatory point of passage for different groups of actors?

IDRC (*Acacia*): was interested in establishing the role of ICT in community development and increasing the value of local knowledge in community-based decision-making.

The central hypothesis of *Acacia* is that ICT will empower communities to take control over their own development. [Extracted from key *Acacia* Features www.IDRC.ca/Acacia].

The CIUEM: This body was charged with studying and assessing local experiences related to the use of ICT and with promoting the use of ICT to support community development.

For the CIUEM the implementation of Telecentres in Mozambique is a good opportunity to test different approaches for the process of adoption and use of ICT in rural communities. [Senior Manager_CIUEM_Interview 26, pp. 39-40].

The project Manager was charged with ensuring the proper implementation of Telecentres and with creating conditions for the adoption and use of Telecentres in Manhiça and Namaacha.

It is our (project team's) responsibility to install Telecentres in these two districts so that local communities can use ICT facilities for their needs. [Project Manager_CIUEM_Interview 25, pp. 38-39].

CAL: It has the responsibility of ensuring that the Telecentres are managed under defined procedures and guidelines, and of promoting the use of the Telecentre facilities among the community members.

The main objective of the CAL is to have a local body that can monitor the process of implementing the Telecentre experience in each district. In addition, this committee will be advising the project team on the new services that are needed for the local community. [Extract from the CAL terms of reference document, p. 1]

Telecentre managers: Their responsibility is to provide assistance and training to the users, to manage day-to-day operations and to improve their working conditions.

Public users: They are responsible for using ICT facilities efficiently to fulfil their own needs.

Some users in both districts mentioned the following:

In Manhiça we now have a new opportunity to improve the level of ICT skills of our employees. They could be trained in basic computer skills. This will enhance our activities performance. [Manager_NGOManhiça_Interview 12, pp. 18-20].

In our Municipality we now have a place where we can type, photocopy and bind documents. These are types of services that before the Telecentre's existence, we could only get in Maputo. [Municipal Officer_Manhiça_Interview 9, pp. 14-15].

As soon as the problems of electricity and telecommunications are resolved we think that more students and teachers are going to use the Telecentre services for education purposes [Extract from the minutes of the CAL meeting in Namaacha, p. 48].

Local authority: It aims to achieve an improvement in the quality of the services provided by public administration through using the Telecentre facilities.

The local administration in Manhiça is using some Telecentre services. Some of the administration employees have already been trained in basic computer skills at the Telecentre. We also use communication facilities such as e-mail and fax in order to communicate with other agencies in the country and outside. During the

period of flooding in 2000, we used the Telecentres facilities - particularly e-mail - to inform different organisations inside and outside the country that wanted to help us. [Administration Officer_Manhiça_Interview 11, pp. 17-19].

MAAC: to ensure that ICT is part of the local community resource and is used for their needs.

5.2.3.2. 'Interessement'

The initiators awakened the interest of other actors in using the Telecentre facilities, for example by describing the project to the local administration authorities. As a result, the local administration authorities became interested in the Telecentre idea, and helped to further the network by interesting teachers, students, community members and the public in it. It was argued that the maximum number of community members should experience this initiative to help ensure its success. It was also deemed important to increase the commitment and engagement of the public users in the Telecentre implementation. During the initiation phase it was necessary to contact students, teachers, and private and public institutions to inform them about the new initiative being made available in these two districts. This means that even before the installation of the Telecentre infrastructure, different actors were already locked in to the Telecentre idea. During this phase some of the users expressed their interest in the Telecentre idea and made proposals concerning additional facilities and services they needed.

The process of selection of Telecentre managers contributed to the deepening of commitment. The selection criteria used were based on the level of their computer skills. These managers were members of the local community which helped to ensure their commitment to promoting the Telecentre initiative among the community members. The selected managers were thus spokespersons for the initiative. Another key event was the inauguration of the Telecentre during which the project team used the opportunity to answer the question: 'What is a Telecentre?' and to explain the services that would be made available to the community. The project team did this by giving examples of improvements that could be made in education and administration, etc.

On the basis of the problems identified by users in both Telecentres, the project team and CIUEM began negotiating with CPI, TDM and EDM to revise policies for establishing universal access to information in rural communities, and improvement and extension of telecommunication and electricity infrastructure in the rural areas.

We think that there is a need to reduce the cost of e-mail and Internet access in districts. The establishment of a universal information access fund can do this.
[Project Manager_CIUEM_Interview 25, pp. 38-39].

As stated during the data collection process for this study in Manhiça and Namaacha, the majority of users were motivated and interested in the possibility of using the facilities provided in the Telecentre. The CAL was also motivated and willing to participate in the monitoring process of the Telecentre and to identify ways to maintain the sustainability of the Telecentres.

The Telecentre gives us an opportunity for training in the area of computers. Before Telecentre installation it was not possible to have this type of training in the village. But we know that there are not enough computers available at the Telecentres for our needs, so we think that it is also our responsibility to identify other resources so that the number of computers can be increased. [Extract from the minutes of the CAL meeting in Manhiça, pp. 41-42].

We (CAL) are preoccupied about the future of the Telecentre after the project ends. We are interested in continuing to use and improve the Telecentre services for our own benefits. Therefore, for us it is important to discuss details of the sustainability of this project in terms of identifying means to achieve self-sufficiency, raising awareness and fostering community interest so that local effort can be mobilised. [Extract from minutes of the CAL meeting in Manhiça, pp. 43-44].

Here in Namaacha, the continuation of the Telecentre is certain, but we need to start finding ways to contribute to the continuation of the Telecentre after the project ends. There is a need to solve the identified problems as soon as possible and also to find other organisations that might be interested in providing the Telecentre with support. [Extract from the minutes of the CAL meeting in Namaacha, p. 47].

For the actors involved in the management of the Telecentres, the adoption and use of the Telecentre facilities by the rural communities represented an effort and opportunity to engage the local citizens in the use of ICT for development.

5.2.3.3. Enrolment

The process of *interessement* was marked by different negotiations, which resulted in different actors joining the Telecentre network. Some users already exposed to the Telecentre facilities helped to enrol other users, both individuals and institutions.

The project manager, Telecentre managers and CAL members enrolled different community members through publicity campaigns and by offering special services to potential users. For instance, during school holidays the Telecentre organised courses in basic computer skills for teachers and bright pupils. This motivated teachers and pupils and helped to enrol more users.

We are very interested in having the Telecentre as a physical space that provides individuals, community groups and local organisations with ICT for socio-economic development, and for personal and educational purposes. Moreover, we believe that the younger generation has an important role to play in this process and therefore we organised training programmes for the best students, particularly girls, and for teachers. [Project Manager_CIUEM_Interview, 25 pp 38-39].

Since participating in the training course for word processing, I have been trying to type my teaching materials, but it is not easy because we do not have sufficient computers and we also frequently experience electricity cut-offs. I am trying to put copies of my teaching materials in the Telecentre so that each student can go there and make photocopies. [Extract from the minutes of the CAL meeting in Namaacha, p. 47.

The CAL and other local organisations, such as the youth group on AIDS/HIV, women's groups, and religious groups also attempted to make the Telecentre the focal point where a variety of social actors could come together and use the

Telecentre facilities. As one teacher in Namaacha mentioned during the CAL meeting:

I used to go on Saturdays to the Telecentre with groups of adolescents or children to watch educational video programmes. The Telecentre is the only public place where we can watch video in a large group. [Teacher CMA_Namaacha_Interview 19, pp 28-30].

Usually during weekends we organise cultural programmes with different activities, watch videos, dancing and also show what can be done at the Telecentre. [Extract from the minutes of the CAL meeting Namaacha_p. 45.

All these programmes are made available as a way to contribute towards increasing the number of users.

5.2.3.4. Mobilisation

How did the Telecentres link agencies that were not linked before? For example, the Telecentre helped to bring together previously separate agencies like the CIUEM and local administration in Manhiça or Namaacha, and the Telecentre and its users. This linkage was completely new in both districts. During the Telecentre implementation phase, the MAAC became a spokesperson for IDRC (*Acacia*) and the Mozambican Government for the Telecentre initiative. Such relationships could be seen as a product of solid grounding in communities based on multiple local alliances, as well as important national and international linkages. These linkages played an important role in making the Telecentre initiatives and their institutionalisation sustainable.

To summarise, the initiators defined the Telecentre initiative as an OPP to facilitate local development. The agencies proposing the Telecentre initiative were all actors from outside both of the local communities. The initiators engaged themselves in the process of persuading community members involved in the initiative to see the Telecentre as their own project. Thus, the Telecentre is becoming a focal point for community members. In the process of implementing Telecentres in Manhiça and Namaacha, the CIUEM played an important role as an

intermediary institution in supporting the linkages between the ICT initiative and development, such as access to information for the purposes of education. Different actors participated in this ongoing process of building up the Telecentre network to enhance conditions and facilities for access to information needs through ICT.

5.2.4. Summary

In analysing the findings of the three case studies in terms of ANT, three issues can be seen as important. One concerns the role of actors' involvement and their efforts to introduce new actors. The second concerns the communication and negotiating skills of the initiators and other human actors in order to create, translate and stabilise the network of alliances. Finally, the third concerns the way in which the process of implementation of new ICT-related initiatives is managed. These aspects will be taken into account in refining the initial framework for analysis of the process of adoption and use of ICT-based initiatives in organisations or communities, and to understand the dynamics of the interplay between ICT and development.

The next level of interpretation of the case studies builds on the above ANT analysis.

5.3. Second level of analysis: the social context

The second level of analysis of the case studies constitutes an attempt to take into account the local, and also the regional and national contexts in which the ICT initiatives were implemented. Internal and external contexts as well as the demands of the wider organisational and societal contexts influenced the settings of the case studies.

The analysis is based on the ‘human environment’ view, introduced in Chapter 2, and described by Du Plooy (1998:241) as follows:

... The human environment is an integration or mix of social contexts of people, organisations, groups, tasks, environments and technology. A mix therefore of ‘people’ and ‘things’ or ‘structures’ that are different in their natures, but that must be viewed as a collective, even a network, that is tied together by the notion of a human environment consisting of their social contexts. Therefore, when considering this human environment we do not distinguish in the ordinary way between humans and their artefacts, or between humans and their structures, but rather view them as ‘two sides of the same coin’.

Understanding the process of adoption and use of ICT initiatives in organisations and communities implies making sense of ICT initiatives in their human and social context. This environment consists of external and internal factors which influence the technology, organisation and community, groups of actors within organisations and communities, individuals and their organisational and societal activities and tasks as well as their philosophical viewpoints on work, community, organisation and ICT. The human environment model (HEM) (Du Plooy, 1998) is composed of six social context components, namely the environmental, organisational, group, task, innovation and individual contexts.

The **environmental context** within the social contexts of the HEM represents the influence of unions, institutions, competitors, etc. In the case of this study there were some forces that contributed to the implementation process of the ICT initiatives, such as the liberalisation of the economy.

The following factors constituted a major driving force for change in the three case studies: The political stabilisation of the country after many years of civil war, the liberalisation of the Mozambican economy, new Government programmes of public reform to improve customer service provision by introducing new management practices, programmes of poverty alleviation to improve living standards in communities, and globalisation processes surrounding the use of ICTs. These influences led to the transformation of EDM from a parastatal to a public

enterprise in 1995, and the split of BM functions into commercial bank and central bank functions in 1993.

The liberalisation of the banking industry and the associated increase in the number of commercial operating banks and other financial institutions (e.g. foreign exchange houses), coupled with the new and emerging focus on customer services and improved technology use, forced the BM management to embark on the path of IT strategic planning. This was with the aim of improving flexibility, responsiveness and the quality of service delivery for its customers and to respond to the competitive environments. In the case of the EDM, the Government contract programme with the EDM and the Y2K problem forced the EDM to embark on the process of implementing *Galatee* to improve the quality of service for the customers within the EDM.

The Telecentre initiative case was also directly influenced by an international organisation (IDRC), the Government and the CIUEM.

The **organisational context** includes different elements such as the organisational culture, information politics, organisational learning, organisational norms and values, and organisational information sharing politics. These elements of the organisational context influence the adoption and use of ICT initiatives in organisations and communities.

The organisational culture represents the manner in which actors in organisations think and act (Du Plooy, 1998). For example, if the organisation has a culture of control, this becomes evident in the type of the ICT initiatives they implement. The organisational culture also influences the way in which the ICT initiatives are developed and implemented.

Organisational learning means that an organisation is skilled in creating, acquiring and transferring knowledge and modifying its behaviour to reflect new knowledge and insights. In the two organisational case studies it was found that the lessons learned in previous projects were not usually formally recorded to increase the

‘organisation memory’. Usually the experiences reside in the minds of the people involved in the specific projects and they used to use them informally. This usually leads to problems when the ICT professionals involved in these projects leave the organisation as is typical in the ICT professional environment. Organisational learning is an important element of the human environment of the adoption and use of ICT.

The ICT-based initiative cannot be viewed in isolation, but must always be viewed within the context of the social entities within which it is institutionalised and used, and the manner in which organisation or community members think and act. The cultural and philosophical background contributes to the formation of organisational norms and values that influence the willingness of an organisation’s member to institutionalise an ICT initiative.

The **task context** is related to how ICT initiatives could introduce changes in the work content. In terms of task context, the EDM did not take the opportunity to use *Galatee* as a vehicle to make major changes in the work content of different professional groups. Nevertheless, through *Galatee* the Audit and Finance Departments are able to control all invoices and payment transactions. The level of usage of *Galatee* for the cashier personnel was enforced by beliefs relating to culture and power. The EDM accepts *Galatee* as a resource which, however, is not yet fully implemented. In BM, it is accepted that with the implementation of the new organisational structure and of the IT master plan, BM work would be challenged and modified. This may imply changes in the content of work that some employees are expected to perform. The task context may influence how employees react to the introduction of a new ICT initiative. In the two organisational case studies, there was no clear preparedness on the part of employees to understand and make sense of the changes being brought about by the initiatives. This may contribute to the smaller likelihood of employees being proactive in the process of institutionalising the new ICT in the network.

The **ICT-related initiative context** corresponds to the innovation context from the HEM. In this context, different aspects related to the innovation to be introduced in the organisation or community are outlined. These aspects are as follows: the influence of the innovation on values and judgement, on business processes, on organisational learning and on internal communication.

