INVESTIGATING E-COMMERCE ADOPTION IN THE PROCUREMENT PROCESSES OF THE BOTSWANA DEFENCE FORCE: A QUALITATIVE STUDY

By

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Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature: Date: 08/11/07

ABSTRACT

This study sets out to explore the factors that affect e-commerce adoption in the Botswana Defence Force (BDF) procurement process. The factors that were identified as affecting e-commerce adoption emerged from studies conducted mainly in the context of the developed world, particularly the Western world. Discussions in the academic literature therefore appear to be based on assumptions that do not necessarily apply to the developing world. This study explores these factors in an organisation in a developing country.

The purpose of the study was to develop a rich picture of the factors that affect e-commerce adoption in the BDF procurement process. The study aimed to identify issues, factors, and problems critically involved in IT adoption in the BDF procurement process and to develop a theory that could help to understand these factors.

Grounded theory methodology was the chosen method of qualitative data collection and analysis. This methodology was chosen because it facilitates inductive theory generation from an interpretive perspective. This approach was suitable for the study as the aim was to develop a theory that was grounded in the data and likely to resemble reality. The data was gathered through semi-structured interviews with procurement officers, IT officers, and BDF senior officers.

The research findings identified the benefits, limitations, drivers and barriers of e-commerce adoption in the BDF procurement process. The technological capabilities of the BDF were identified and it was concluded that the BDF is prepared in terms of IT infrastructure for e-commerce adoption. A theory of the factors affecting e-commerce adoption was developed using grounded theory

methodology and a model of the factors affecting e-commerce adoption in the procurement process was developed. To strengthen the theory that was 'built', it was compared to previous e-commerce adoption literature.

Overall, this research provided a stepping stone for new research into e-commerce adoption in the Botswana Defence Force. It has facilitated better understanding of how participants view e-commerce adoption in the BDF. The study also contributes to the literature on e-commerce adoption, which is currently under-researched, particularly in developing countries such as Botswana.

OPSOMMING

Hierdie studie is gemik op verkenning van die faktore wat die oorskakeling na e-handel in die Botswana Weermag se aanskaffingsproses affekteer. Faktore wat 'n effek op oorskakeling het en voorheen geïndentifiseer is, het na vore gekom in studies wat hoofsaaklik in die konteks van die ontwikkelde, veral die Westerse, wêreld uitgevoer is. Besprekings in die akademiese literatuur laat blyk dus dat sulke faktore op aannames gebaseer is wat nie noodwendig op die ontwikkelende wêreld van toepassing is nie. Die huidige studie verken hierdie faktore binne 'n organisasie in 'n ontwikkelende land.

Die doel van die studie was om 'n volle beeld van die faktore wat oorgang na e-handel in die Botswana Weermag se aanskaffingsproses affekteer, te verkry. Die studie was daarop gemik om kwessies, faktore en probleme wat krities betrokke is by die oorskakeling na Informasietegnologie (IT) in hierdie Weermag se aanskaffingsproses te identifiseer en 'n teorie te ontwikkel wat sou help om hierdie faktore te verstaan.

Die metodologie van gegronde teorie is as metode gekies om data kwalitatief te versamel en te analiseer. Dié besluit is geneem omdat die metodologie induktiewe teoriegenerering vanuit 'n verklarende perspektief in die hand werk.

Die benadering was geskik omdat die studie daarop gerig was om 'n teorie te ontwikkel wat in die data gegrond was en moontlik die werklike sou weergee. Die data is deur middel van semigestruktureerde onderhoude met offisiere wat by aanskaffing betrokke is, offisiere wat by IT betrokke is en senior lede van die Botswana Weermag ingewin.

Die bevindings van die navorsingstudie het die voordele, beperkings, aandrywers van en hindernisse tot oorgang na e-handel in die Botswana Weermag se aanskaffingsproses geïdentifiseer. Die tegnologiese vermoë van die Botswana

Weermag is geïdentifiseer en die slotsom was dat die Weermag in terme van IT-infrastruktuur gereed was vir die oorgang na e-handel. Teorie oor die faktore wat oorgang na e-handel affekteer, is met behulp van gegronde teoriemetodologie ontwikkel en die verwantskap tussen die faktore is geïdentifiseer. Die teorie wat ontwikkel is, is met vroeër literatuur oor die oorgang na e-handel vergelyk om dit te versterk.

In geheel bied hierdie navorsing 'n middel tot verdere navorsing in verband met oorgang na e-handel in die Botswana Weermag. Dit het beter begrip bewerkstellig vir deelnemers se beskouings ten opsigte van die oorgang na e-handel in hierdie Weermag. Die studie lewer ook 'n bydrae tot die literatuur oor oorgang na e-handel, waaroor daar tans nog min navorsing gedoen is, veral in ontwikkelende lande soos Botswana.

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LIST OF ABBREVIATIONS

B2B	Business-to-Business
BDF	Botswana Defence Force
C2C	Customer-to-Customer
CEO	Chief Executive Officer
CQDA	Computer Qualitative Data Analysis
EDI	Electronic Data Interchange
G2B	Government-to-Business
GABS	Government Accounting Budgeting System
GDN	Government Data Network
GDP	Gross Domestic Product
ICT	Information and communications Technology
IS	Information System
IT	Information Technology
LAN	Local Area Network
LIMS	Logistics Information Management Systems
PPADB	Public Procurement and Asset Disposal Board
SAICSIT	South African Institute of Computer Science and Information Technology
TOE	Technology, Organisation, Environment
WAN	Wide Area Network
WEF	World Economic Forum
WEFGITR	World Economic Forum Global IT Report

CHAPTER 1

INTRODUCTION

1.1   INTRODUCTION

With the increased diffusion of information and communication technologies throughout most areas of society and the economy, organisations are becoming increasingly aware of the need to face the challenge of effectively exploiting the opportunities that these technologies present.   One of the most recent technological developments in recent years has been the Internet and the World Wide Web (www).   The Internet in general and the WWW in particular have revolutionised business activities.   The open standard of the Internet brings electronic commerce (e-commerce) even within reach of small and medium enterprises.

E-commerce is considered to provide substantial benefits to business. These benefits can take a number of forms, such as efficiency gains (e.g. internal communications); increased management effectiveness and increased business performance (Fink, 1998).

