

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. Problematization

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

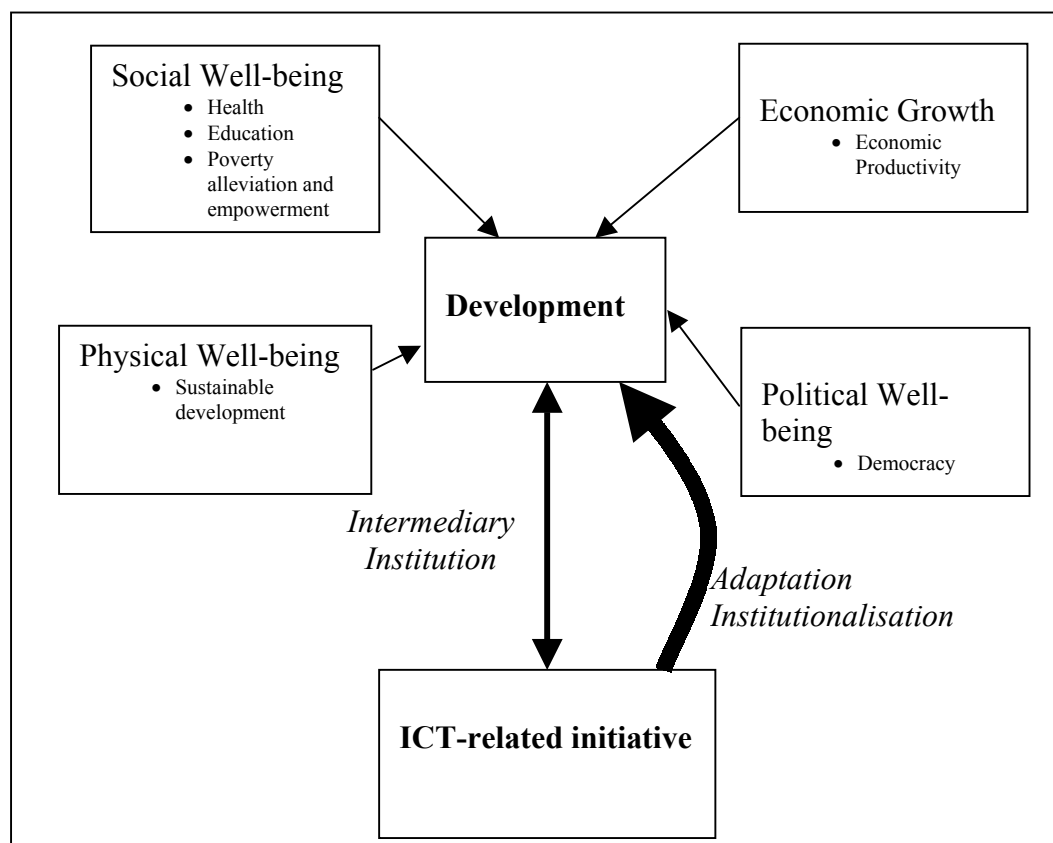
In this section, the third level of analysis of the case studies takes place on the basis of the interaction of the ICT initiatives with development programmes and their contribution to the issues addressed in the national ICT policy. This ICT policy addresses issues of education and human skills building, 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.