The ICT innovation introduced at the EDM is an integrated, customer-oriented, invoicing computer-based information system (*Galatee*) acquired in the context of the Y2K problem and to support the issue of integration of customer services management. The influence on values and judgement and organisational learning was not well explored by the initiators of *Galatee*. However, *Galatee* brought about changes in the judgements and thinking of the members of the organisation in relation to the process of introducing a new actor within the existing network. For example, as described in the previous chapter, at the operational areas in Beira and Chimoio some users were questioning the way in which the implementation process of *Galatee* was taking place.

At the BM, the BPR initiative was part of the restructuring process of the whole organisation. The BPR practices contributed toward changing the viewpoints of different employees on the manner in which projects should be managed and performed. This is clearly evident in the change of strategy between the first subproject (organisational restructuring) and the IT Master Plan development subproject. In the first subproject the initiators decided not to involve user departments and identified the business functions through official BM documents. In the second project the initiators, while using certain documents, also tried to get the viewpoints of the members of the user departments concerning their business functioning.

The context of the Telecentres' implementation differs from the first two initiatives as it involves rural communities rather than organisations and was initiated by actors from outside the community. This initiative contributes to the

enhancement of communication in Manhiça and Namaacha, and towards changing the values of community members as regards their use of the ICT facilities.

The **group context** is a further component of the human environment that influences the process of adoption and use of a specific ICT-based initiative. The following elements form part of the group context: the technological frame of groups, relevance, shared understanding, making sense of the role of the ICT initiative, partnership between ICT initiative and users, group resistance to change, the role of ethnic culture, attitudes towards management, users and the IT Department relationship, and user ownership.

The institutionalisation of a specific ICT-based initiative is often related to a particular division or group. For example, in the EDM case *Galatee* was directly related to the Commercial Department and in the BM case it was related to the IT Department. In the Telecentre project, groups and their interests were represented in the Local Advisory Committee (CAL). As described in Chapter 4, and also in the previous section in this chapter, CAL motivated various interested groups as a way to create a partnership between the Telecentre initiative and users. This was done through publicity measures. The participation of the CAL in the management of the Telecentres also contributed towards the positive enhancement of the attitudes of the managers and users.

The **individual context** includes elements of ethnic culture, worldviews, technological frames of reference, power bases, empowerment and 'disempowerment'. These elements express the role of individuals relating to the adoption and use of ICT. In each of the case studies, there were different users, and each of them had been influenced by the new initiative while also influencing the way in which the initiative was implemented and institutionalised in the organisation or community. In the process of creating the human environment for adoption and use of the ICT-related initiative there is a need to prepare the users, and there is more to this than simply training them. Preparing users within the human environment perspective means informing the users about changes that will

occur in their job, and how they will work differently. As described earlier in Chapter 4, the initiators of the *Galatee* system failed to prepare the users for the ICT implementation. In the case of the BM, the organisational restructuring subproject also did not prepare the users in terms of understanding the consequences of the new structure for their functioning. The IT master plan subproject tried to inform the users about how new ICT-based business solutions would be implemented in the bank. The Telecentre project never directly addressed individuals, but rather relied on reaching them through their representative groups. This could, of course, leave some individuals totally in the dark about the intentions behind the initiative. Their expectations, if any at all, could be based on the ‘community myths’ developing around the Telecentre initiative.

Du Plooy (1998) points out that the human environment should be viewed as a whole and not as divisible into parts. It constitutes the social (or local) context for the institutionalisation of the ICTs within situated networks.

The human environment, i.e., the social context of the adoption and use of an ICT-related initiative should be cultivated and nurtured by the network of alliances to ensure the stability and the irreversibility of the network. The cultivation and nurturing of the human environment is dependent upon a holistic understanding of the human environment, including the organisational, social, political and ethical concerns that govern and influence the adoption and use of the ICT initiative. An important aspect is the need to maintain good communication between the actors involved in the network of alliances. Failure to cultivate and nurture a conducive human environment increases the risk of the network of alliances to ‘leak’.

In the Oxford Advanced Learner’s English Dictionary (Cowie and Hornby, 1991) ‘leak’ has different meanings such as referring to a hole through which liquid or gas may wrongly get in or out; or to reveal information. For the purpose of this analysis, it is used as a metaphor to underline the importance of attending to all the social contexts of the HEM as a whole and in totality. This means that if, in each

network of alliances of the ICT-related initiatives described and analysed in this dissertation, no attention is paid to their human environments, these initiatives might begin to unravel. Referring to Figure 2.4 (in Chapter 2), and putting the above in more illustrative terms, failure to attend to all social contexts constituting the human environment increases the risk of one or more of the sides of the human environment cube ‘opening’ and contributing to the black box ‘leaking’. Preventing the HEM from ‘leaking’ contributes to the irreversibility of the network of alliances and also assures the black boxing of the initiative. This enhances the process of adoption and use of the ICT-related initiative, i.e., its institutionalisation.

In each of the case studies, it was necessary to adapt the initiatives to make them suit the local context. The notion of translation covers the negotiations which an actant may (or may not) use to enrol a sufficient number of allies to achieve a certain goal. The focus is on how each initiative changes in the hands of new actors in the actor-network, and how it adapts to local interests and needs. This process contributes to the consolidation of the human environment in which a new ICT initiative could become a member of the actor-network in a specific setting.

This level of analysis highlights some issues that should be considered in the process of introducing a new initiative into organisations or communities. While these issues were only addressed in the process of analysing the adoption and use of ICT in organisations or communities, it is clear that a more normative approach, where cultivating and nurturing the human environment of the initiative is part of the process of introducing the initiative, could increase the likelihood of a stable institutionalisation of the initiative in the network of alliances. In this normative approach, cultivating and nurturing the human environment of the initiative is part of the process of introducing the initiative.

5.4. Third level of analysis: development of the country

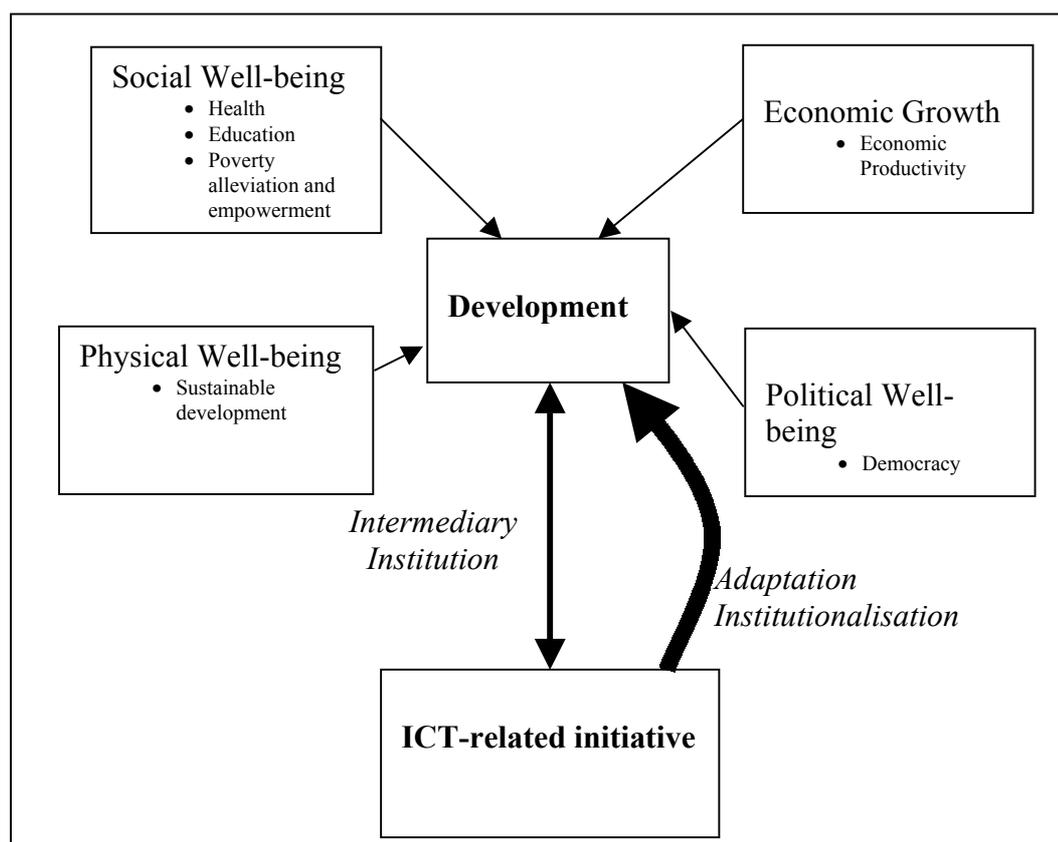
In this section, the third level of analysis of the case studies takes place on the basis of the interaction of the ICT initiatives with development programmes and their contribution to the issues addressed in the national ICT policy. This ICT policy addresses issues of education and human skills building, poverty alleviation and infrastructure building as part of the overall development programme of the country. To this end, structuration theory (ST) will be applied to guide the understanding of how new structures created in an actor-network at the local level might initiate the process of building a new actor-network at a higher level. The understanding of this process, it is hoped, will further contribute to understanding the relationship between ICT-related initiatives and development.

The importance of expanding access to ICT-related programmes in developing countries has been increasingly recognised by Governments and international agencies. ICT and related technologies should be considered as a part of the strategic national infrastructure (Governo de Moçambique, 2000b; Madon, 2000; Akpan, 2000, Yahaya, 2000). It is against this background that the Mozambican Government is involved in different initiatives to address the issue of ICT as part of its strategic development programme.

A development programme in developing countries must focus on the alleviation of dire poverty and on the creation of a social environment that is conducive to the provision of universal access to basic welfare systems. This implies that ICT initiatives must address the above issues and be linked to the development programmes of the country. Only then will ICT contribute to the social progress of citizens (Mozambicans). The role of intermediary institutions is crucial in order to make sure that the technology is applied in a manner that is consistent with local development priorities. In addition, intermediary institutions are responsible for providing the necessary technical support.

The Telecentre case could be considered as an example where different intermediary institutions, such as CIUEM, IDRC and CAL have contributed

greatly to the increase in the usage of ICT and related technologies in rural communities in Manhiça and Namaacha. The role of consultant companies could be seen as part of the intermediary institutions, which collaborated with EDM and BM to increase the application of the ICT initiatives. Figure 5.1 below summarises the developmental view assumed in this work and the idea of the intermediary institution in the process of linking development and ICT.



*Figure 5.1: Conceptual interaction between ICT-related initiative and development
(source: Madon, 2000)*

It has been argued throughout this thesis that the institutionalisation of a specific ICT-related initiative in organisations or communities could contribute to the improvement of the organisational or community outcomes, and consequently contribute to the improvement of working and living conditions in the country. While each of the ICT-related initiatives described in this research could be viewed as an attempt to improve the quality of services provision in the country,

the focus in the third level of analysis will be on the third case study (Telecentre). It provides the most 'natural' setting for addressing developmental issues.

Structuration theory is used to tentatively draw linkages between the Telecentre initiative analysed in this thesis and its contribution to the development of the country. In structuration theory terminology, the Telecentre initiative represents the structure and the users the agency. Figure 5.2 below summarises the idea of the linkage of ICT initiative and agency. In relating these two dimensions the arrow (a) means that the Telecentre initiative represents the rules and resources of the community, which influence the way in which users act, and the arrow (b) implies that the users of the Telecentre initiative influence the creation and institutionalisation of these rules and resources. As will be further explained below, this integrates the micro and macro-level of social analysis by demonstrating the relationship between the human agency (users) and the new structures produced by the adoption and use of ICT-related initiatives.

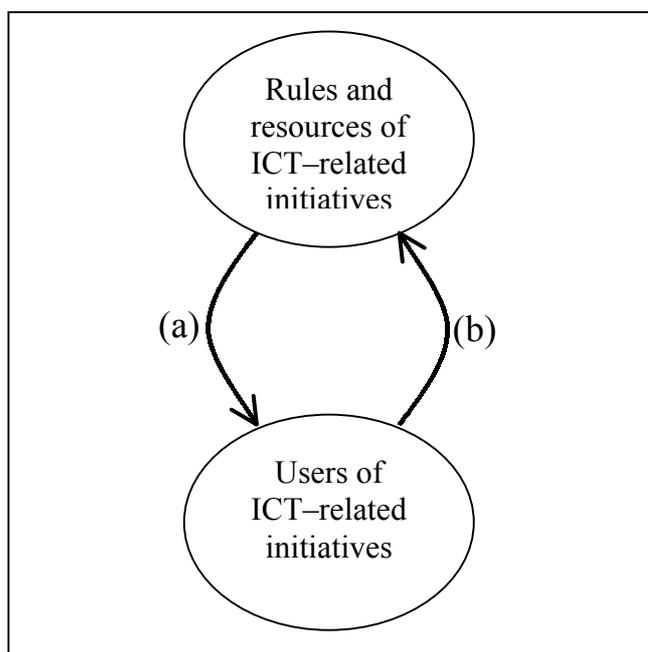


Figure 5.2: Linkage of ICT related initiative and its users

Although the focus in this section is on the Telecentre initiative, each of the ICT-related initiatives described and analysed in this study creates, grows and stabilises an actor-network in a specific setting. This takes place under social conditions within which the rules and resources, and agencies are linked at a higher level with other agencies and create a new actor-network at a higher level of interaction. In this way, different networks are being built and stabilised with a diffuse system of allies for the development of Mozambique.

Table 5.1 summarises the efforts made in each case study in order to change structures to create new resources and rules. It is important to see all these new structures as an attempt of the people involved in these initiatives to integrate the new rules and resources produced in this process of adoption and use of ICT within the development priorities of each organisation and community.

Table 5.1: Examples of the nature of agency, changing of structure and new rules and resources for each case study

| Case study | Nature of Agency | Changing structure | Rules and Resources |
|-------------------|---|--|--|
| EDM | Increased awareness of ICT for business activities | Customer care Energy sector | Increased role of ICT facilities in the management of EDM |
| BM | Increased awareness of ICT Better planning approaches | Education Financial sector | Increasing emphasis on ICT skills Inter-linkages of banking systems Increased respect for the customer |
| Telecentres | Increased awareness of ICT facilities for community purpose | Education Infrastructure Information access Services access | Increased information and computer literacy Better access to Government information Increased employment opportunities |

The 'use' of the Telecentre initiative to promote development is not devoid of problems. There are enabling factors and also constraining factors within the existing structure, such as the manner in which education services are performed, the quality of the infrastructure required and the level of involvement of the actors being affected by the new ICT initiative. In general, it can be said that the ICT for development is under both enabling and constraining tension. To overcome or minimise such constraints, ICT initiatives need to be aligned with the development priorities, and employees and community members need to be trained in ICT skills. These things can be achieved by applying participatory approaches that contribute to the institutionalisation of the ICT initiative and increase the ICT awareness of the whole society in order to substantiate the principle that ICT can drive development.