Participation in e-commerce is important from the perspective of commercial transactions, but more so in the way it encourages transformation of internal systems and the subsequent influence in terms of cost, responsiveness to customers, customisation of offerings and the potential emergence of new products and services (Pease & Rowe, 2005).   In procurement, e-commerce could encourage transparency, wider choice of suppliers; product cost reduction and improved delivery.

From this viewpoint, it is considered that the adoption of e-commerce in the Botswana Defence Force (BDF) procurement process would enable faster and more responsive procurement.   Procurement within government organisations

and, to a large extent within the military, is somewhat distinct from procurement in private sector enterprises, due to differing operational objectives. Since government organisations are not profit-oriented but rather are entrusted with tasks of public interest, they face far more regulations than private corporations, particularly in areas concerning bidding and purchasing procedures, and are usually under closer public scrutiny (Gebauer, Beam & Segev, 1998).

This chapter introduces the thesis and explores the motivation for research within the procurement processes of the Botswana Defence Force. It further defines the research problem addressed in this thesis and presents the research scope as well as the research question. The chapter also presents the research objectives and the contributions and limitations of research are discussed. Finally, the chapter concludes with the outline of the organisation of the thesis. The next section presents the motivation for research.

1.2   MOTIVATION FOR RESEARCH

Procurement in the Botswana Defence Force can be characterised as being fragmented and information-intensive. A considerable degree of information flows between the various stakeholders in the process of procurement. These include procuring entities, suppliers, the BDF tender committee, the BDF finance unit, the Ministry of Finance and the Public Procurement and Asset Disposal Board (PPADB). A procurement project is a team effort which involves several inter-organisational activities, dialogue, and information flows, which makes it a highly complex process. Appendix A illustrates the complex process involved in the procurement process.

Despite the organisation having invested highly in information technology (IT) infrastructure in the past years, the information flow in the procurement process was still mainly paper-based and very inefficient at the time of this study. In order to prevent stagnation and move forward with the times or risk being left

behind, the Botswana Defence Force should investigate ways to amalgamate new technologies such as e-commerce into its day-to-day working methods. The Botswana Defence Force could reduce the effects of fragmentation by using technological tools to increase efficiency and quality of procurement. Collaborative information technology tools could be used to improve co-ordination between all stakeholders in the procurement process.

Due to the Botswana Defence Force's relatively well-developed information technology infrastructure, which affords scope for observing current IT applications, the researcher was provided with the opportunity to investigate the factors that affect e-commerce adoption. The Botswana Defence Force was not chosen because the researcher is a member of the organisation, which would enable access to people and information, but, more importantly, because it appears that defence procurement is attracting more attention from local researchers and the media (Mompati, 2005). This brings us to the next section, in which the problem statement of the research is defined.

1.3   PROBLEM STATEMENT

Research investigations into e-commerce adoption in organisations are commonplace. The factors that were identified as affecting e-commerce adoption have emerged from studies conducted mainly in the context of the developed world (primarily the western world). Discussions in the academic literature thus appear to be based on assumptions that do not necessarily apply to the developing world (Cloete, Courtney & Fintz, 20002).

It is apparent that the IT developed in and for developed countries may not be a perfect fit for organisational operations in all countries. Problems that companies in developed countries face may not be present in the context of developing countries, such as Botswana, which may, in turn, present unique issues of their

own. Environmental conditions in developed nations may impact significantly on organisations, their structures, operational processes and users.

Furthermore, there has been no published research on e-commerce adoption in the procurement process of the Botswana Defence Force. The present research was expected to lead to a model of the factors affecting e-commerce adoption that would go a long way in assisting practitioners and management. Hence, the focus of this research was to explore the factors affecting e-commerce adoption in an organisation in Botswana as a developing country. This leads to the scope of the research, which is presented next.

1.4   THE SCOPE OF THE RESEARCH

Broadly, the study was focused on investigating the factors affecting e-commerce in the procurement process of the Botswana Defence Force. The purpose of the study was to gain understanding of factors affecting e-commerce adoption and to develop a theory based on factors affecting the adoption of e-commerce (drivers and barriers) in organisational procurement. The study was conducted with the help of qualitative data collection and analysis method.

The research method used to explore the factors was grounded theory (GT). The grounded theory method was deemed the most appropriate approach for the study because the researcher began by choosing an area of study and entering the field without any preconceived theory or pre-existing theories (Strauss & Corbin, 1998). As explained in Chapter two, grounded theory method allows categories and theory to emerge from the gathered data. Thus the data gathered were not forced into categories and the theory was likely to resemble reality. The grounded theory approach to the study allowed procurement officers, IT officers and senior Botswana Defence Force officers to explain their concerns and/or problems and the motivation for e-commerce adoption reflects their own perspective. In the next section, the research question for the study is stated.

1.5   RESEARCH QUESTION

The research question of this study is: What are the factors affecting the adoption of e-commerce within the Botswana Defence Force tendering process for organisational procurement?

In endeavouring to answer the research question, the following secondary questions were asked:

1. What are the factors that affect organisational e-commerce adoption?
2. How does the context that the BDF finds itself in affect the adoption of e-commerce?
3. How can the existing BDF procurement processes, in particular, tendering be enhanced by the adoption of e-procurement?

1.6   RESEARCH OBJECTIVES

The primary goal of research is to gain knowledge. The research goal or objective is particularly important as it outlines what the researcher wishes to attain with the research. Three main goals of research, namely, descriptive, exploratory and explanatory, have been highlighted by Neuman (2003). The purpose of exploratory research is to gain a broad understanding of a phenomenon. In descriptive research the researcher observes with the intention of giving the most accurate description of the state of affairs, for example census. Explanatory research answers the 'why' question of what is being investigated (Neuman, 2003). The present research was exploratory in nature and sought to understand the factors that affect e-commerce adoption in the BDF.

The objectives of this research were:

1. To identify the benefits and limitations of e-commerce adoption

2. To identify the barriers and drivers of e-commerce adoption

3. To review the existing technological capabilities of the BDF that impinge on the adoption of e-commerce

4. To identify organisational, environmental, and economical factors that influence the adoption of e-commerce in the BDF

5. To extract a set of recommendations based on the synthesis of e-procurement theory and the BDF organisational context.

1.7   CONTRIBUTION OF RESEARCH

It was intended that the study would contribute to the literature on the adoption of innovation in developing countries and, furthermore, that understanding the factors affecting e-commerce adoption would benefit the organisation as decision makers would be enabled to formulate better strategies to enhance IT adoption in the organisation. The contribution of this research is fully defined in Chapter 6 according to Barrett and Walsham's (2004) framework for evaluating interpretive information systems (IS) research.