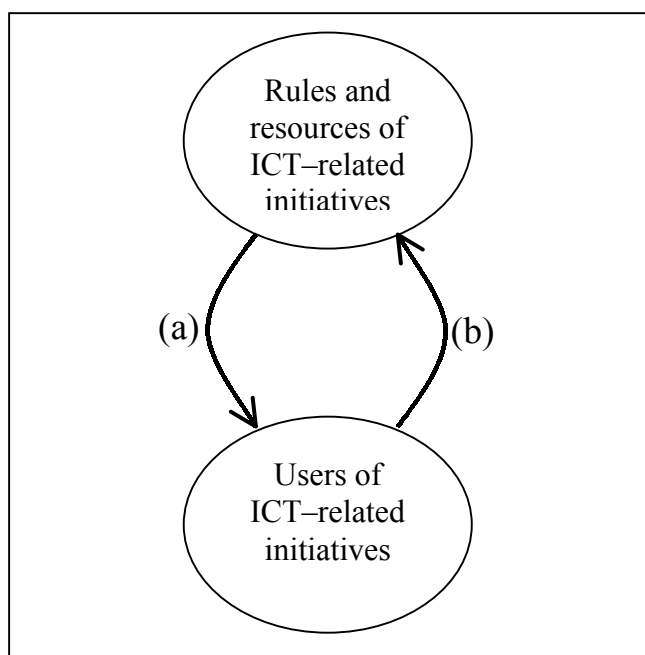


Figure 5.2: Linkage of ICT related initiative and its users

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.

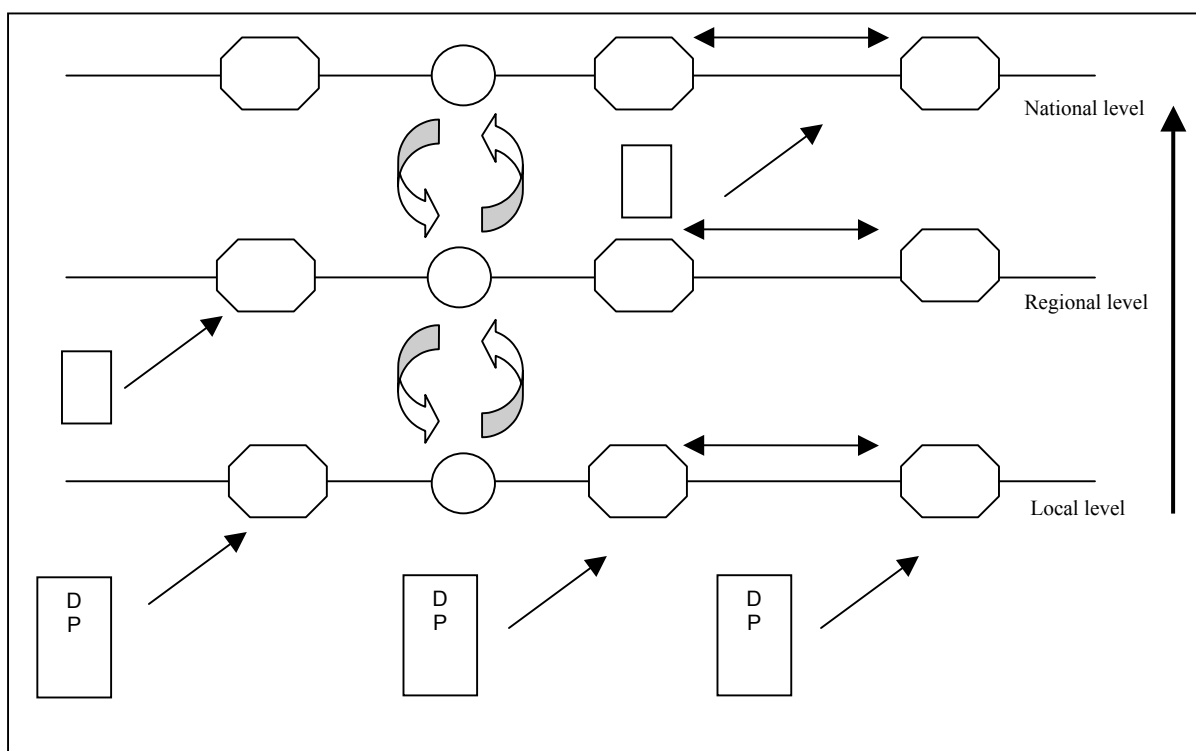


Figure 5.3: Understanding the interaction between ICT-related initiatives and development (DP – Development priorities) (adapted from Roode, forthcoming)

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 *interessement* 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.