To sustain the role of ICT in development there is a need to apply the sustainable development principle discussed earlier in Chapter 1. Based on the notion of self-reliant human scale development Roode (Forthcoming: 19) argues that 'sustainable development is achieved through self-reliant human scale development which flows from the individual level to the local, regional and national levels, and which is horizontally interdependent and vertically complementary'. This means that ICT initiatives implemented at the local, regional and national levels should be horizontally interdependent with other development projects with the aim to satisfy the fundamental development needs at the specific level and in addition, they must be complemented and supported by higher level policies and initiatives.

Referring to information systems strategy formation in a UK District Health Authority, Jones (1999) notes the following:

At the same time, however, structuration also points to the inseparable linkage of micro-level, individual action and institutional processes; ... For example, as Jones (1994) discusses, the actions of individuals involved in the formation and implementation of an IS strategy in a District Health Authority could be seen as contributing to significant changes in the UK National Health Service associated with the introduction of the internal market and also with the growth of a

discourse on managerialism in the UK and, in principle, internationally. (Jones, 1999:130).

Structuration therefore, helps us to understand how vertical complementarity between local, regional and national levels could become institutionalised. While these processes have not been observed in the field study of the Telecentre case, the arguments put forward above and below lead to the following framework for understanding the interaction between ICT-related initiatives and development.

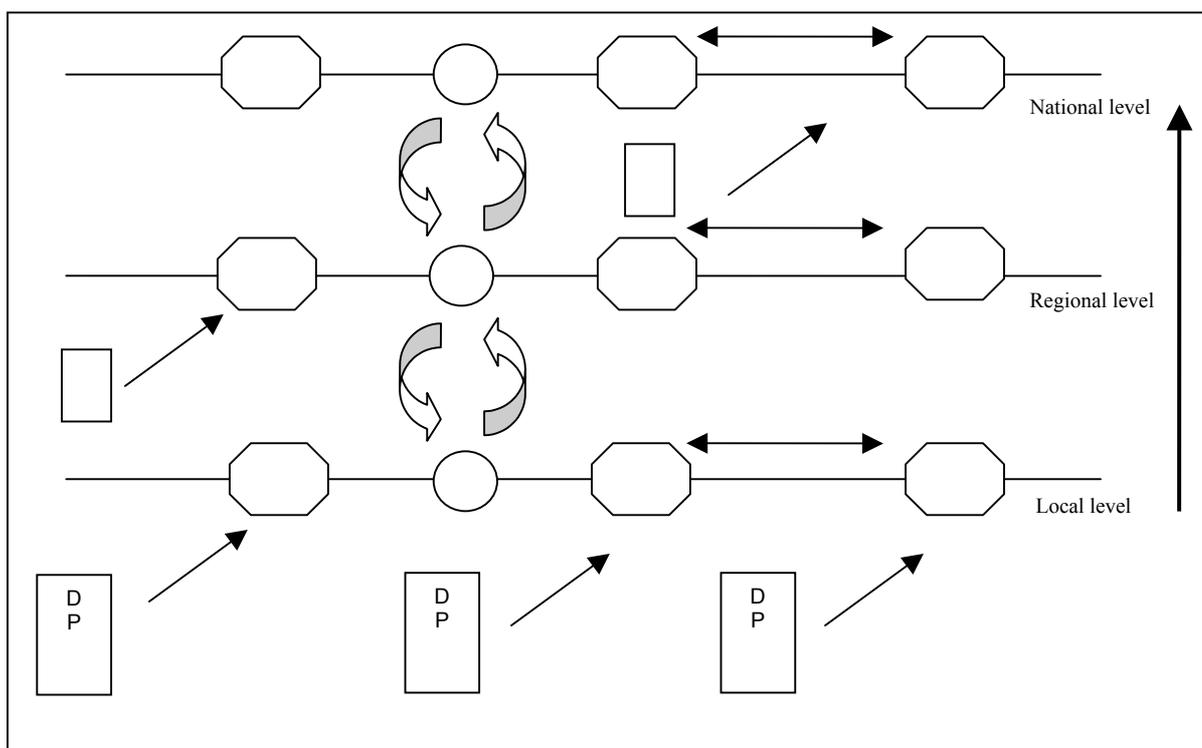


Figure 5.3: Understanding the interaction between ICT-related initiatives and development (DP – Development priorities) (adapted from Roode, forthcoming)

Figure 5.3 is an attempt to illustrate the way in which an understanding of the interaction between ICT-related initiatives and development can be gained. This is done by showing that the implementation of the initiatives at the local level is based on development priorities. Horizontally, different initiatives need to be interdependent, and vertically, initiatives are complementary.

The adoption and use of the horizontally interconnected initiatives at the local level produces rules and resources, which are then used by the agency at the regional level in the process of implementing the initiatives at this level. It is important to consider that the agency at the regional level also contributes to the production of the rules and resources at the local level and in this way the vertical complementarity between the levels is ensured. This process of vertical complementarity also occurs at the national and the international levels.

The figure depicts how the actions of different users involved in the process of implementing the Telecentre initiative in the two districts in Mozambique could be seen to contribute to significant changes in the different sectors within the local level, such as education. At the local level the users within the Telecentre shape the new structure by gaining new knowledge about ICT. This new structure will also be used at the regional level by other agencies to improve education services, ICT infrastructure and community access to information. In this way, the Telecentre initiative contributes towards bringing rural communities in Manhiça and Namaacha into the stream of ICT use.

The actions of the individuals (users) involved in the ICT initiatives described in each case study contribute to significant changes in the electricity and finance sectors and also in communities. Consequently, each of the ICT-related initiatives is contributing to the provision of better quality services in the country. In the case of the Telecentre initiative, it has been shown how the initiative could contribute to the socio-economic development of the country. The same analysis could be applied to the other two case studies if more field data were available.

The creation and stabilisation of a network in each of the case studies can therefore be seen as part of the network for the development of Mozambique. The effective social and systems integration of a specific initiative improves the likelihood of institutionalising it within the development network. It is argued that the improvement of working conditions in organisations, improved customer services

provision and access to information in communities for different purposes also contribute to the creation of welfare systems in the country.

From this level of analysis it is argued that the adoption and use of individual interdependent initiatives should be aligned to the development priorities of the local level and that these horizontal initiatives must be vertically complementary with other initiatives at the higher level. Structuration theory (ST) guides the understanding of this interaction between vertical and horizontal initiatives by relating the agencies and the structures involved in this process. In this way ST helps us to understand the process of vertical diffusion of the interdependent initiatives at the local levels and their contribution towards sustainable development. It is important to consider that failure to consider the vertical interaction between initiatives at different levels will increase the likelihood of not being able to institutionalise these initiatives.

5.5. Conclusions and refinement of the framework

The aim of this section is to draw conclusions about each level of analysis to help to refine the initial framework.

The first section of this chapter focused on the analysis of each case study using the sociology of translation as explained in Chapter 2. On the one hand, the purpose of using this analytical tool was to identify whether or not, and how, the ICT-related initiatives studied became obligatory points of passage. On the other hand, the purpose was to discuss factors that contribute towards either stabilising or to unsettling this obligatory point of passage - in other words, to discuss the process of adoption and use of these initiatives.

The story described in each of the case studies in Chapter 4 and also in the first section of this chapter is a story about active builders of socio-technical actor-networks, and how the actor-network grows, changes and stabilises.

The four steps of the translation of the adoption and use of ICT-related initiatives point to different skills that human actors (such as managers, ICT professionals, and users) may develop to enhance their interaction with the non-human actors. Problematisation and *interesement* demonstrate how important it is for the managers and ICT professionals to develop communication skills, which permit them to convince and persuade other agencies to transit the OPP. Enrolment depends on the capacity for negotiation of the initiators to convince other actors to enrol in the initiative. This means that the negotiating skills of initiators (managers, ICT professionals) might increase the likelihood of enrolling other agencies. The mobilisation phase is concerned with the identification of the spokesmen or representatives integrated in the network.

The second level of analysis brings the issues of social context and global and local interaction into the debate. For the purpose of this dissertation it was assumed that the social context represents the local context within which the ICT initiative is institutionalised.

The analysis of the findings of the case studies also has implications for the transfer of the ICT and management techniques in the context of the debate about global-local interaction. The ICT-related initiatives analysed here are developed in other countries (particularly western countries) and applied in countries around the world as part of the globalisation process. One of the implications is that the global-local interaction does not happen in a homogeneous context. This implies that the local context must be able to mediate global influences in order to derive benefit from this interaction process. Evidence from the case studies also suggests that ICT-related initiatives implemented in these cases as features of the global institutional environment, were adapted in different organisational and community contexts. From this point of view, in the implementation of new ICT-related initiatives the social context, the history and tradition of doing things within local organisational and community contexts must be taken into consideration. Consequently this implies that the organisations and communities need to have skilled human resources with the ability to creatively adapt new technologies and

global practices to the local context and also manage the whole process of implementation. This has significant implications for human resource development as well as for education. In the case where the organisations or communities lack these skilled human resources, this role can be played by the intermediary institutions, which might have already accumulated the knowledge and skills.

The results of the case studies also have implications in terms of team building to support ICT-related initiatives in organisations. There is a need to have decision-makers (management) highly committed to the initiatives, and responsible for building cross-functional teams representing several business functions in the organisation. These teams need to work closely with managers and staff members to promote the conceptualisation and implementation of the ICT initiatives.

Through these case studies, it is recognised that one of the major challenges of the process of adoption and use of ICT in organisations and in society is related to the transformation of the organisation/community in order to meet customer and competitive demands. This transformation has to be seen as facilitating the capacity to learn to manage ICT-enabled change.

New ways of working necessarily bring about shifts in organisational power, culture, process and structure. This also implies a redistribution and diffusion of learning in the organisation that a new way of work may cause. It is always difficult to manage change. ICT-enabled change adds a new dimension of difficulty; new technologies stimulate unprecedented processes of change throughout the organisation, including shifting the location of knowledge levels within the organisation.

The organisational case studies showed that there is a limited conceptual base or centre of learning to help facilitate organisational change. The two organisations need to develop managers of change to create the experiential learning that will improve the organisation's chances of bringing about successful change. Another important role is to educate its business units to be directly involved in the process and understand the implications of change before initiatives are implemented. This

indicates the need to learn what change management is, and how to control new processes in the context of organisational transformation.

It is recognised that in order to achieve an informed or transformed organisation, it is necessary for an organisation to have the capacity to learn. Learning how to learn is difficult as it involves an empowerment process within the organisation. Empowerment means that operational decisions will not be made hierarchically. Knowledge workers must feel comfortable about making decisions and managers must learn to provide counsel rather than directives.

Another conclusion that is drawn from a deeper understanding of the interplay between ICT-related initiatives and development is the evolution of multipurpose networking. This means that while different initiatives adopted and used for different purposes in different locations may contribute to the stabilisation of their specific actor-networks, they will simultaneously be part of the national actor-network for development. Multipurpose networks enhance a context where reflection on the organisational or societal action is central and at the same time attempts to satisfy the needs of every actor are very important. This notion of evolving multipurpose networks is important for researchers, managers, practitioners, and leaders. It underscores the negotiated and complex character of the interplay between ICT-related initiatives and development.

The final part of this section pulls together the theoretical approaches discussed in Chapters 1 and 2, the description of the case studies outlined in the previous chapter and the analyses of the case studies made in this chapter. These are then synthesized into a broad framework for analysis as a basis for gaining an understanding of the interplay between ICT dynamics and development. Figure 5.4 is a diagrammatic illustration of the way in which the framework will be refined.

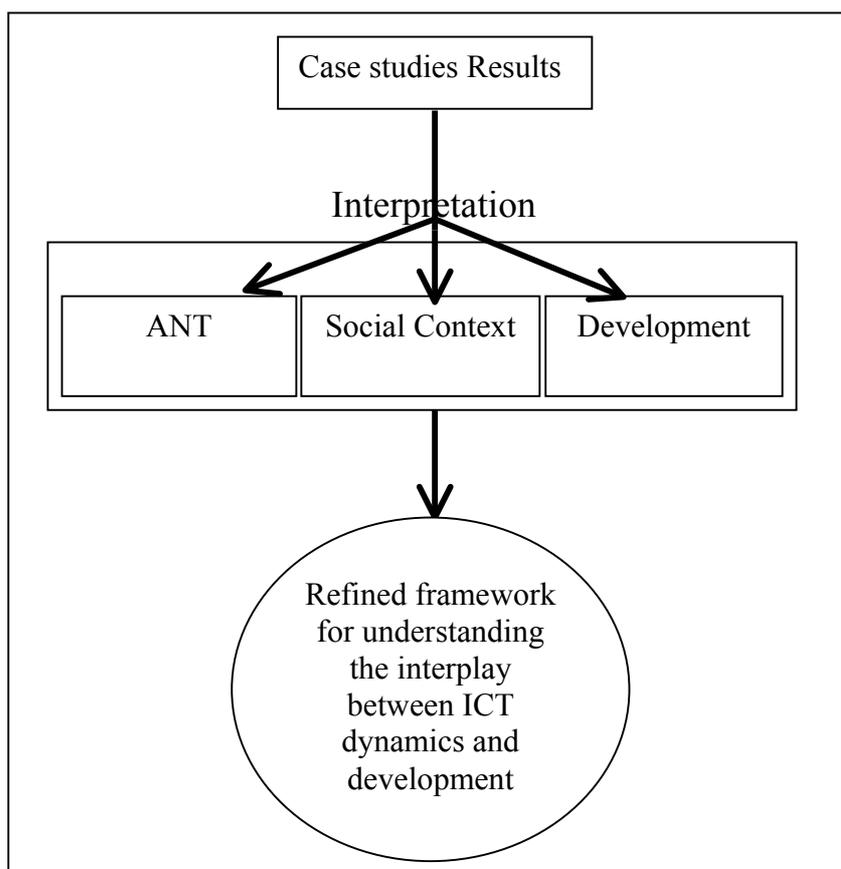


Figure 5.4: Analytical refinement of the framework

The framework of analysis to understand the link between development and ICT dynamics is made up of the components of the initial model: the ANT perspective for the creation of the actor-network, the social contexts (HEM) of the ICT innovations, and structuration theory. The model also takes into account the issues of managing change and project management as part of the framework. This has implications in terms of skills building, particularly those relating to communication, facilitation and negotiation on the part of the managers, IT professionals and information users. In addition, the composition of the team that will conduct the process of institutionalisation should be considered as an important issue.