1.8   LIMITATIONS OF THE RESEARCH

Exploratory research uses qualitative techniques for gathering data and, in particular, interviewing techniques. This method renders a few problems or disadvantages (Neuman, 2003). Firstly, the lack of anonymity might make the interviewee reluctant to answer questions that he or she believes might lead to self-incrimination, if answered. Secondly, there might be bias due to poorly constructed questions. Thirdly, the research, in involving a case study and being limited to one organisation, defies generalisation to the entire population.

1.9   STRUCTURE OF THE THESIS

Chapter 1 introduces the thesis in a nutshell and states the research problem. It also discuses the motivation for the research, scope of the research and introduces the research methodology used to undertake the research. The research question is stated, as well as the research objectives. Finally, the contribution of the research and the limitations are presented.

Chapter 2 explores in detail the options available to undertake research related to the research questions. Justification for adopting a primarily interpretive paradigm is given and the choice of the research method is substantiated. Lastly, the choice of Grounded Theory as a data collection and analysis method is explained.

Chapter 3 is divided into two parts. This first part explores ICT infrastructure development in Botswana and in particular in the Botswana Defence Force. The second part examines the available literature on adoption of e-commerce. The definition of e-commerce is explored and the benefits and limitations of e-commerce are presented. The drivers and barriers to e-commerce adoption are also studied and factors affecting e-commerce adoption are explored. Technological, organisational and environmental factors influencing e-commerce are reviewed in particular.

Chapter 4 describes the data collection and analysis procedures used for the development of the theory. This chapter also presents the ethics of the research and how trustworthiness of the findings was achieved and concludes by presenting the major findings of the research.

Chapter 5 presents the results of the study. Data collected through interviews were analysed using the grounded theorising technique of coding. The findings are presented in the form of coding – open, axial, selective – a theoretical model

and a running story line explaining our understanding of the factors that affect e-commerce adoption. This chapter also discusses the theory in relation to literature.

Chapter 6 discusses the key findings of the research, including the implications for practitioners. It also discusses the lessons learned as well the limitations of the research. The definition of the contribution of the research is presented, as well as suggestions for the direction for feature research.

1.10 DEFINITION OF TERMS

This section defines the key terms referred to throughout this thesis to inform the reader and provide clarification of the concepts referred to.

E-commerce

Zwass (2003) defines e-commerce as: The sharing of business information, maintaining business relationships, conducting business transactions by means of telecommunications network.

Business-to-Business e-commerce (B2B)

Business-to-Business can be defined as any form of commercial transaction or structured information exchange that take place between firms within the industry value chain via an ICT-based, computer-mediated network (Moodley, 2003).

Business-to-Government e-commerce (B2G)

Business-to-Government e-commerce can be considered to be yet another type of e-commerce. For this purpose of this thesis, we subsume B2G e-commerce within the B2B e-commerce, viewing the government as simply a form of

business when it acts as a procurer of goods and /or services (Laudon & Traver, 2003: 17).

Business-to-Customer e-commerce (B2C)

The most discussed type of e-commerce is Business-to-Customer e-commerce in which online business attempts to reach individual consumers.

Customer-to-Customer e-commerce (C2C)

Customer-to-Customer e-commerce provides a way for consumers to sell to each other, with the help of online markets such as auction site e-bay. In C2C e-commerce, the consumer prepares the product for market, places the product for auction or sale, and relies on the market maker to provide catalogue, search engine, and transaction-clearing capabilities so that products can easily be displayed, discovered and paid for (Laudon & Traver, 2003:18).

Grounded Theory (GT)

Grounded theory is an inductive theory generation methodology that permits the researcher to develop concepts, ideas and theories by grounding the observation in qualitative data (Glaser & Strauss, 1967).

Open Coding

Strauss and Corbin (1998) define open coding as the analytical process through which concepts are identified and their properties and dimensions are discovered in the data.

Axial Coding

Strauss and Corbin (1998) describe axial coding as the process of relating categories to their subcategories at the level of properties and dimensions.

Selective Coding

Strauss and Corbin (1998) have described selective coding as the process of integrating and refining the theory. This is a process of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development.

Theoretical Sensitivity

Theoretical sensitivity refers "to the researcher's capacity to think about the data in theoretical terms" (Douglas, 2003) and implies having "insights, the ability to give meaning to data, the capacity to understand, and the capability to separate the pertinent from which isn't" (Strauss & Corbin, 1990: 46).

Theoretical Saturation

Strauss and Corbin (1990) speak of theoretical saturation as the point when a) "no new or relevant data seem to emerge regarding a category, b) the category is well developed in terms of its properties and dimensions demonstrating variations, and c) the relationships among categories are well established and validated" (188).

1.11 SUMMARY

The background of the thesis has been outlined in this chapter. It contains the introduction to the research problem and the research questions. Justification for the research is presented and the contribution of the research is discussed in it. Limitations of the research have also been stated. Based on this foundation, the next chapter commences a detailed description of the research approach to the study.

CHAPTER 2
RESEARCH METHODOLOGY

2.1 INTRODUCTION

The purpose of this chapter is to explore in detail the options available to undertake research related to the research questions derived in the preceding chapter. Justification for adopting a primarily qualitative, interpretive and grounded theory approach is given, and the choice for the case study method is substantiated.

The chapter is organised as follows: A description of the classification of research methods is outlined in the first section of the chapter. Then the philosophical assumptions that inform qualitative research are discussed. Next, qualitative, interpretive research in the field of information systems is examined. The chapter will proceed by outlining the chosen qualitative research approach as the appropriate research method for this study. Finally, the last sections will deal with the case study as the chosen research method and the discussion of grounded theory methodology as a data collection and analysis method.

2.2 CLASSIFICATION OF RESEARCH METHODS

Research methods can be classified in various ways. However, one of the most common distinctions is between qualitative and quantitative research methods (Myers, 2005). All data gathered within a research study reach the researcher either as words or as numbers. If the data in the study is concerned more with words than with numbers, you are working within the qualitative research paradigm.

Myers (2005) describes qualitative research as "the use of qualitative data, such as interviews, documents and participant observation data to understand and explain social phenomena". Neuman (2003) stated that "qualitative researchers are more concerned about issues of the richness, texture and feeling of raw data because their inductive approach emphasizes developing insights and generalizations out of data collected" (137). Examples of methods used in qualitative research are case study research, action research and ethnography (Myers, 2005).