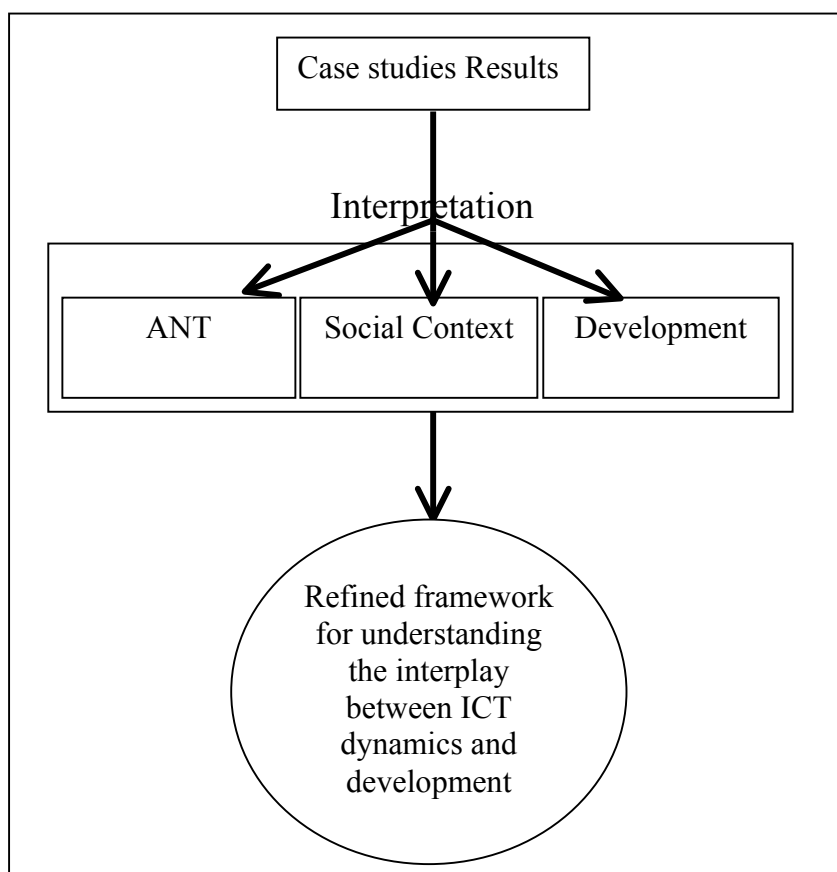


Figure 5.4: Analytical refinement of the framework

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.