One of the tools that could be used as a practical guide during the analysis of the creation and stabilisation of actor-networks within the ANT perspective is the ‘due process model’. This model was used by McMaster and his colleagues (1998) to

analyse the process of information systems development. Whitley and Hosein (2001) used the 'due process model' to study an attempt to support electronic commerce at national level in the UK. This study looks at the regulatory Powers Bill and also focuses on the political actions of those seeking to amend the Bill in Parliament. Another example of applying the due process model is a forthcoming analysis by Roode of the process of the introduction of ICT in a rural community in South Africa.

The 'due process model' is a practical tool based on the ANT view and is used to examine the process of introducing new ICT-related initiatives at different organisational or societal levels. It has four components as illustrated in Figure 5.5, and analyses the way in which a new ICT-related initiative becomes institutionalised as a result of various negotiating processes. The first stage of the 'due process model' consists of presenting candidates for consideration. This stage is characterised by questions like 'how many are we?' 'what is it?' 'how does it affect me?' 'who and what else are affected?' For example, in the Telecentre case study, the Internet and e-mail services are seen as suitable entities for inclusion in the Telecentre initiative debate. The second stage is related to the consultation and debate among other actors about the legitimacy of the candidacy of the new ICT initiative, for example in the case of the Telecentre this could be the discussion about the Telecentre initiative itself as a new project within the two districts Manhiça and Namaacha. This stage is characterised by the question 'how can we live together?' This involves the acceptance of the new actor (new ICT) by the existing actors and the proposed actions based on them. In the Telecentre case, for instance, this might mean that the Government should revise the legislation that regulates the price of telecommunication services for rural areas in order to increase information access for citizens in the rural areas. The third stage is concerned with the importance of placing of the new actor in the existing network (compared to other issues). After that the new ICT may become accepted through institutionalisation. The candidate for inclusion into the network of aligned interests could be excluded, and may be re-considered at a later stage. Thus, the due process model is a dynamic model and can potentially continue to evolve at

different moments during the adoption and use of ICT-related initiatives in organisations or communities.

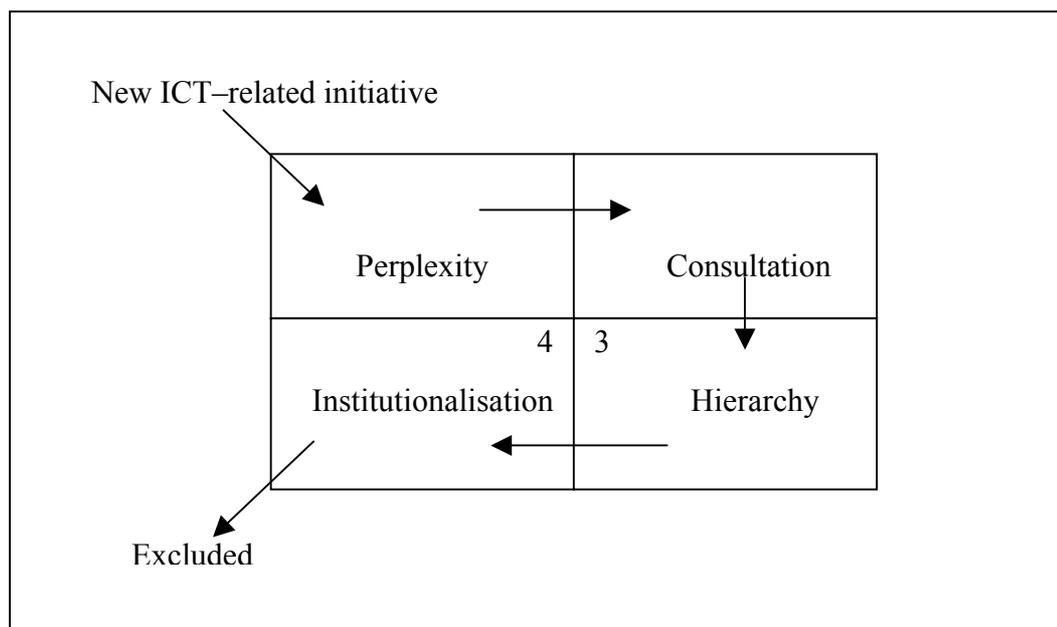


Figure 5.5: The 'due process model' (source: McMaster et al. (1998))

This model might help us to understand the complexity involved in the process of introducing a new ICT initiative in organisations or communities. The model may be used in two ways. Firstly, it can be used in order to guide the negotiation loops in each translation step. Secondly, it can be seen as an alternative view to the sociology of translation as an analytical tool to understand the process through which an ICT initiative might be institutionalised and consequently contribute to the improvement of local conditions. The 'due process model' is not a prerequisite for successful institutionalisation, but it increases the likelihood of the institutionalisation or adoption and use of an ICT-related initiative in organisations or communities.

Considering the 'due process model' as a practical tool for the introduction of a new initiative in a specific context, Figure 5.3 can be enhanced as is shown in Figure 5.6. In this figure, it is shown that a new initiative has been introduced in the organisation or community through the 'due process model' as a way to increase the likelihood of its institutionalisation.

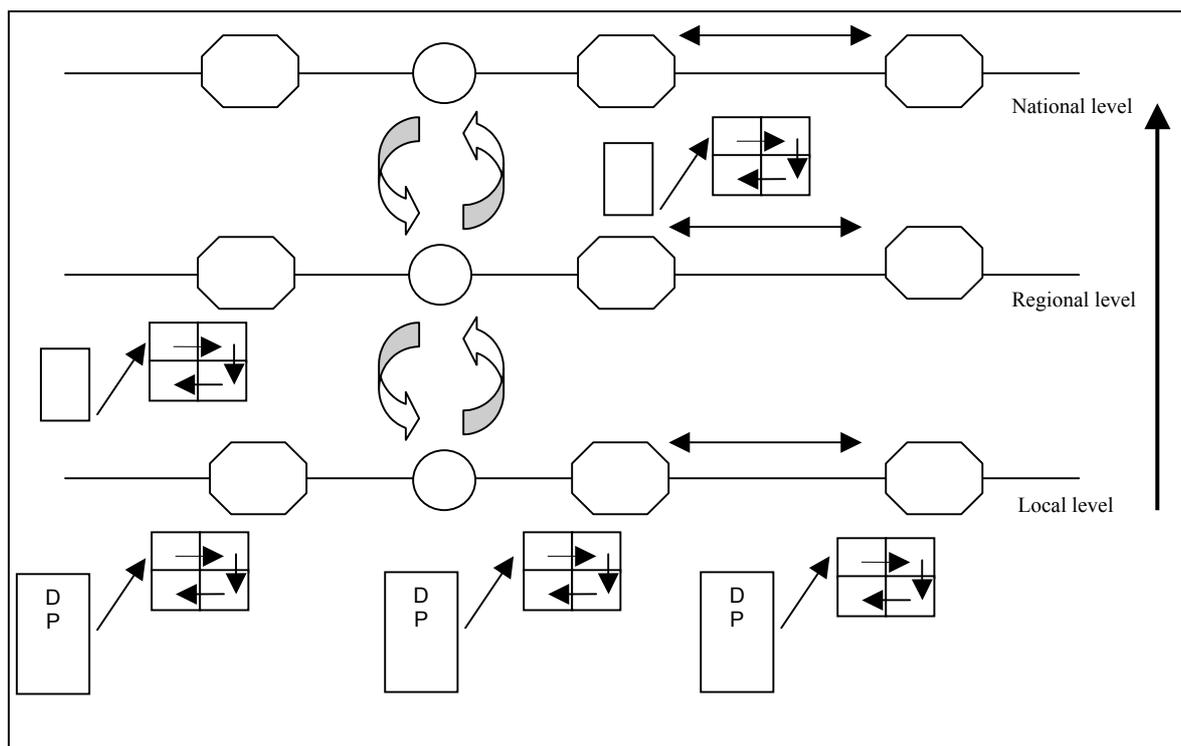


Figure 5.6: Understanding the interaction between ICT-related initiatives and development guided by the due process model for introduction of the initiative (DP – Development priorities) (adapted from Roode, forthcoming)

The framework proposed in this research is composed of three levels (not to be confused with the three levels shown in Figure 5.6). The macro-level is comprised of the interaction of the ICT-related dynamics and development. This is informed by structuration theory for the interaction of the components involved. The middle or meso-level comprises the social contexts from the HEM to describe the institutionalisation of the ICT initiatives, and the lower or micro-level uses the ‘due process model’ within the ANT in order to trace the micro-dynamics of the ICT initiatives. Although the social context is used in the second level of analysis, it is important to bear in mind that the social context should be taken into account throughout the process of institutionalising the ICT-related initiatives in organisations or communities. In addition, the framework should also include the issues of project management, management change, skills and team building. Such a holistic understanding of the interplay between ICT initiatives and development can be expected to increase the likelihood of successful development resulting

from an ICT initiative or intervention. The whole idea of the framework is summarised in Table 5.2.

Table 5.2: Refined framework for the analysis of the interplay between ICT and development

| | | |
|-------------|--|---|
| MACRO-LEVEL | ST rules and resources (new structures), Agency (users) | D E V E L O P M E N T |
| MESO LEVEL | Social context – HEM Global-local interaction | |
| MICRO-LEVEL | ANT (translation); due process model, negotiations and communication skills, managing change, team building and project management | |

The above framework, conceptualised in this chapter, can be used in two different ways: First, it can be used as an analytical tool to guide the analysis of the process of implementation of the ICT-related initiatives in organisations or communities. This approach was tentatively used in this work. Secondly, this framework can be used as a normative tool for the process of introducing new ICT-related initiatives into organisations or communities. It is assumed that this normative tool will increase the likelihood of the ICT initiative succeeding. This normative use can be done by applying ANT through the use of the due process model and translation phases for the creation and growing of the new actor-network. In this way the micro-level of the framework is applied. To increase the likelihood that the created actor-network becomes stabilised, irreversible and institutionalised, it is important to pay attention to all components of the HEM that constitute the social context of the new actor-network. Paying attention to the social context means that we will

hopefully avoid the ‘leaking’ of one or all sides of the HEM. The application of structuration theory increases the understanding of how a new actor, institutionalised at the local level, may contribute to the initiation of a new actor-network of alliances at a higher level. In the building process of this new actor-network at a higher level, the lower levels of the framework may play an important role in its creation, institutionalisation and stabilisation.

This framework has implications in terms of the skills required of ICT professionals, managers and users in general. These insights should lead to a revision of the typical ICT curriculum, particularly in terms of content, to address the above issues and methods of teaching. It also holds implications for ICT professional careers and the organisation of the IT Department.

In the next and last chapter, the research effort is concluded. This is done by analysing the contribution of each chapter towards addressing the research questions and also by discussing the research contributions. Lastly, implications are drawn for further research work.

Chapter 6

Conclusion

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Conclusion

6.1. Introduction

The aim of the research has been to contribute towards understanding the interplay between development and ICT-related initiative dynamics at the organisational level and in the community context of Mozambique. To this end, the thesis adopted an interpretative stance and a multiple case study strategy. It is argued that ICT-related initiatives can only contribute to human development if the implementation of these initiatives is aligned with the developmental programmes of the country within the social context.

This chapter concludes the research effort by analysing how each chapter has contributed towards addressing the research questions. The next section continues with the discussion of the research contributions and their implications. The contribution of the study is assessed using criteria formulated by Whetten (1989). The final section discusses the limitations of the study and also includes an overview of opportunities for further research.

6.2. Overview of the research

In Chapter 1, the thesis examined the nature of the research problem. Developing countries, organisations and communities have increasingly been implementing ICT-based initiatives with the implicit objective of improving their developmental levels. Studies have suggested that the implementation of ICT-related initiatives should take into account the social context and the need for situated change in order to fit the ICT initiatives into the organisational or societal context in which they are implemented. The chapter introduced four major viewpoints, which form the basis of the research, namely globalisation discourses, development discourses, transfer of ICT innovation, and the relationship between ICT/IS and organisational change.

Within the globalisation discourse, the focus is on the global and local interaction debate. The literature review of this theme revealed that there are different scenarios for this interaction. One scenario is the linear and deterministic view, which suggests that the local has increasingly been globalised and is merely a recipient of culture from the global. Another scenario focuses on the mutual interaction between the global and local; assuming that the local influences the global just as much as the global influences the local.

The literature review continued with the topic of development. The view adopted in the research is that ICT-based initiatives can only contribute to growth in the context of a developing country if the implementation of such initiatives is directly aligned with development priorities. Moreover, its people must be in a position to adapt, adopt and use ICTs to address local and regional development issues. In this thesis, the developmental view adopted is a socio-economic one for the creation of welfare systems for the satisfaction of the fundamental human needs.

From the literature review and in this research study it was argued that the implementation of ICT-based initiatives developed in 'western' countries cannot be introduced mechanically in developing countries with the expectation of getting the same or similar results achieved in the West. Therefore, there is a need to accommodate the local context in the ICT-related initiatives. It was also suggested that the study of transfer of ICT innovation could be conducted using the translation process from the ANT perspective, instead of the traditional diffusion perspective.

In addition, Chapter 1 examined the literature on the ICT/IS relationship and organisational change. A review of this topic demonstrated that contemporary organisations are entangled with technology. Therefore, one cannot understand organisations without understanding the technology, since ICT/IS and organisational contexts have transforming effects on each other. In this chapter, and also in Chapter 2, a review was also conducted of different approaches to change. These include the contextualist approach where change is seen as emergent, planned, situated and improvised. The study argued that local improvisations are necessary to allow a

fruitful transfer of technology in the context of DC, but that there is a need to integrate this within a planned change perspective. It is assumed that the balance between local action and global vision, as well as planned and improvised actions, can help to achieve more optimal utilisation of resources, which is of particular concern in a poor country like Mozambique.

For the empirical research, three case settings within the Mozambican context were selected. Chapter 1 also discussed the significance of this research for policy makers, IS researchers and professionals, and for managers and users. The key contribution of this study arises from the application and refinement of the framework for the empirical analysis of the three case studies in order to understand the interplay between development and ICT initiatives at the organisational and societal levels.