Quantitative research was originally developed in the natural sciences to study phenomena. Examples of quantitative methods now well accepted in the social sciences include survey methods, laboratory experiments, formal methods and numerical methods such as mathematical modelling (Myers, 2005). Quantitative researchers are more concerned about issues of design, measurement, and sampling because their deductive approach emphasises detailed planning prior to data collection and analysis (Neuman, 2003). Table 2.1 indicates the difference between qualitative and quantitative research.

Table 2.1: Quantitative Research versus Qualitative Research

QUANTITATIVE RESEARCH	QUALITATIVE RESEARCH
Tests the hypothesis that the researcher begins with.	Captures and discovers meaning once researcher becomes immersed in the data.
Concepts are in the form of distinct variables.	Concepts are in the form of themes, motifs, generalisation and taxonomies.
Measurements are systematically created before data collection and are standardised.	Measurements are created in an *ad hoc* manner and are often specific to the individual settings or researcher.
Data are in the form of numbers from precise measurements.	Data are in the form of words and images from documents, observations, and transcripts.
Theory is largely casual and is deductive.	Theory can be casual or non-casual and is often inductive.
Procedures are standard, replication is assumed.	Research procedures are particular, and replication is very rare.
Analysis proceeds by using statistics, tables, or charts and discussing how they relate to hypothesis.	Analysis proceeds by extracting themes or generalisations from evidence and organising data to present a coherent, consistent picture.

Source: Adopted from Neuman (2003)

In this study, the qualitative research approach has been followed because of its characteristics of being "designed to help researchers to understand people and the social and cultural context within which they exist" (Myers, 2005). Qualitative research is based on three or four fundamental philosophical assumptions as to what amounts to "legitimate" research and which research methods are suitable. These fundamental philosophical assumptions are discussed in the next section.

2.3 PHILOSOPHICAL ASSUMPTIONS

All research, whether quantitative or qualitative, is based on some underlying assumptions about what constitutes valid research and which research methods are appropriate (Myers, 2005). For this study, the most pertinent philosophical assumptions are those that relate to the underlying epistemology that guides the research. Following Burrell and Morgan (1979, cited in McElwee & Atherton,

2005), the researcher chose to differentiate between methodologies that emphasise deductive or inductive perspectives. Researchers utilising an objective perspective view the social world as "if it were a hard, external, objective reality" and tend to search for universal laws to explain this reality. Researchers utilising a subjective perspective are concerned "with an understanding of the way in which the individual creates, modifies and interprets the world" and are interested in the individual explanations of their unique experiences. According to Orlikowiski and Baroudi (1991), Information Systems (IS) make use of three categories, based on the underlying research epistemology, namely positivist, interpretive and critical. These are discussed in the next sections.

2.3.1 Positivist research

Klein and Myers (1999) stated that "information system research can be classified as positivist if there is evidence of formal propositions, quantifiable measures of variables, hypothesis testing, deducing the inferences concerning the phenomena from the representative sample to a stated population" *(methodology)*. Positivists assume that the relationship between social reality and humans is independent *(epistemology)* (Myers, 2005), and objective reality is assumed, which can be systematically and rationally investigated through empirical investigation, and is driven by general casual laws that apply to social behaviour *(ontology)*.

Exclusive reliance on statistical or experimental testing of hypotheses has been soundly criticised in the social sciences (Kaplan & Duncho, 1988). The design and use of information technology in the organisation, in particular, is intrinsically embedded in social contexts, marked by time, locale, politics and culture. Neglecting these influences may reveal an incomplete picture of the information systems phenomena (Orlikowski & Baroudi, 1991). Secondly, positivist research techniques encourage deterministic explanations of phenomena, in that these

explanations emerge from interactions between the researcher and his subjects, where the researcher, by definition, dominates the relationship.

In investigating the factors that affect e-commerce adoption in an organisation is not experimental by nature and cannot be done in a laboratory. It is exploratory by nature. There are no specific hypotheses to be tested and this therefore suggests that this paradigm cannot be used.

2.3.2 Critical research

IS research, according to Klein and Myers (1999), is classified as critical if the "main task is seen as being one of social critique, whereby the restrictive and alienating conditions of the status quo are brought to light". Critical theorists assume that people can consciously act to change their social, cultural and political domination, as well as natural laws and resources. Critical research focuses on the oppositions, conflicts and contradictions in contemporary society, and seeks to be emancipatory (Myers, 2005). An example of critical research can be found in Ngwenyama and Lee (1997). This study seeks to understand phenomena and the researcher has no intentions of contradicting or critiquing the status quo. Therefore the research paradigm was not suitable for this particular study.

2.3.3 Interpretive

Following Klein and Myers (1999), the basic assumption for interpretive research is that "knowledge of reality is gained through social constructions such as language, consciousness, shared meanings, documents, tools and other artefacts" *(ontology)*. In addition to the emphasis on the socially constructed nature of reality, interpretive research acknowledges the intimate relationship between the researcher and what is being explored, and the situational constraints shaping this process *(epistemology)* (Rowlands, 2005). In terms of

methodology, interpretive research does not predefine dependent or independent variables. It does not set out to test hypotheses, but aims to produce an understanding of the social context of the phenomenon and the process whereby the phenomenon influences and is influenced by the social context *(methodology)* (Walsham, 1995b).

Using the interpretive perspective enables the researcher to increase his/her understanding of the critical, social and organisational issues related to the adoption of e-commerce in organisations and communities. The interpretive approach operates under the assumption that access to reality is only possible through social constructions such as language and shared meanings (Klein & Myers, 1999). It has its "philosophical base in hermeneutics and phenomenology" (Myers, 2005). Interpretive approaches give the research greater scope to address issues of influence and impact, and to ask questions concerning why and how particular technological trajectories are created (Orlikowski & Baroudi, 1991). Without a hypothesis to be verified or validated in trying to understand the factors that affect e-commerce adoption, the interpretive paradigm was seen to best underpin this study.

As a way of improving the quality of research conducted from the interpretive perspective, Klein and Myers (1999) proposed a set of principles derived from "anthropology, phenomenology and hermeneutics". The set of principles suggested by these authors which applies mostly to the conduct and evaluation of interpretive research of a hermeneutic nature comprises: the hermeneutic circle, contextualisation, interaction between researcher and the subjects, abstraction and generalisation, dialogical reasoning, multiple interpretations and the principle of suspicion.