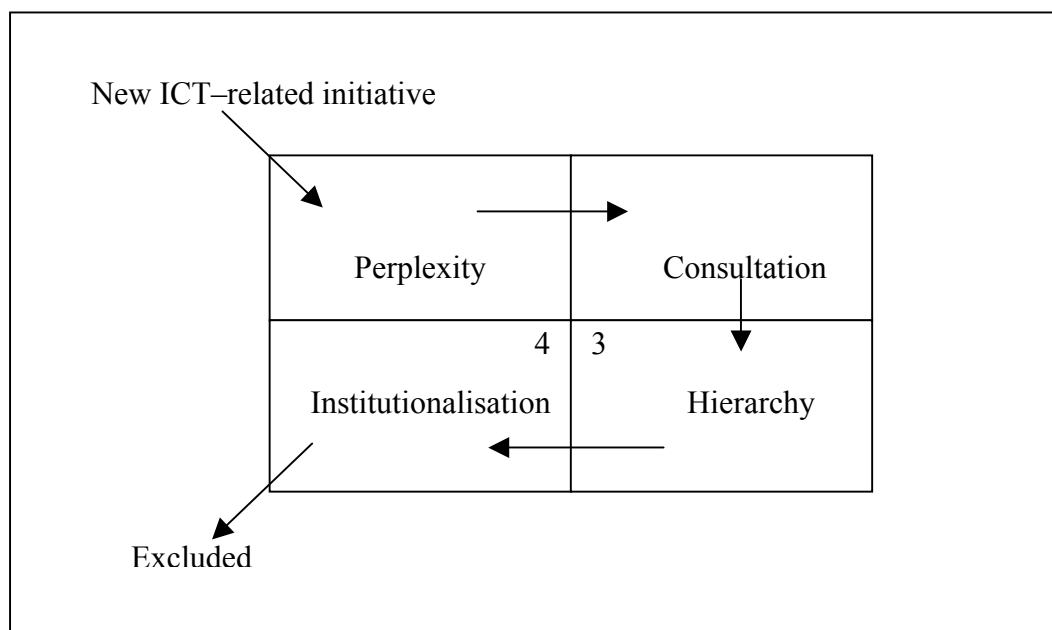


Figure 5.5: The 'due process model' (source: McMaster et al. (1998))

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.

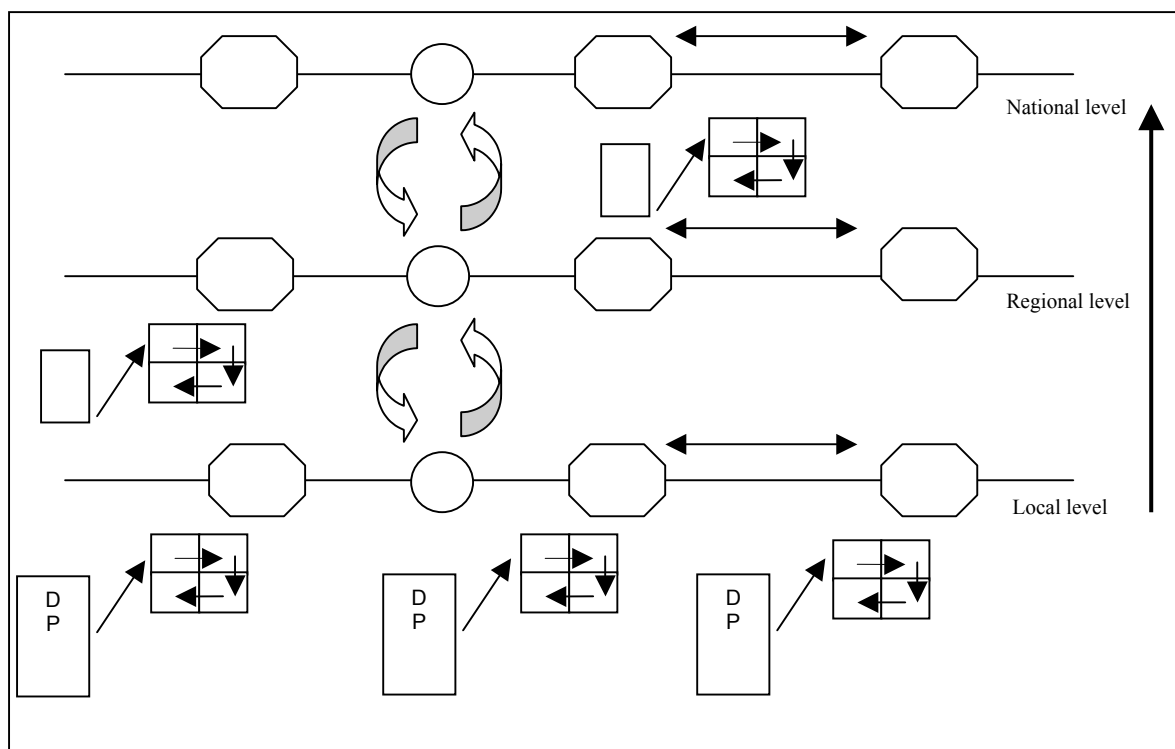


Figure 5.6: Understanding the interaction between ICT-related initiatives and development guided by the due process model for introduction of the initiative (DP – Development priorities) (adapted from Roode, forthcoming)

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.