Chapter 2 presented the background of Mozambique in terms of socio-economic and ICT information. The statistical data found in the literature placed Mozambique as a marginalized country in terms of its technological achievement. It was also found in the literature review that the government of Mozambique is profoundly interested in the role of ICT in the development of the country. This Chapter continued with a literature review of actor-network theory (ANT), structuration theory (ST), and context-based theoretical approaches. The literature review of ANT emphasised the concepts of the sociology of translation, which were later used in Chapter Five to analyse each of the case studies. This part of the review also discussed the relationship between ANT and IS, and also the limitations of ANT. The section continued with the review of the main concepts and ideas of ST. In the review, the ST, ANT and IS relationship were also discussed, and it was argued that ANT is more appropriate for analysing the micro-level and that ST can be applied to link the micro and macro-level analysis.

The final part of this chapter dealt with the conceptualisation of the framework for the analysis of the findings of the case studies in Chapter Five. The framework consists of three levels of analysis. At the first level, the case studies are analysed through the use of the concepts of translation from ANT. This helps one to understand the process

of building, growing and stabilising of the network of the adoption and use of ICT-related initiatives in the three case studies. The second level of the analysis interprets the results of the case studies in terms of the local contexts in which the ICT-related initiatives are implemented. For this purpose, the human environment model (HEM) and other contextual approaches are taken into account. The final level of analysis is an attempt to interpret the results of the fieldwork by examining the contributions made to the development of Mozambique by the ICT initiatives that have been introduced. This analysis is done through the application of a ST perspective to link the micro and macro-levels.

Chapter Three outlined the philosophical assumptions underpinning this research. These correspond to the epistemological and ontological assumptions of interpretive research. As the aim of the research was to create a better understanding of the interplay between development and ICT dynamics at the organisational and societal level in the context of Mozambique, we chose the case study strategy in order to gain rich insights into the process. In so doing, three case studies were conducted, two in an organisational context and one in a community setting. This chapter presented the research design as well as data collection techniques employed in the fieldwork.

Chapters Four and Five described the case studies. Chapter 4 introduced the case studies that were concerned with the implementation of ICT-based initiatives at the organisational level and at the rural community level. The first case study describes the process of implementation of an IS in the national electricity company. The second case study describes the introduction of a BPR initiative in the central bank, and the third case study describes the first experience in the country of the implementation of Telecentres in a rural community. Chapter Four also described the fieldwork process in the three case studies.

In Chapter Five, the findings of the case studies were interpreted at three levels of analysis. The first level analysed the results of the case studies by using the sociology of translation from the ANT perspective. It also discussed how the network of alliances necessary for the institutionalisation of the sub-units of analysis (*Galatee*,

BPR and Telecentres) depends on the success of the four steps of translation (problematization, '*interessement*', enrolment and mobilisation).

The second level of analysis interpreted the results of the case studies from the social context perspective. For this purpose, the human environment model is applied. In each of the case studies, there was a need to adapt the ICT-related initiative in order to accommodate the local context. The process of accommodating the ICT-related initiative in terms of the local interests and needs contributes to the consolidation of the human environment in which the new ICT initiative should become a member of the actor network. In this chapter, we also discussed how the liberation of the economy and political stability force these organisations to embark on ICT initiatives as part of their organisational change programmes. From this level of analysis it was argued that it is important to attend all components of the HEM in order to avoid leaking of the black boxes established by stabilisation of the actor network.

The final level interpreted the results based on attempting to link the ICT-related initiatives and development. This linkage is made through ST, where the users represent the agency and the ICT initiative represents the rules and resources of structure. To sustain the role of ICT in development there is a need to apply the sustainable development principle, which means that the ICT-related initiatives and others implemented at the local, regional and national levels should be horizontally interdependent with the aim of improving and satisfying the fundamental needs. These initiatives must vertically complement each other and must also be aligned with development priorities and policies. The network created by the adoption and use of each initiative is accepted as a contribution to the whole organisation and industry. The improvement of a particular industry contributes to the creation, growth and stabilisation of the development network in Mozambique.

In the final part of this chapter, the initial framework used to analyse the case studies empirically was refined. This refinement was done on the basis of the findings of interpretations. The refined framework consists of three levels: the micro-level analyses the ICT-related initiatives through a translation process from the ANT

perspective and by applying the due process model as a practical tool to examine the process of introduction of new ICT-related initiatives in a specific setting. The meso-level deals with the analysis of the ICT initiatives in terms of the social context in which they are implemented. Finally, the macro-level tries to describe the interaction between the ICT-related initiatives and development.

Revisiting the research questions formulated in Chapter 1

Various questions were asked in Chapter 1 in order to break down the problem of the ‘interplay between ICT dynamics and development in the Mozambique context within the global trends’. In this subsection, the research questions are revisited in the light of the results of the case studies.

How do we understand the ICT-related initiatives within the organisations and communities?

This question was addressed throughout the thesis but with particular emphasis in Chapters 4 and 5. This was done by describing the three case studies and by analysing and interpreting them from an ANT perspective, taking into account the social contexts in which these initiatives were implemented. The framework proposed in this research study is intended to assist in the process of gaining an understanding of the implementation process of ICT initiatives.

What can be done in order to make the use of ICT more effective?

The case study results give some idea of how the ICT initiatives might be implemented in order to bring about more effective adoption and use. Firstly, the ICT must be aligned with the productive activities of the organisations in which it is going to be implemented. Secondly, the process of implementing such initiatives should actively involve all affected users so that they can understand the reasons and their place within networks. This could increase the likelihood of the institutionalisation of these new initiatives. The new skills required for the initiators, users, managers and

ICT professionals could be understood through the due process model in order to increase its effective use. This question was also discussed in Chapter 5.

To what extent is ICT contributing to development in developing countries in general and in Mozambique in particular?

This question was addressed by reviewing the aspects of globalisation, development and transfer of technology, in Chapter 1. Based on the developmental view assumed in this research, ICT initiatives can potentially bring benefits to the users. In Chapter 2, an analysis of the developing country and its ICT policy was presented, in which the role of ICT and human resource development were highlighted.

In this study, particularly in Chapter 5, it is argued that each specific ICT project at organisational or community level contributes to improvement at the local level. All ICT projects contribute to the building and stabilisation of a multipurpose network for the development of a given industry or community and consequently of the country as a whole. A multipurpose network is an actor-network that enrolls and maintains various actors. Multipurpose implies a configuration of various actor-networks and their integration into one.

The three case studies showed that the contribution of ICT could only happen if the ICT initiatives are aligned with the development programmes and locally adapted. The people involved in and affected by the initiatives need to be well informed about the changes, and they should participate in the network building and its stabilisation.

This thesis makes three types of contributions. These contributions are discussed in the next section.

6.3. Research contributions

This section focuses on the contributions of this dissertation. The section is divided into three subsections addressing contribution to theory, methodology and practice.

6.3.1. Theoretical contributions

Both theory and empirical findings contribute to our understanding of the interplay between ICT dynamics and development under global integration. This study also contributes to our understanding of the question of how organisations and communities in Mozambique have adopted and used ICT-related initiatives.

The findings of the case studies suggest that the institutionalisation of ICT-related initiatives is favoured when the initiative is integrated with the core productive actions (own interest) of the organisation. Other factors favouring institutionalisation are consultations, debate and negotiations among the actors in order to accept or reject the new actor in the network. Hence the likelihood that an initiative will be adopted and used increases when local interest and support is elicited from all actors, leading to institutionalisation within the larger organisational network.

The application of the sociology of translation helps to analyse the findings of the case studies. The four steps of translation, problematisation, *interessement*, enrolment and mobilisation are followed.

Problematisation and *interessement* indicate how actors (agencies) form alliances, and are enrolled in an ICT initiative if they perceive it as the solution to their problems. *Interessement* is also a fundamental step if the initiative is to be adopted and used in the new network context, and its success depends on the ability and capacity of the agency proposing the initiative to translate the interests of other agencies in terms of their own interests. Also, the actor proposing the initiative needs to counter competing projects.

As the case studies showed, once the initiative has been defined as a solution for a problem – as an OPP, the interest of other actors is aroused. The agency proposing the initiative has to enrol and to mobilise those actors to participate in its project, either by force or persuasion. The former can be employed when the actor proposing the

initiative has the power and the latter when the agency proposing the initiative lacks power. Whatever the case, actors need the resources and authority to negotiate, consult and debate, or forcibly achieve the enrolment and mobilisation of other actors.

The above paragraph suggests that it would be worthwhile to study how initiators, ICT professionals, managers and decision-makers communicate with users and the rest of the organisation or community.

Although some research studies have been done on how organisations or communities in developing countries adopt and use ICT (Du Plooy, 1998; Silva, 1997), very little has been done on Mozambique (Kluzer, 1993). The work developed by Du Plooy addresses the issues of adoption and use of ICT in organisations in South Africa in terms of creating a proper social context where the adoption and use can ‘healthily’ happen. Silva (1997) discusses the issue of power and politics within the process of institutionalisation of ICT-related initiatives in organisations in Latin America. The work done by Kulzer a decade ago was about Mozambique but the main focus was on economic issues related to the distribution of computers in that country. Although there are studies on the adoption and use of ICT-related initiatives in developing countries, none of those focusing on Mozambique have, as their main focus, the interplay between ICT dynamics and development in the global integration context.

6.3.2. Methodological contributions

The main methodological contribution of the research has been the combination and application of concepts from ANT, ST, contextual approaches and HEM, globalisation and development to study the process of adoption and use of ICT-related initiatives for development within Mozambique.

Another methodological contribution lies in the experience gained through the application of case study strategy and an interpretive approach and techniques applied for data collection. This experience may be useful for other studies on the adoption

and use of ICT-related initiatives in organisations and communities in the context of developing countries.

Finally, a methodological contribution relates to the appropriateness of applying theoretical concepts and theories developed in other contexts. The applicability of some research theories and models developed in other developed countries to studies in the context of a developing country has been questioned owing to the differences that exist in social and cultural settings. The successful use of these theories in this study contributes towards providing examples of the interpretation of case studies from developing countries like Mozambique.

6.3.3. Practical contributions

One of the practical contributions of this research is the detailed insight provided by the three case studies. The case studies reveal that ICT-related initiatives should be linked to productive activities of organisations. This implies that for effective implementation, emphasis should be placed on the importance of understanding the social contexts of work, task and organisation. This will help to increase the social integration of the ICT initiative and, hopefully, its institutionalisation.

The case studies also reveal that ICT professionals and managers need to acquire new skills of negotiation and communication in order to persuade other actors to join the network of adoption and use of the ICT-related initiative.

Another practical contribution is the framework for analysing the process of adoption and use of ICT initiatives, in order to gain an understanding of the interplay between ICT and development in a specific context. The contribution of this research is to understand, based on theoretical assumptions, how the ICT initiative can be institutionalised and also how it contributes to development. To this end, the due process model can be used as a practical tool.

6.4. Assessing the contribution

In 1989, Whetten, in his article on “What constitutes a theoretical contribution” identified four important components to be taken into account as part of a theoretical contribution. They are as follows:

- What? What factors and concepts should be included as part of the explanation of the contribution? For this purpose, two criteria are taken into account, comprehensiveness, the inclusion of all the relevant factors and *parsimony*, excluding those that have little role to play in improving the understanding of the contribution.
- How? Subsequent to the identification of the factors and concepts that are part of the contributions, the researcher should reflect on how these factors are interrelated.
- Why? Why select certain factors? What are the underlying assumptions of the theory or model? The logic of the proposed conceptualisation should be of interest to other researchers.
- Who, where and when? These enquiries define the boundaries for generalisation.

Based on Whetten’s framework for the evaluation of the theoretical contribution, a set of questions are now asked in order to assess the theoretical contribution of this study.

What is new? Does this study make a significant contribution to current thinking?

The contributions of this study are three-fold: Firstly, they lie in the review of the relevant literature on the interplay between ICT-related initiatives and development in the context of a developing country like Mozambique.

Secondly, the contribution lies in the empirically rich insights provided by the case studies and in the refined framework for analysis of the adoption and use of ICT initiatives. This framework can be used to guide the process of introducing new ICT

initiatives in organisations and communities, and to help gain an understanding of the interplay between ICT and development.

Thirdly, the contribution lies in the combination and application of different theories developed in western countries to study the process of adoption and use of ICT in a developing country. The fieldwork description and the data techniques applied in this study process can also help other researchers in conducting similar studies in other developing country contexts.

So what? Is it likely that the theory will change the way in which ICT-related initiatives are implemented in organisations and communities in the Mozambican context?

Based on the assumption that the implementation of new ICT-related initiatives will continue in Mozambique in general, this study seeks to contribute to the way in which organisations and communities may implement ICT-related initiatives in order to increase the likelihood of their institutionalisation. In this regard the framework presented in Chapter Five is a contribution that can be used as a practical tool to guide the implementation process. This study also draws implications in terms of building new skills and knowledge for users, managers and ICT professionals.

How so? Are the underlying logic and supporting evidence compelling?

In Chapter One, the research problem was reviewed from four different viewpoints: Globalisation, ICT innovation transfer, organisational change and development. Three theoretical perspectives were used in order to interpret the results of the case studies, namely ANT, ST and the human environment model. In Chapter 2, the context of Mozambique was described and different social theories were discussed and in Chapter 3 different research approaches were also discussed. This led to the choice of the interpretive approach and case study strategy to conduct this study. In Chapter 5, a framework for the analysis of the interplay between ICT-related initiatives and development in the context of a developing country was developed, based on the

interpretation of the results of the case studies presented in Chapter 4. The research conclusions presented in Chapter 5 were therefore drawn from a solid base of evidence.

Well done? Does the research work reflect seasoned thinking, conveying completeness and thoroughness?

The research problem, as well as the results of the case studies, was viewed from different angles. The various research approaches were discussed in Chapter 3 and the interpretation of the results was undertaken from multiple perspectives in Chapter 5. The interpretation perspectives used were ANT, Human environment (social context) and ST and development. The last chapter of the thesis is used to review the research, and, in particular, the research questions and the contributions made by the research study. This indicates thoroughness and reflection on the part of the researcher.

Done well? Is the dissertation well written? Does it flow logically? Are the central ideas easily accessed?

The research topic and a broadly relevant literature review were introduced in Chapter 1. A background of the Mozambican context was presented in Chapter 2. The study continued in a logical way to review different theories that constitute the theoretical basis for this thesis. The research approach followed was discussed in Chapter 3. The researcher stressed throughout the thesis that the major premise is the question of the adoption and use of ICT-related initiatives in order to contribute to sustainable social development in Mozambique. Empirical studies were done in the context of Mozambique and their results were analysed on the basis of the theories introduced in this thesis to help refine a framework for analysis of the interplay between ICT-related initiatives and development. The quality of writing in this thesis was ensured by engaging the services of a professional language editor. The index of terms and the glossary allow for easy access to the central ideas.