Klein and Myers (1999) recommend that researchers work out for themselves how a principle and which principle may be applied in any particular situation. They also believe that the set of principles may not be applied mechanically

(Klein & Myers, 1999), since the importance and relevance of each principle is partly derived from the manner in which the others are applied to the collection. In the next section the choice of the qualitative research approach for this study is justified.

2.4   CHOICE OF QUALITATIVE RESEARCH METHOD

The aim of this research was to determine the factors that affect e-commerce adoption by the Botswana Defence Force in terms of procurement processes. In gaining understanding of e-commerce adoption in procurement processes, the researcher had to deal with people's attitudes and perceptions, the consequent actions deriving from those behavioural characteristics, as well as the contextual influence of the society within which they exist (Myers, 2005; Orlikowski & Baroudi, 1991). The researcher therefore believes that the study can be classified as qualitative.

Trauth (2001a) lists five factors influencing the choice of qualitative research methods in IS research. The first factor is the research problem; the second is the researcher's theoretical lens; the third is the degree of uncertainty surrounding the phenomena; the fourth factor influencing the choice of qualitative research method is the researcher's skills, and the last factor is the academic politics. These will be discussed in the following sections.

2.4.1 Research Problem

In her paper, Trauth argues that the research problem should influence the choice of a research methodology. That is, what one wants to learn determines how one should go about learning it (Trauth, 2001a). Rowlands (2005) extends the argument and stated that "what we want to learn will help shape the research questions posed, and the questions posed will depend on the stage of knowledge accrual about the phenomenon".

The following research questions were asked in this study:

1. What are the factors that affect organisational e-commerce adoption?
2. How does the context that the BDF finds itself in affect the adoption of e-commerce?
3. How can the existing BDF procurement processes, in particular, tendering, be enhanced by the adoption of e-procurement?

The research aim of this study was to explore the factors affecting e-commerce adoption in an organisation. The researcher identified a need for a research method enabling exploration to this problem. The researcher therefore chose an in-depth case study because of the desire to uncover the story behind the factors that affect e-commerce adoption in an organisation in a developing country. Case study has been an essential form of research in the social sciences and has been used in IS research involving e-commerce adoption (Mackay, Parent & Gemino, 2004). Yin (2003), has suggested that qualitative research in the form of a case study should be considered when the phenomena under study meet the conditions of little technical knowledge and high complexity. This certainly is the case for e-commerce adoption by an organisation in a developing country.

2.4.2 The researcher's theoretical lens

Trauth (2001a) lists the second important influence on the choice of research method as the theoretical lens that is used to frame the investigation. With "theoretical lens", Trauth is referring to "philosophical issues of epistemology and a choice among positive, interpretive and critical studies". For researchers, the starting point is to identify the philosophical and theoretical assumptions that lead to the choice of an appropriate methodology.

As mentioned before, the interpretive paradigm is based on the view that people socially and symbolically construct their own organisational realities. By adopting

an interpretive approach, the author assumed that the adoption of e-commerce is not an objective phenomenon with known properties or dimensions. The research approach accordingly was consistent and compatible with the epistemological and ontological assumption that reality is interpreted by people in the context of historical and social practices (Rowlands, 2005). By assuming subjectivity and choosing the interpretivist method of research, the study proceeded from the claim that defining the aspect under investigation (e-commerce adoption in an organisation) was complex and measuring it with standard instruments was complicated. This led to the researcher's proposed method of the interpretive case study.

2.4.3 Degree of uncertainty

The degree of uncertainty surrounding the phenomena under study is another important factor in the choice of research method (Trauth, 2001a). From a positivist perspective, the less known about a phenomenon the more difficult it is to measure. As little is known about the factors affecting e-commerce adoption in developing countries, and as the phenomenon under consideration (government organisation) was relatively unexplored and undefined, the case study approach was chosen as the appropriate methodology.

2.4.4 The researcher's skills

Deciding on which method of research to use can be a daunting task. The researcher's skills, knowledge, and experience in using qualitative research methods comprise a significant influence when deciding whether or not to employ them in IS research. In the instance of this research study, the researcher had no prior knowledge of qualitative research, so only the research question, the researcher's theoretical lens and the degree of uncertainty influenced the research choice.

2.4.5 Academic politics

This factor relates to the norms and values of the IS field, the institution at which one works and the status that one holds there, and the country in which that institution is located (Trauth, 2001a). The institution did not impose any methodological preferences with regard to this study.

For this study, the qualitative research method was chosen. Following the analysis of this method, the further choice decided on an interpretive qualitative in-depth case study. The next section elaborates on the choice of case study as the method of research.

2.5 CASE STUDY STRATEGY AS A CHOSEN RESEARCH METHOD

As a research strategy, the case study is used in many situations to contribute to the knowledge of individual, group, organisational, social, political, and related phenomena. Yin (2003: 13) defines case study as follows: "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident". Yin (2003) argues that the case study allows an investigator to retain the holistic and meaningful characteristics of real life events such as an individual life cycle organisation and managerial process and/or neighbourhood change. Benbasat, Goldstein and Mead (1987) pointed out that the case study research method is particularly suited to IS research, since the object of the discipline is the study of the information system in organisations, and interest has shifted to organisational rather than technical issues.

Case study research is the most common qualitative method used in IS (Myers, 2005), but can also be used as a method of enquiry employing positivist epistemology and ontology. A study conducted by Choudrie and Dwevedi (2005) revealed that the case study approach was widely used in examining adoption

issues at organisational level from a survey of articles published during the period 1992-2003.

The major strength of the case study is that it allows the researcher to understand the problem and the nature and complexity of the process taking place and to gain valuable insights into new topics emerging in the rapidly changing field of e-commerce (Yin, 2003). In addition, case study research can contribute to knowledge by relating findings of the particular to generalisable theory.

2.5.1 Data sources

Yin (2003) identified six primary sources of evidence for case study research. The use of each of these might require different skills from the researcher. Not all sources are essential in every case study, but the importance of multiple sources of data to the reliability of the study is well established (Yin, 2003). The six sources identified are: Documents, Archival records, Interviews, Direct observation, Participant observation and Physical artifacts.

No single source has a complete advantage over the others; rather, they complement each other and could be used in tandem. Thus, a case study should use as many sources as are relevant to the study. In this study, interviews were mainly used as sources of evidence. Table 2.2 indicates strengthens and weakness of each type.