Why now? Is the topic of contemporary interest to scholars and practitioners in this area?

Recently, Mozambique has launched different ICT-related initiatives in organisations and communities with the main purpose of improving the provision of customer and citizen services. To this end, it was important to conduct empirical studies in the context of Mozambique in order to contribute to a better understanding of the process of adoption and use of these ICT-related initiatives. Moreover, the need to understand the process of institutionalisation and use of ICT in the context of developing countries has been of interest to different scholars in the area of IS. This study emphasises the consideration of local context in the process of the adoption and use of ICT and, in this way, contributes to the discourse on a new approach to implementing ICT-related initiatives in organisations and communities in Mozambique.

Who cares? What percentage of academic readers is interested in this topic?

Besides the researcher, this topic is of interest to Mozambicans who are involved in applying ICT-related innovations in different sectors as part of the country's development. This might be of particular interest to ICT professionals, managers and decision-makers in terms of the implementation of ICT-related initiatives that contribute to development. Within the IFIP organisation there are active working groups that deal with ICT in organisations and developing countries. For example, IFIP WG 8.2 is concerned with ICT and organisational change; IFIP WG8.6 is an active group for ICT adoption and use, and IFIP WG 9.4 deals with the social issues of ICT in developing countries. These groups and others regularly organise conferences on the topic of the adoption and use of ICT in organisations and other themes. The topic might also be of interest to researchers and agencies involved in the issues of addressing ICT-related initiatives for development in the globalisation arena. The topic is thus clearly of major concern to the academic ICT/IS community and it is a very active area of research.

6.5. Limitations and suggestions for further research

There are three major limitations to this study that have implications for further research work. The first limitation is related to the fact that the framework for the analysis of ICT innovations for development derived in Chapter Five was not applied during the process of introducing ICT-related initiatives in organisations or communities, but was derived by analysing the three case studies of this dissertation. This being the case, it is suggested that further research studies should take into account this framework during the process of introducing ICT-related initiatives, quite apart from analysing the interplay between ICT and development.

As expounded in the dissertation, this study attempts to illustrate the process of the adoption and use of ICT initiatives in Mozambican organisations and communities and its interplay with development. However, the fact that the case studies represent specific ICT-related initiatives unique to the Mozambican context may make the lessons learnt not entirely transferable to other developing countries, organisations and communities. Thus, it would be interesting to expand the study of the adoption and use of ICT for development first to other organisations, community contexts and sectors within Mozambique and secondly to other developing countries in order to further emphasise cross-cultural influences. For example, a study might focus on the implementation of ICT and related technologies and management practices in the Mozambican financial sector to determine what developmental contributions they make to the specific sector, and more broadly, to the developmental effort in Mozambique. Another example could be a study of the implementation of ICT-related initiatives in public institutions to examine to what extent these initiatives are taking place and what developmental contributions are being made to the public administration and the country. This would help to expand our knowledge on the dynamics of the process of adoption and use of ICT-related initiatives for development.

A final limitation, perhaps applicable to most studies of organisational change, is the fact that change itself is an ongoing process. The presentation of the ICT-related

initiatives in three case studies does not suggest that the actors involved have stopped changing or introducing new programmes. During the process of writing up this thesis, different initiatives were already taking place in each of the case study settings.

Indeed, towards the end of writing this thesis it was learnt that the *Galatee* system is still not completely implemented and also that some of the problems observed during the fieldwork persist. In addition, the IT Department at EDM submitted a project requesting the study and review of the ICT status and its relation to the business. Some new services are in place, such as a toll-free number: the EDM customer can now phone and obtain information about payment, which he/she can pay through bank facilities. It would therefore be interesting to do an empirical study on the closure of the actor-network for the introduction of *Galatee* at EDM by applying the framework for analysis proposed in this work.

At BM, the new organisational structure is in place and the IT Master Plan is in its implementation phase. An integrated system is being developed by a contracted software company that uses SAP, and *Perago* is doing quality control of the implementation of the entire IT Master Plan. As regards the BM case, a further area of research could be to analyse to what extent the two actors (IT Master Plan and the organisational structure) resulting from the BPR project are institutionalised after the implementation.

The organisations involved in two of the case studies opted to outsource some of the ICT services. The relationship between outsourcing companies and organisations that hire their services could be another area of further study. It would be interesting, for example, to apply the sociology of translation, together with the due process model, to understand how outsourcing firms exercise an influence on organisations and *vice versa*.

At the Telecentres of Manhiça and Namaacha, the actors are busy trying to identify the sustainability mechanisms for the continuation of the Telecentre initiative beyond 2002. In addition, more Telecentres are being established in different regions of the

country. A further research area could be to conduct a comparative study of the Telecentre experiences across the country by looking at the cultural and even ritual issues that might influence the way in which communities could institutionalise Telecentres.

While it is agreed that some of these developments will have implications for the cases studied, some form of closure has to take place in order to complete a Ph.D. thesis within a certain time limit and space. In the words of Van Maanen (1988:120), '... we know our analysis is not finished, only over'.



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Appendix

2.1 Composition of the ICT policy commission (CPI)

- Pascoal Mocumbi, Prime Minister, Chairperson of the Commission (CPI)
- Lídia Brito, Minister of High Education, Science and Technology
- Luísa Diogo, Minister of Planning and Finance
- Alcido Nguenha, Minister of Education
- Tomaz Augusto Salomão, Minister of Transport and Communications
- Venâncio Massingue, Deputy Vice Chancellor UEM
- Gomes Zita, Administrator of TDM
- Salomão Manhiça, Executive Secretary for the CPI

Permanent invitees: They were former members of the CPI before the general election in 1999

- Eanes Comiche, Chair of the Commercial Bank of Mozambique (BCM) (Former Minister of Social and Economic issues)
- Arnaldo Valente Nhavoto, Member of Parliament (former Minister of Education)
- Paulo Muxanga, Lawyer (Former Minister of Transports and communications)

4.1 Interview guide for each interview type

A. Organisations

Interviewee's background: Job description, educational background, work history

EDM case

What do you know about the *Galatee* system? Can you describe the *Galatee* system?

How does it affect you?

What are the weakness or advantages of the *Galatee*?

How would you describe the process of implementation of *Galatee* in your operational area?

How will *Galatee* fit into your work?

How was the training process?

Is the *Galatee* system a solution to the initial problems?

Have you read the *Galatee* project document?

What are the future challenges?

BM case

What is the role of IT in your work? How does it affect you?

Can you describe the main functions of your department?

What are the problems you are facing presently?

Can you describe the BPR project?

How did you conduct this project/ who are the main stakeholders?

Where did the idea for getting started with BPR come from?

Is there a well-planned business strategy in the organization?

Is BPR a solution to the initial problems?

B. Telecentre: Interview guide for organizations in Manhiça and Namaacha

Nome da pessoa entrevistada----- Data da entrevista---/08/2000 posto
na organizacao do entrevistado

Nome da organização----- Numero de membros /empregados

Qual é o nível escloridade mais alta na sua organizacao
e mais baixa

Qual é a missão/função da sua organização

Quais são as actividades principais da sua organização

Quais são os maiores problemas relaccionados com a informação que sua organização tem de
momento?

A sua instituição usa computador na execução das suas aticividades

Quantas pessoas da sua organização tem capacidades de usar computador?

Tem usado os serviços do telecentro?

Quais?

Se não usa qual é a razão principal?

Estaria a sua organização interessada para usar os serviços do telecentro?

Qual e o preço que estaria preparada a pargar para os serviços do telecentro

De forma se comunica com outros sectores for a da vila?

A sua organização tem usado o correio electronicou internet?

Para que fins usa este tipo de serviços?

Se usa o telecentro qual é a frequencia de uso?

Na sua opinião quais são os impactos positivos e negativos que o tecentro pode ter perante a
comunidade?

Que servicos gostaria de ver disponiveis no telecentro?

Em que aspectos acha que a sua organizacao poderia se beneficiar do telecentro

Qual é a sugestão que dá para o sucesso do telecentro?

Questoes relaccionads com a informação

a) Quais são os prinicipais tipos de informção usados na sua organização? Os mais importantes?

b) Quais são as fontes de informção dessa informação?

c) Que meios de informação usa? (telefone, fax, cartas, etc)

d) Qual é custo desses meios (estimativa annual ou mensal se for posivel)

e) Está a sua organização satisfeita com a informacao que recebe em termos de qualidade, tempo de chegada, etc.?

| a. informação | b. Fonte | c. Meio | d. Custos | e. Satisfação |
|---------------|----------|---------|-----------|---------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

4.2 List of key informants

A. EDM (only IT staff)

| Number of employees : 2860 | | | Number of employees in IT: 16 | | | |
|----------------------------|--|-----------------------|-------------------------------|------------------|--------|--|
| Intervi ew# | Position of the interviewee | Level of Schooling | Years in organisation | Years in IT | Sex | Comments |
| 1 | Manager of the IT unit | Intermediary | 4 | 4 | Male | Programmer |
| 8 | IT Manager | University degree | 4 | 4 | Male | No longer IT Manager |
| 9 | Systems Analysis Manager for development and implementation of IS projects | University degree | 6 | 6 | Male | Manager for development and implementation of IS projects |
| 10 | Systems Analyst Manager of the Database | University degree | 14 | 6 | Male | Presently IT Manager at EDM |
| 19 | Manager of the IT unit | | 1 | 1 | Female | Also gives support to Invoice unit |
| 25 | IT staff member | Intermediary | 16 months | 16 mont hs | Male | |
| 30 | Manager of the IT unit | Intermediary | 18 | 18 | Female | More than two IT staff participated in this interview |

| | | | | | | |
|----|------------------------|--------------|----|---|------|---|
| 36 | Manager of the IT unit | Intermediary | 12 | 4 | Male | Also working as customer manager and support invoice unit |
|----|------------------------|--------------|----|---|------|---|

B. BM (only the individual interviews)

| Number of employees 600 | | | Number of employees in IT 20 | | | |
|-------------------------|--------------------------|--------------------|------------------------------|-------------|--------|----------------------------|
| Interview# | Position of interviewee | Level of Schooling | Years in organisation | Years in IT | Sex | Comments |
| 1 | Acting IT Manager | University degree | 8 | 6 | Male | Manager of the BPR project |
| 2 | Systems analyst | University degree | 10 | 10 | Female | IS development |
| 3 | Business Systems Analyst | University degree | 6 | 6 | Male | Organisational procedures |
| 4 | Systems Analyst | University degree | 6 | 6 | female | Management of IS |

4.3 Telecentre Questionnaires

A. User's questionnaire

QUESTIONÁRIO AOS UTENTES DO TELECENTRO

Usando alguns minutos do seu tempo a preencher este questionário, irá ajudar-nos a servir-lhe melhor. Para tal, basta colocar a letra X nos quadradinhos das opções e preencher os espaços especialmente indicados.

0. Identificação do Inqueridor/ Língua usada para a Entrevista

Data: ----/ Agosto / 2000

Nome do Inqueridor: _____
 Língua Usada para a Entrevista: Portugues Changana Outras: _____

1. Telecentro e Tipo de uso

Indicar se o uso do Telecentro é a título individual ou representa uma instituição ou empresa

Usa o Telecentro a título: Pessoal Instituição/Empresa
 Qual o Telecentro que usa? Manhiça Namaacha

2. Identificação do Utente

Indicar o género e o grupo etário a que pertence e o último nível académico obtido

Género: Masculino Feminino
 Grupo Etário: 0-16 anos 17-25 anos 26-40 anos mais de 41 anos
 Nível Académico: Nenhum Primário Básico Médio Superior

3. Residência / Morada

Indicar se a morada localiza-se na sede do Distrito ou no Interior (Zona Rural)

Vila Zona Rural (Interior)

Bairro de Residência: _____ Distrito: _____

4. Ocupação

Estudante
 Nível: EP1 EP2 Secundário Outros Níveis: _____
Formação de Professores Disciplinas: _____

Professor
Primário Secundário Instrutor

Funcionário do Estado (não professor)
Funcionário de uma Empresa Pública
Conta Própria } Profissão: _____
 Actividade Económica: _____

Empregado de terceiros (Trabalhador de Empresa Privada)
Doméstico(a)
Agricultor(a) do sector familiar
Desempregado(a). A Quanto Tempo? _____ Outras: _____

5. Instituição ou Empresa de Trabalho

| | |
|--|--|
| <input type="checkbox"/> <i>Escola</i> | Nome da Escola: _____ |
| | Nível: <input type="checkbox"/> <i>Primário</i> <input type="checkbox"/> <i>Básico</i> <input type="checkbox"/> <i>Médio</i> |
| <input type="checkbox"/> <i>Instituição Pública (não Escola)</i> | Nome da Instituição: _____ |
| <input type="checkbox"/> <i>Instituição ou congregação religiosa</i> | |
| <input type="checkbox"/> <i>Empresa Privada</i> | Ramo de Actividade: _____ |
| <input type="checkbox"/> <i>ONG</i> | Nome da ONG: _____ |
| | Área(s) de Intervenção da ONG: _____ |
| | Outros: _____ |

6. Frequência de Uso dos Serviços

Com que frequência usa os serviços que se seguem e qual o tempo médio de utilização de cada serviço, por visita ou solicitação

| | Diária (5 dias/Se) | 3 a 4 dias/Se. | 1 a 2 dias/Se. | 2 dias/ mês | 1 dia/ mês | | Tempo Médio de Utilização |
|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------|
| <input type="checkbox"/> <i>Correio Electrónico</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Internet</i> | <input checked="" type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Utilização de Computador</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Impressão</i> | <input checked="" type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Fotocópias</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Encadernação</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Telecartão</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Telefone</i> | <input checked="" type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Fax</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Televisão/Video/Radio</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Biblioteca</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Encomenda de Serviços</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Informação</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Aluguer de Equipamento</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Outros: _____</i> | <input type="checkbox"/> | _____ |

7. Participação em cursos Formação ou Treinamento no Telecentro

Já participou em algum curso de formação ou Treinamento, ministrado pelo Telecentro?

Não Sim

Se **Sim**, Especifique os cursos em que participou e avalie-os:

| | MBom | Suf | Mau |
|--|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> <i>Correio Electrónico</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Internet</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Utilização de Computador</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

8. Forma de utilização dos Serviços e Língua que usa

Especificar se usa os serviços pessoalmente ou os usa por intermédio de Terceiros (pede ajuda) e que Língua usa com maior frequência, para a escrita de mensagens

Para enviar as mensagens: *Faço pessoalmente* *Peço ajuda*

Porquê ? não sei escrever

não sei usar computador

não estou familiarizado com o serviço de E-Mail

Com que língua escreve as Mensagens?

Português

Materna

Estrangeira

Especifique a Língua Materna: _____

Especifique a Língua Estrangeira: _____

9. Finalidade de Uso do Serviço de Internet, E-Mail e Computador

Para que Finalidade usa os Serviços de Internet e E-Mail ?

Uso o E-Mail para me comunicar, **DENTRO DO PAÍS**, com :

- Filho/a* *Irmão/Irmã* *Pais*
 Pais *Amigos* *Outros Familiares*
 Clientes/ Fornecedores *Instituições ou Empresas Congéneras*
 Outros: _____

Uso o E-Mail para me comunicar, **FORA DO PAÍS**, com :

- Filho/a* *Irmão/Irmã* *Pais*
 Pais *Amigos* *Outros Familiares:* _____
 Clientes/ Fornecedores *Instituições ou Empresas Congéneras*
 Indique o(s) País(es) para o(s) qual(is) envia ou recebe mensagens: _____

Alguma das pessoas ou Instituições/Empresas com as quais se comunica também usam Telecentros ou ponto de acesso colectivo?

Não *Sim*

Se **SIM**, indique qual(is)? *Manhiça* *Namaacha* *Outros*

indique o Grau de parentesco ou parceria:

- Filho/a* *Irmão/Irmã* *Clientes / Fornecedores*
 Pai/mãe *Amigo(a)* *Parceiro de Trabalho*

Outros: _____

Outras Finalidades: _____

Usa Internet e/ou E-Mail para a frequentar um Curso de Ensino a Distância?

Não *Sim*

Usa Internet para consultar diversa Informação? Não Sim

Usa Internet para fins escolares? *Não* *Sim*

Que disciplinas lhe obrigam a recorrer a INTERNET? _____

Para que finalidade usa o computador? _____

10. Qualidade de Serviços

Indique a qualidade dos serviços fornecidos e sempre que possível, justifique a classificação atribuída

| | MBom | Bom | Suf. | Med. | Mau | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| <input type="checkbox"/> <i>Correio Electrónico</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Internet</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Utilização de Computador</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Impresão</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Fotocópias</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Encadernação</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Telecartão</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Telefone</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Fax</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Formação</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Biblioteca</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>Encomendar Serviços</i> | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> <i>TV/Vide/Radio</i> | <input type="checkbox"/> | _____ |

Justifique a atribuição de qualidade do serviços MBom e Bom: _____

Justifique a atribuição de qualidade do serviços Med e Mau: _____

11. Interrupção dos Serviços do Telecentro

Durante a exploração dos serviços do Telecentro, tem sido afectado(a) pela interrupção no fornecimento de Energia Eléctrica?

Nunca *Raras vezes* *Frequentemente* *Sempre*

Durante a exploração dos serviços do Telecentro, tem sido afectado(a) pela interrupção da linha telefónica?

Nunca *Raras vezes* *Frequentemente* *Sempre*

12. Horário de Funcionamento do Telecentro

Dê a sua opinião quanto ao horário de funcionamento (abertura e fecho) do Telecentro

MBom *Bom* *Suficiente* *Medíocre* *Mau*

Sugestão de horário de funcionamento do Telecentro: _____

13. Formação Técnica do Pessoal

Dê a sua percepção quanto às capacidades técnicas demonstradas pelos Técnicos do Telecentro

Considera que a Formação Técnica do pessoal que trabalha no Telecentro é:

Boa *Suf.* *Má*

Para casos em que teve algum problema técnico, a intervenção do Técnico foi:

Boa Suf. Má

14. Impacto do Telecentro

Indique os benefícios (vantagens) e constrangimentos (desvantagens) que o Telecentro traz na **sua vida** ou **empresa/Instituição** e na **comunidade**

Reduz o número de deslocações? Não Sim

Poupa algum dinheiro? Não Sim

Tem estado mais informado? Não Sim

Melhora o seu rendimento escolar (estudantes)? Não Sim

Melhora o nível das aulas (professores)? Não Sim

Melhora o Negócio? Não Sim

Indique (máx. 3) vantagens do Telecentro: _____

Indique (máx. 3) desvantagens do Telecentro: _____

15. Contacto com Computador

Indicar se teve o primeiro contacto com o Computador antes ou depois de se tornar utente do Telecentro

Antes de se tornar utente do Telecentro já tinha tido contacto com computador? Não Sim

16. Parentes que utilizam Telecentro

Indicar se têm algum familiar que utiliza Telecentro

Tem algum familiar que também utiliza Telecentro? Não Sim

Se **SIM**, indique quantos: _____, o(s) Grau(s) de Parentesco: _____

Que Telecentro(s) o(s) teu(s) familiares usa(m)? _____

17. Distância, Custos de deslocação e Meio de Transporte para chegar ao Telecentro

Quanto tempo leva do seu local de residência ao Telecentro?

+5min +15min +30min +60min +120min +120

Qual o meio de transporte que usa? A pé Bicicleta Mota

Transporte público Viatura Particular

Quanto dispense (gasta em Meticais) para Chegar ao Telecentro? _____

18. Cartões do Telecentro

Tem cartão de utente? Não Sim

Se **Sim**, o que acha sobre a taxa de utente?

Baixo Aceitável Alto

Se **Não**, justifique porquê não é utente: _____

Tem cartão de membro/estudante? Não Sim

Se **Sim**, o que acha sobre a taxa de membro?

Baixo Aceitável Alto

19. Custo dos Serviços

Indique se os **preços** praticados pelo Telecentro são, Baixos, Aceitáveis ou Altos

| | Baixo | Aceitável | Alto |
|--|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> <i>Correio Electrónico</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Internet</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Utilização de Computador</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Impressão</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Fotocópias</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Encadernação</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Telecartão</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Telefone</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Fax</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Formação</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>Encomendar Serviços</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> <i>TV/Vide/Radio</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

20. Auscultação para a introdução de Novos Serviços e Melhoramento dos Serviços já existentes

Para além dos serviços disponíveis, que outros serviços gostaria que o Telecentro disponibilizasse?

Na sua opinião, o que deve ser feito para a melhoria da qualidade de serviços prestados pelo Telecentro ? _____

Agradecemos a sua ajuda !

Satisfação dos Utentes é o nosso primeiro objectivo!

B. Potential User's questionnaire

QUESTIONÁRIO A POTENCIAIS UTENTES DO TELECENTRO

Usando alguns minutos do seu tempo a preencher este questionário, irá ajudar-nos a servir-lhe melhor. Para tal, basta colocar a letra X nos quadradinhos das opções e preencher os espaços especialmente indicados.

O. É potencial utente do Tecentro da

 Manhiça
 Namaacha

Data do Inquérito: ____ / Agosto / 2000

1. Identificação do Utente

Indicar o género e o grupo etário a que pertence.

Género: *Masculino*
 Femenino
Grupo Etário: *0-16 anos*
 17-25 anos
 26-40 anos
 mais de 40anos

2. Residência / Morada

Indicar se a morada localiza-se na sede do Distrito ou no Interior (Zona Rural)

 Vila
 Zona Rural (Interior)

Bairro de Residência: _____ Distrito: _____

3. Ocupação

Indique a sua actual ocupação e a instituição onde estuda ou trabalha

 Estudante

Nível de Escolaridade: _____

Escola onde estuda: _____

 Professor

Nível de Académico: _____

Escola onde Trabalha: _____

Outra Ocupação: _____

4. Conhecimento de Telecentro / Uso de Computador

Sabe o que é um Telecentro? *Não* *Sim*Se **Sim**, conhece algum? Qual: _____Tem necessidade de usar um Telecentro? *Não* *Sim*Se **Sim**, por que razão não uso o Telecentro?
 distância *preço* *horario* outras razões: _____
Alguma vez usou Computador? *Não* *Sim*

5. Parentes que utilizam Telecentro

Indicar se tem algum familiar que utiliza Telecentro

Tem algum familiar que utiliza algum Telecentro? Não Sim

Se **SIM**, indique quantos: _____, o(s) Grau(s) de Parentesco: _____

Que Telecentro(s) o(s) teu(s) familiares usa(m)? _____

6. Serviços que pode usar no Telecentro

Se tivesse acesso ao Telecentro, que serviços gostaria de usar ?

| <u>SERVIÇO</u> | <u>FINALIDADE DE USO DO SERVIÇO</u> |
|---|-------------------------------------|
| <input type="checkbox"/> Correio Electrónico | _____ |
| <input type="checkbox"/> Internet | _____ |
| <input type="checkbox"/> Utilização de Computador | _____ |
| <input type="checkbox"/> Impressão | _____ |
| <input type="checkbox"/> Fotocópias | _____ |
| <input type="checkbox"/> Encadernação | _____ |
| <input type="checkbox"/> Telecartão | _____ |
| <input type="checkbox"/> Telefone | _____ |
| <input type="checkbox"/> Fax | _____ |
| <input type="checkbox"/> Formação | _____ |
| <input type="checkbox"/> Biblioteca | _____ |
| <input type="checkbox"/> Encomendar Serviços | _____ |
| <input type="checkbox"/> TV/Vide/Radio | _____ |

7. Informação da Internet

Se tivesse acesso à Internet, que tipo de informação lhe interessaria? Selecciona, por um **X** indicando o nível de Importância na respectiva coluna

| Nível de Importância Tipo de Informação | MUITO IMPORTANTE | COM ALGUMA IMPORTANCIA | POUCA IMPORTÂNCIA | NENHUMA IMPORTÂNCIA |
|--|---------------------|---------------------------|----------------------|------------------------|
| Educação | | | | |
| Cuidados de Saúde | | | | |
| Eventos sociais / culturais | | | | |
| Estado do Tempo | | | | |
| Informação Governamental – taxas, leis, procedimentos | | | | |
| Informação Local | | | | |
| Agricultura | | | | |
| Comercio | | | | |
| Desporto | | | | |
| Cultura | | | | |
| Religião | | | | |
| Diversão | | | | |
| Outro | | | | |
| | | | | |

8. Custo dos Serviços

Quanto está disposto a pagar pelo uso de cada um dos serviços que se seguem?

| | |
|---|-------|
| <input type="checkbox"/> Correio Electrónico | _____ |
| <input type="checkbox"/> Internet | _____ |
| <input type="checkbox"/> Utilização de Computador | _____ |
| <input type="checkbox"/> Impresão | _____ |
| <input type="checkbox"/> Fotocópias | _____ |
| <input type="checkbox"/> Encadernação | _____ |
| <input type="checkbox"/> Telecartão | _____ |
| <input type="checkbox"/> Telefone | _____ |
| <input type="checkbox"/> Fax | _____ |
| <input type="checkbox"/> Formação | _____ |
| <input type="checkbox"/> Encomendar Serviços | _____ |
| <input type="checkbox"/> TV/Vide/Radio | _____ |

Agradecemos a sua ajuda !

Satisfação dos Utentes é o nosso primeiro objectivo!

4.4 Telecentre: Group discussion guideline

Group discussion guide for CAL meeting

Objectivo do encontro

Neste encontro espera-se que os participantes sejam capazes de identificarem os pontos Forte, fracos, oportunidades ameaças do seu telecentro.

Aspectos chaves da discussão

Informação necessaria para o telecentro
 Prioridade dos servicos
 Novos servicos
 Precos
 Recursos
 Beneficios desta experiencia
 Futuro do telecentro

Sequencia dos eventos

Apresentação dos participantes em termos gerais e profissionais eo seu papel no telecentro

Apresentar o programado dia e o que se espera de cada participante

Identificação das capacidades internas em termos de que tornam telecentro forte

Identificação das fraquezas internas

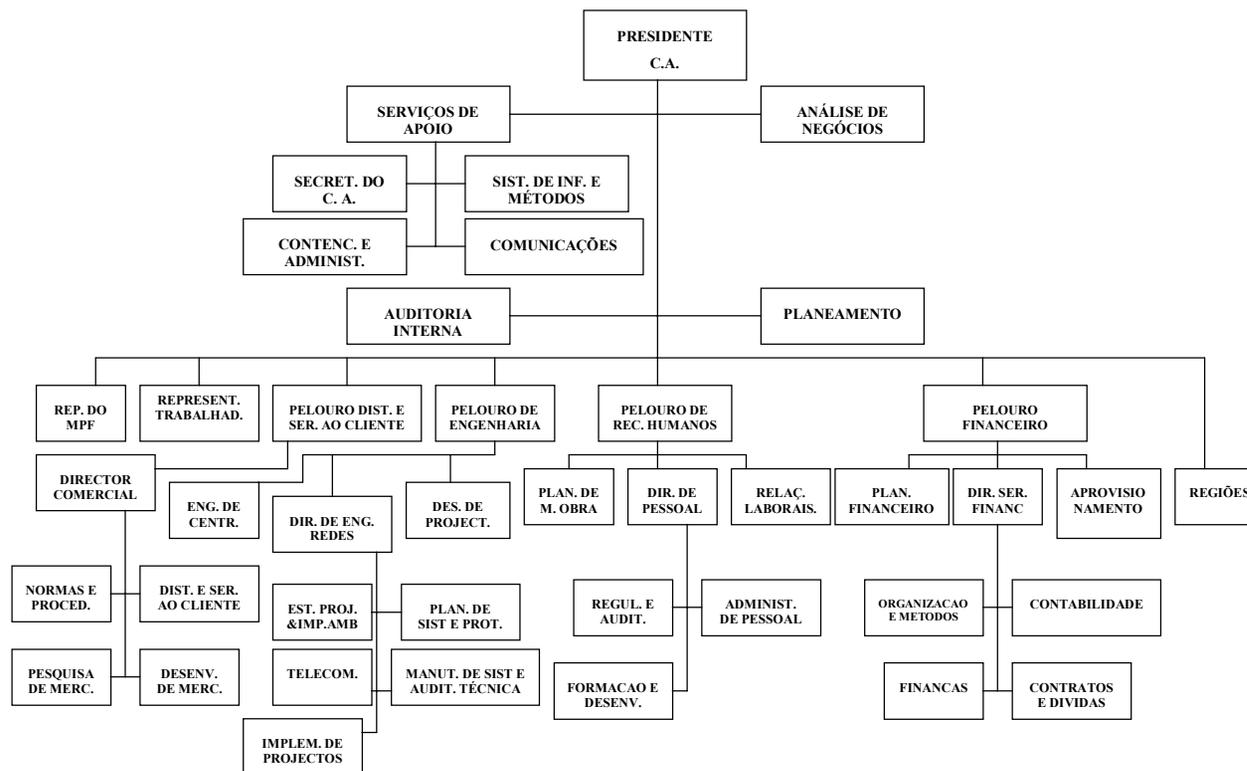
Identificação das oportunidades externas