Table 2.2: Types of case study evidence

Source of evidence	Strength	Weakness
Documentation	• Stable – repeated • Unobtrusive – exists prior to case study • Exact – names, etc • Broad coverage –extended time span	• Retrieval – difficult • Biased selectivity • Reporting bias – reflects author bias • Access – may be difficult
Archival Records	Same as above	Same as above
Interviews	• Targeted – focuses on case study topic • Insightful – provides perceived casual inferences	• Bias due to poor questions • Response bias • Incomplete recollection • Reflexivity – interviewee expresses what interviewer wants to hear
Direct observation	• Reality – covers events in real time • Contextual – covers event in context	• Time consuming • Selectivity – might miss facts • Reflexivity – observer's presence might cause change • Cost – observers need time
Participant's observation	• Same as above Insightful into cultural features	• Same as above • Bias due to investigator's action
Physical Artifacts	• Insightful into cultural features • Insightful into technical operations	• Selectivity • Availability

Source: Adopted from Yin (2003)

Data collection for this study was done through both secondary and primary sources. Primary data sources were interviews with procurement officers.

Secondary data sources mainly covered procurement processes and policies of the BDF. Valuable insight was also gained from the analysis of the research studies conducted by the National Information and Communications Technology (ICT) Policy commission on ICT in the country.

The objective of this study was to study people and their actions within an organisational context, namely the adoption of e-commerce in the tendering process of the BDF. As procurement is a human activity normally involving many participants, it is argued that it is impossible to separate the action itself from the organisation or social context in which it takes place.

As the research concerned investigating how the participants behaved and not investigating whether the participants behaved in a specific way, the study was not experimental in nature and could not be conducted in a laboratory due to its explorative nature (Hansen & Kautz, 2005). With no hypothesis to verify or validate, the author argued that data collection had to be extensive rather than just a mere search for the impact of already known factors. In this study we therefore followed this argument and proposed an extensive search of data with a number of procurement units.

Following a review of the available research methods for undertaking an interpretive study of this nature, the method chosen for data collection and analysis was grounded theory methodology, which will be discussed next.

2.6   GROUNDED THEORY METHODOLOGY

Grounded Theory (GT) or, as it was originally titled, 'The Discovery of Grounded Theory' (Glaser & Strauss, 1967) is a method for the collection and analysis of qualitative data (Hughes & Jones, 2003). GT is an inductive, theory generating methodology that permits the researcher to develop concepts, ideas and theories by grounding the observations in qualitative data (Hughes & Jones, 2003).

The two critical stages of grounded theory identified by Glaser and Strauss (1967) are that of constant comparative analysis, a procedure for the identification of conceptual categories and their properties, which may be embedded in the data, and secondly, theoretical sampling, which is a category-enriching procedure. The procedures revolve around the coding of transcripts and the development of categories, which lead to the emerging theory (Hughes & Wood-Harper, 1999).

The author chose to use grounded theory techniques in the analysis because, according to Straus and Corbin (1990), grounded theorising is well suited to capturing the interpretive experiences of the interviewee and developing theoretical propositions from them. Furthermore, the application of grounded theory is appropriate when the research focus is explanatory, contextual, and process oriented (Eisenhart, 1989).

Since the original publication by Glaser and Strauss (1967), other writings by these authors alone or with others have been published. These publications reflect differences in Glaser and Strauss's views on grounded theory (Straus & Corbin 1990, 1998). These different approaches are known as the Straussian and the Glaserian approaches (Hunter, Hari, Egbu & Kelly, 2005; Douglas, 2003; Parker & Roffey, 1999). It must be noted that other adaptations have also been developed and these are identified in Heath and Cowley (2003). The former two approaches will be discussed in the next section and the differences between the two will be highlighted. The choice of approach for this study will then be made explicit.

2.6.1 Glaserian or Straussian approach

Heath and Cowley (2003) described the difference between the two approaches as methodological, which involves different foci on induction and deduction

processes, Glaser's being an extension of the original whereas Strauss's incorporates analytical techniques. According to Strauss and Corbin (1998) "theory denotes a set of well-developed categories (e.g. themes, concepts) that are systematically interrelated through statements of relationship to form a theoretical framework that explains some relevant social, psychological, educational or other phenomenon" (15).

The Glaserian approach selects an area (or organisation or activity) for study and allows issues to emerge in the course of the research process (Parker & Roffey, 1997). The Straussian approach is more specific and prefers to identify a phenomenon or issue for study. Thus Glaser's approach to the identification and specification of the research issue is entirely dependent on the perceptions of the actors and the researcher (Douglas, 2003). Strauss and Corbin permit the researcher to predetermine the general subject of enquiry before entering the research site. Glaser also prefers an analytical method that is more general in its frame of reference (Douglas, 2003) while Strauss and Corbin "opt for a somewhat more structured set of analytical steps. Glaser regards Strauss and Corbin's analytical method as forcing issues/problems to emerge rather than allowing emergence of theory" (Parker & Roffey, 1997). In this respect, "Glaser's methodological approach relies primarily upon the constant comparison of different incidents, perceptions, relationships, and issues, with the aim of identifying inconsistencies, contradictions, gaps in the data and consensus on key concepts and relationships" (Parker & Roffey, 1997). Straus and Corbin (1990) are significantly more prescriptive in specifying the steps to be taken by the researcher in coding and analysing phenomena.

The Glaser adherent can allow the central concept to emerge inferentially from the coding process, reflecting the key issue or problem as perceived by the actors being studied. The researcher, for example, could initially inquire in terms of a firm's general management as an approach. Alternatively, following the Strauss and Corbin approach, "the researcher could elect in advance to focus

observation interviews, archival data gathering on a particular issue" such as procurement (Douglas, 2003). Coding is then oriented around this issue, and a "central concept (or code) is then sought to represent the interplay of subjects and researchers' perceptions of the nature and dimensions of the phenomena under study" (Douglas, 2003). The objective of this study was to identify the factors that affect the adoption of e-commerce in the procurement process of the BDF. Here it is clear that the researcher had already elected a particular area to focus on, which was in line with Strauss and Corbin's approach. Table 2.3 below shows the difference between Glaser's approach and that of Strauss and Corbin.