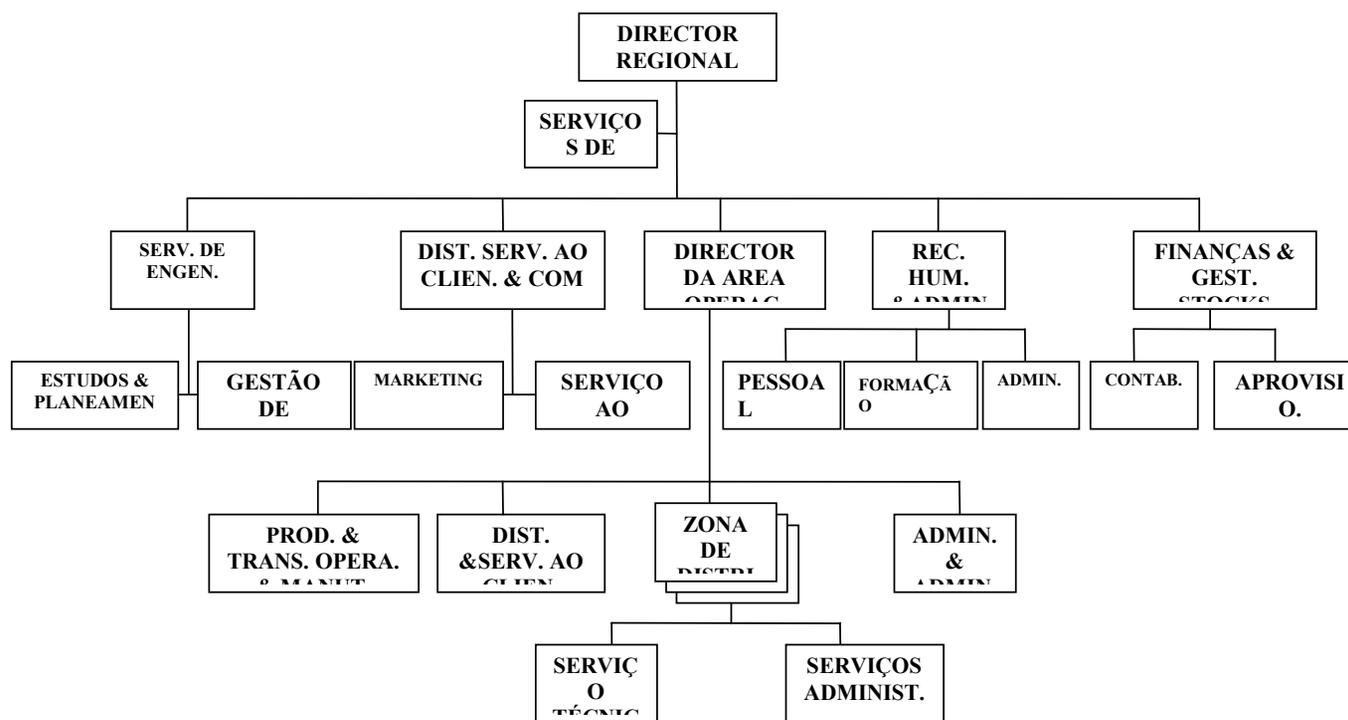
Identificação das Ameaças externas.

Com a identificação deste pontos vai se identificar as potencialidades do telecentro e os seus constringimentos

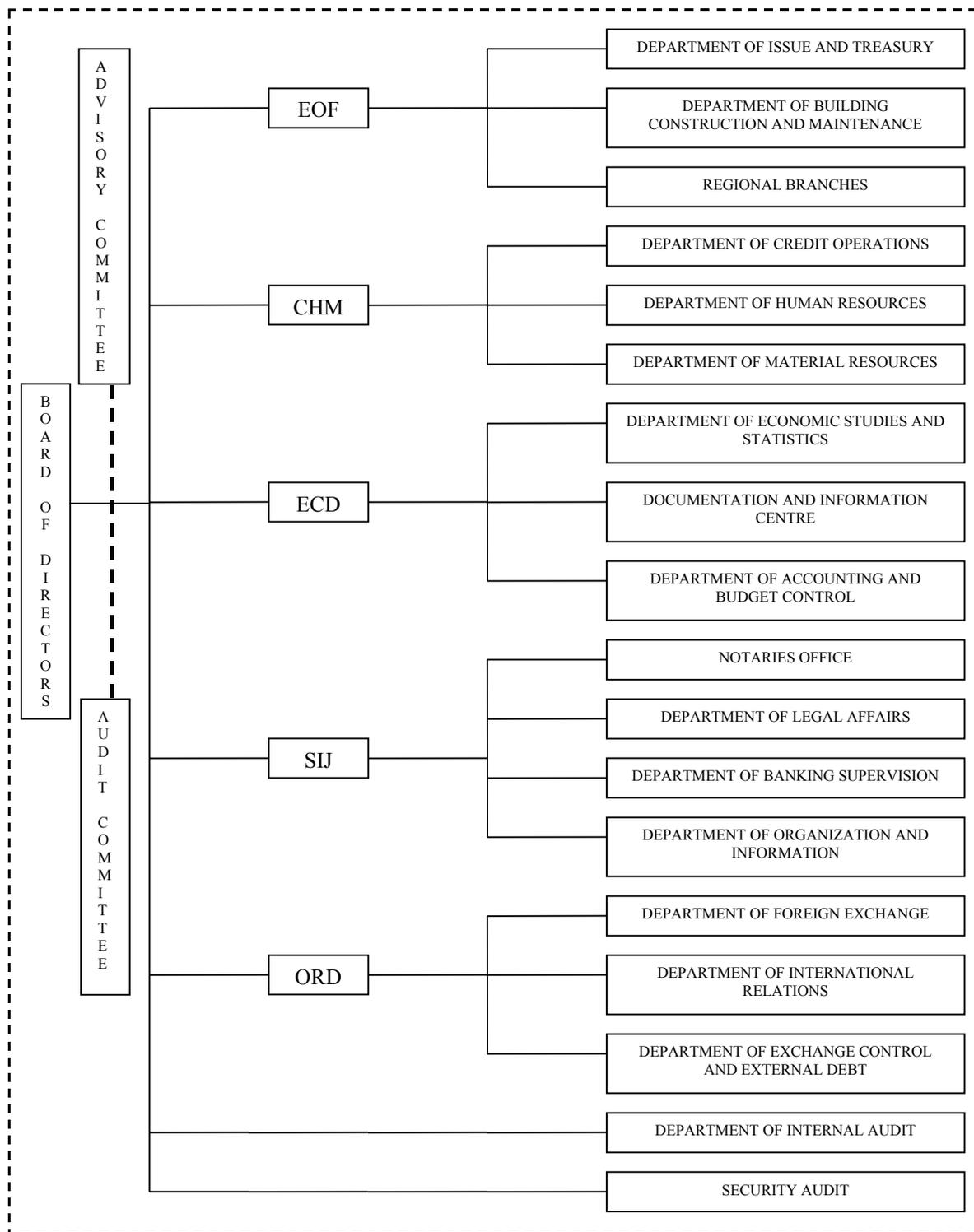
Na base desta análise qual é o futuro do telecentro?

4.5 EDM organisational structure



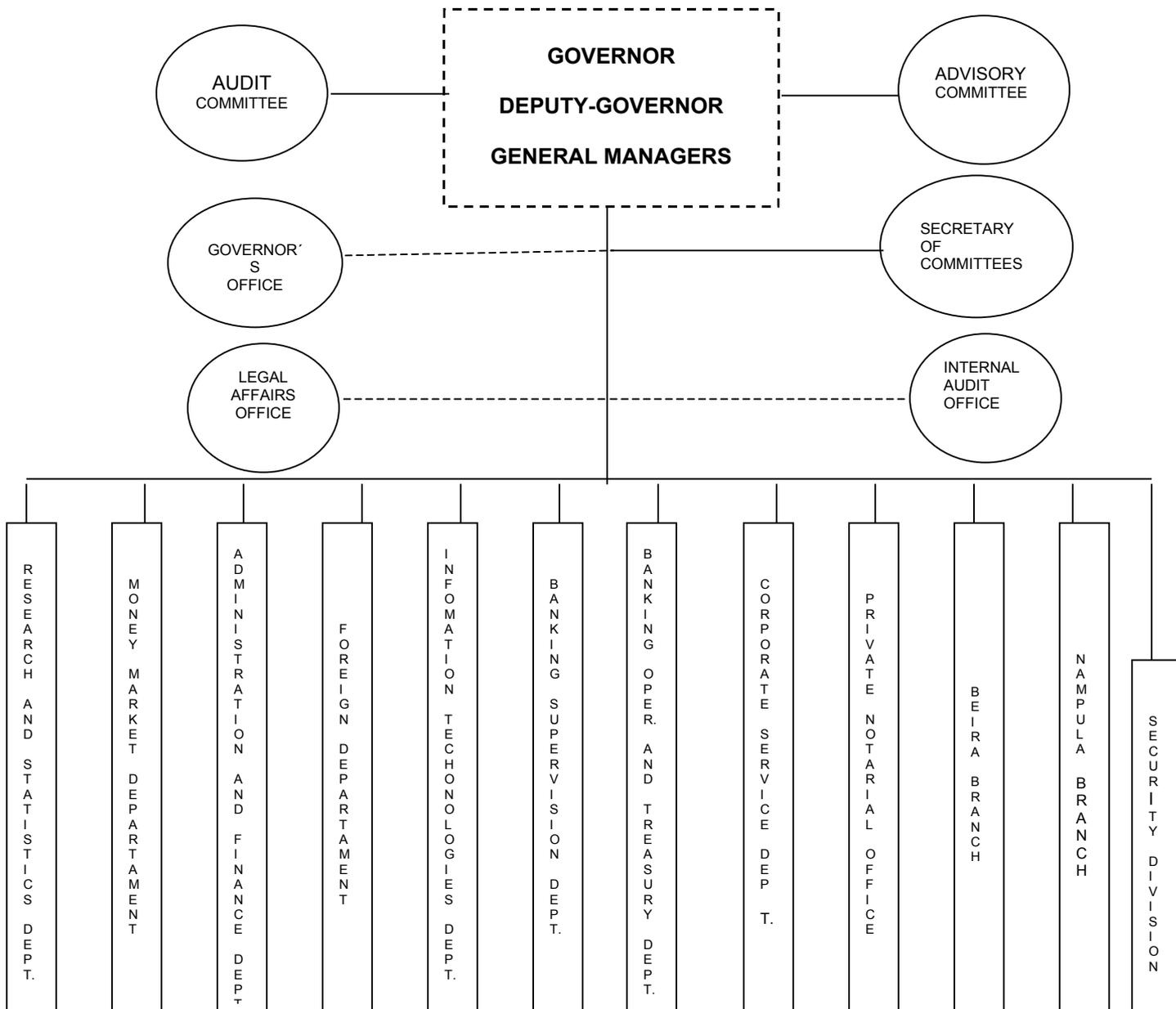


4.6 BM organisational structure before BRP project



- LEGENDA:
- EOF Issue, Building Construction and Branch
 - CHM Credit, Human and Material Resources
 - SIJ Supervision, Information Technology and Legal Affairs
 - ECD Economic Studies, Accounting and Documentation
 - ORD Operations, International Relations and Foreign Department

4.7 BM organisational structure after BPR



4.8 Summary of institutions interviewed during Telecentre study

Manhiça

| Sector | Nome da empresa/ Instituição | Nível de escolaridade mais baixo | Nível de escolaridade mais alto | Nº de Funcio- nários | Nº de Funcio- nários que usam computador | A empresa / Instituição usa Telecentro? |
|------------------|--------------------------------------|--|---------------------------------------|----------------------------|---|--|
| Governmental | Direcção Distrital de Educação | 7ª classe | Médio | 10 | 4 | sim |
| | Direcção Distrital de Agricultura | 4ª calsse | Médio | 6 | 0 | sim |
| | Administração da Manhiça | 6ª classe | Médio | 13 | 3 | sim |
| | Conselho Municipal | 2ª classe | Médio | 46 | 0 | sim |
| Telecomunicações | TDM | 4ª classe | 10ª classe | 9 | 1 | sim |
| Energia | EDM | 1ª classe | Médio | 8 | 2 | sim |
| Agro-industrial | Inácio de Sousa | Analfabeto | Bacharelato | 426 | 15 | Não |
| | Maragra | 2ª classe | Licenciatura | 52 | 25 | Não |
| Hotelaria | Restaurante Laurentina | 4ª classe | 7ª classe | 15 | 0 | sim |
| ONG | Actionaid | 6ª classe | Licenciatura | 18 | 8 | sim |
| | ANAMA | Analfabeto | Licenciatura | | 0 | Não |
| | Frelimo | 2ª classe | Licenciatura | 1600 (23) | 0 | sim |

Namaacha

| Sector | Nome da empresa/ Instituição | Nível de escolaridade mais baixo | Nível de escolaridade mais alto | Nº de Funcio- nários | Nº de Funcio- nários que usam computador | A empresa / Instituição usa Telecentro? |
|--------------------------------------|---|--|---------------------------------------|----------------------------|---|--|
| Governamental | Direcção Distrital de Agricultura e Pescas | Analfabeto | Superior | 6 | 0 | sim |
| | Direcção Distrital de Saude | 2ª classe | Superior | 48 | 1 | sim |
| Telecomunicações | TDM | 6ª classe | Médio | 14 | 7 | não |
| Hotelaria e comercio | Hotel Libombos | 3ª classe | 12ª classe | 65 | 12 | sim |
| | Simão da Costa | Analfabeto | 9ª classe | 15 | 0 | sim |
| | Industria panificadora | Analfabeto | 10ª classe | 6 | 0 | sim |
| Ensino | Colégio Maria Auxiliadora | Básico | Licenciatura | 3 | 2 | Sim |
| Polícia e segurança | Comando da PRM | 6ª classe | 11ª classe | 45 | 0 | Sim |
| Partido politico/organisaç ões | Frelimo | 2ª classe | 9ª classe | 300 | 0 | sim |
| | OJM | 6ª classe | 10ª classe | 30 (4) | 0 | sim |
| | OMM | 4ª classe | 11ª classe | 30 | 0 | sim |