Table 2.3: A comparison of grounded theory methodology orientations: Straus and Corbin (1990) vs Glaser (1992)

Glaserian	Straussian
1. Two core questions • What is the chief concern/problem of the people in the area under study? • What category or what property of category does the concern indicate?	1. The research question is a statement that identifies the phenomenon to be studied.
2. The problem emerges and should not be forced by the methodology. Categories and their properties emerge through constant comparison from incident to incident	2. The researcher needs help with the interpretation process. Procedures and techniques need to be spelled out. Subcategories are linked to categories that denote a set of relationships (Casual, conditions, action/interactions strategies and consequences).
3. Can be difficult to operationalise	3. Easier to operationalise
4. Generates concepts and their relationship to explain and/or interpret variations in behaviour in substantive area under study	4. Generates an inductively derived theory about a phenomenon comprised of interrelated concepts
5. Produces theoretical formulations or a set of conceptual hypotheses. Testing is left to other researchers interested in such work.	5. Undertakes continual verification and testing to determine the likely validity of concepts and relationships between them

Source: Adopted from Parker & Roffey (1997)

Induction via ongoing comparison is more clearly presented in the second edition of Strauss and Corbin's (1998) book. The authors constantly maintain that the role of induction should not be over-stressed. However, rather than emphasising deduction followed by verification, they talk of validation and elaboration from further data comparisons, which ensure emergence.

Another divergence from the first edition (1990) occurs in the second edition of Strauss and Corbin (1998) when they modify their position in relation to coding and theory construction. The authors claim that a rigidly staged process was never intended in the earlier version and the stages and levels of analysis do appear less contrived. Numerous labels may result from the initial coding but the researcher is urged not to let these accumulate. Furthermore, it is suggested that the researcher will realise, during data analysis, that certain groupings are possible and that patterns will be discovered.

Despite the dichotomy between Glaser and Strauss, the grounded theory method continues to be used and is increasingly present in research literature in IS. Smit and Bryant (2000), in studying IS research projects that make use of, or refer to grounded theory, observed that there are "inconsistencies in the understanding and application of the method in IS research". These authors suggest that, "researchers should study the divergence, contemplate the purposes or expected product of the study which they plan to undertake and, based on the aforementioned, make a conscious decision about which approach to follow".

While the researcher was aware of the continuing debates concerning grounded theory methodology, this study is predominantly guided by Glaser and Strauss' original work (1967) and further expanded by Strauss and Corbin (1990, 1998). Strauss and Corbin's approach was used for the following reasons: (1) the researcher has identified a phenomenon to study in the adoption of e-commerce in the procurement processes. This indicates a predetermined general subject of inquiry even before entering the research site. (2) Strauss and Corbin opt for a

more structured set of analytical steps; and, finally, (3) the researcher could elect to focus observation, interviews and archival data gathering on a particular issue, in this case procurement in the Botswana Defence Force. The process of theory generation in the grounded theory method involves data being systematically collected through observations, interviews and meetings, and the inspection of documentation. This process will be discussed in the next section.

2.6.2 Characteristics of the grounded theory method

While grounded theory methodology has been in use for many years in the social sciences, it still has a minority status in IS research (Fernandez, 2004). Some key methodological aspects of grounded theory will be discussed in the next section.

2.6.2.1 Existing literature

Some people have interpreted the grounded theory method to involve fieldwork preceding a literature search but this is a misconception of the original premise put forward by Glaser and Strauss (1967), who encouraged researchers "to use any material bearing on the area" (Allan, 2003). Strauss and Corbin (1990) have suggested that, "a researcher does not begin a project with a preconceived theory in mind". The researcher begins with an area of study and allows the theory to emerge from the data. Theory derived from data is more likely to resemble reality than is theory derived from putting together a series of concepts based on experience or solely through speculation. However, Smith (1997), cited in Hunter, *et al* (2005), suggested that, "general reading of literature may be carried out to obtain a feel for the issues at work in the subject area, and identify any gaps to be filled using grounded theory". The researcher is therefore able to approach the subject with some background knowledge, but it is important that the reading is not too extensive, as the theories should evolve from the data itself to produce a grounded theory. The initial literature review for this study was

undertaken when the research proposal was being written in order to determine the scope, range, intent and type of research that have been conducted in the area under study.

Strauss's approach involves using the literature to identify a phenomenon. Strauss analyses the data predominately through deduction. This has been criticised by Glaser (1992, cited in Heath and Cowley 2003), who suggested that "the researcher would be making assumptions about what is in the data as opposed to what actually exists".

The other issue regarding literature reviewing in grounded theory concerns determining when the second review of the literature should occur. Strauss and Corbin (1994, cited in Hunter *et al.,* 2005) argue that "selective sampling of the second body of literature should be woven into the emerging theory during the third stage of grounded theory induction, the stage they termed concept development". However, in contrast to these arguments, Glaser (1978), cited in Hunter *et al.* (2005) asserts that, "the researcher should refrain from accessing this second body of literature until the theory has emerged from the data". Therefore, in going along with the Strauss approach, relevant literature was also obtained to name concepts during data collection and analysis.

2.6.2.2   Theoretical sensitivity

This refers to the background knowledge, experience, literature and intuition that a researcher uses to generate and compare categories while coding. Researchers need to think theoretically and conceptually, looking for the relationships between concepts in the data without forcing theory. It requires the researcher to interact continually with data collection and analysis, rather than hypothesising a predetermined "outcome" and suspending "judgement" until all data have been analysed (Parker & Roffey, 1997; Douglas, 2003). According to Strauss and Corbin (1990) "theoretical sensitivity refers to the attribute of having

insight, the ability to give meaning to data, the capacity to understand, and the capability to separate the pertinent form that which isn't (42). All this is done in conceptual rather than concrete terms. It is the theoretical sensitivity that allows one to develop a theory that is grounded, conceptually dense, and well integrated". How theoretical sensitivity was achieved in this study will be dealt with in the chapter on data collection and analysis.

2.6.2.3 Constant comparison

Constant comparison occurs during and after coding and involves going back and forth from one case or transcript to another, from one category to another to search for relationships between concepts. The main purpose of making comparisons is to generate or build a dense theory, with categories that are conceptual and abstract, and which have properties and dimensions (Straus & Corbin, 1998). The elements of grounded theory are conceptual categories and their properties, followed by hypothesis or relationships between these categories and their properties (Straus & Corbin, 1990, 1998).

2.6.2.4 Coding

Coding involves analysis and sorting of data and is the first step in theory development, with categories being the outcome. Text is examined closely, either line by line or using a whole paragraph as per Straus and Corbin (1998). Data from interview transcripts, field notes and archival records can be coded. Raw text data are grouped on paper into categories to obtain manageable units. Three types of coding are performed during the analysis: open coding, axial coding, and selective coding. It must be pointed out that these phases are performed interactively, and are described below.

2.6.2.4.i   Open coding

Open coding involves the examination of the data and assignment of codes to the concepts discovered.   While this process continues, the researcher constantly compares the concepts being examined with those that have already been coded. At this stage, the researcher is simply labelling the phenomena as they are discovered. The next step in open coding is to provisionally combine the concepts into related categories. These categories reduce the number of concepts to be handled and provide a stronger conceptual basis to the themes discovered. Glaser and Strauss (1967) describe this review process as constant comparison.

2.6.2.4.ii   Axial coding

Once open coding has been completed, the researcher can commence axial coding.   This process involves examining each category in terms of the conditions which cause it, the context in which it occurs, actions and interactional strategies by which it is managed or handled and the consequences, which arise from the category (Strauss & Corbin, 1990).   By examining these factors, it becomes possible to link categories and to verify the linkages by testing them against the data.   It is this process that enables researchers to ground their theory on the data.

2.6.2.4.iii   Selective coding

The final stage is selective coding, the most difficult part of developing a grounded theory.   Selective coding involves the interaction of categorised material into a theory that accounts for the phenomenon being researched (Strauss & Corbin, 1998).   This integration is done by selecting one of the categories as the focus of interest and making it the core category or story line against which the rest of the categories are organised. This creates a theoretical

framework, which is validated against the data. Table 2.4 shows the differences that occur in coding procedures by Glaser and Strauss.

Table 2. 4: Data analysis: Glaser and Strauss compared

	Straussian	Glaserian
Initial coding	Open coding Use of analytical technique	Substantive Coding Data dependent
Intermediate phase	Axial coding Reduction and clustering of categories (Paradigm model)	Continuous with previous phase Comparison, with focus on data, becoming more abstract, categories refitted, emerging frameworks
Final development	Selective Coding Detailed development of categories, selection of core category, integration of categories	Theoretical Refitting and refinement of categories which integrate around emerging core
Theory	Detailed and dense process fully described	Parsimony, scope and modifiability

Source: Heath and Cowley (2003)

2.6.2.5   Theoretical Sampling

Theoretical sampling refers to the method of selecting sites or participants. According to Strauss and Corbin (1990), the aim of theoretical sampling is to "sample events, incidents, and so forth that are indicative of categories, their properties, and dimensions, so that you can develop and conceptually relate them" (177). In other words it is a "process of sampling events, situations, populations, and responses, making comparisons between the samples of descriptions, and behaviours to guide the development of theory" (Parker & Roffey, 1997). It is therefore, as Straus and Corbin (1990) defined it, "sampling

on the basis of concepts that have proven theoretical relevance to the evolving theory" (176).

While data are collected, the researcher concurrently engages in analysis, looking for similarities and patterns across participants and sites. Theoretical sampling may not evolve recruiting new participants, but may involve going back to the same participants in the study. In this study, sampling was purposeful and then theoretical. This will be discussed more fully in the chapter dealing with data analysis of this thesis.

2.6.2.6   Theoretical Saturation

Glaser and Strauss (1967) viewed saturation as occurring when no additional data that enabled the researcher to develop properties of the category were collected. They stated that, "the criteria for determining saturation, then, are the combination of the empirical limits of the data, the integration and density of the theory, and the analyst's theoretical sensitivity" (61). In this study, sampling for all identified categories occurred until saturation or failure to obtain new information for all identified categories occurred.

The importance of achieving theoretical saturation was also described by Strauss and Corbin (1998) who stated that the researcher must continue to sample until (1) "no new or relevant data seem to emerge regarding a category, (2) the category is well developed in terms of its properties and dimensions demonstrating variation, and (3) the relationships among categories are well established and validated" (212).

These particular characteristics of grounded theory methodology were applied in this study. The discussion of their application will also be discussed fully in the chapter on data collection and analysis of this thesis.

2.7   SUMMARY

In this chapter, classification of research methods and the philosophical assumptions underlying the research in the field of IS were reviewed. In addition, the choice of the qualitative research method was explained. The research method chosen to undertake the research was then discussed. Grounded theory as a data collection and analysis method for this study was also discussed.

Grounded theory has been used in IS research as a method to study data from case studies. This approach has also been tested and detailed in IS research. It can therefore be concluded that the research method adopted for this thesis is a valid IS research method. In the next chapter the literature review of e-commerce adoption will be presented.

CHAPTER 3
LITERATURE REVIEW

3.1 INTRODUCTION

The commercialisation of the Internet and World Wide Web (WWW) has driven Electronic Commerce (EC) to become one of the most promising channels for inter-organisational business processes. Despite the economic downturn and the burst of the "dot-com" bubble in 2001, e-commerce is expected to continue its significant growth. However, adoption of e-commerce by organisations has not grown according to initial expectations.

Research into the adoption of e-commerce reveals that certain factors affect e-commerce adoption. Those factors that were identified to affect e-commerce adoption emerged, however, from studies conducted mainly in the developed world (primarily the Western world). Discussions in the academic literature therefore appear to be based on assumptions that do not necessarily apply to the developing world and, in particular, to Sub-Saharan Africa. Hence, understanding adoption drivers and barriers in the context of Sub-Saharan Africa becomes increasingly important. The specific objective of this study is to explore e-commerce adoption factors as they relate to an organisation in Botswana as a developing country against the background of existing and available literature on e-commerce adoption.

This chapter will be divided into two parts: the first part will present an overview of the existing Information Communication Technology (ICT) in Botswana and in particular, in the Botswana Defence Force (BDF). In the second part the focus will be on e-commerce adoption literature. The definition of e-commerce used in this study will be clarified; the benefits and limitations of e-commerce highlighted and the literature on the drivers and barriers of e-commerce will be investigated.

A conceptual model of e-commerce adoption and hypothesis based on the technological-organisational-environmental (TOE) framework from the technology innovation and information systems literature will then be developed.

3.2 PART 1: ICT INFRASTRUCTURE IN BOTSWANA

Most of the research on the adoption of e-commerce in developing countries concludes that the lack of technological infrastructure is the main barrier to e-commerce adoption (Gibbs, Kraemer & Dedrick, 2002; Molla & Licker, 2005). A telecommunication infrastructure is essential for the development and spread of e-commerce, particularly with the shift from closed, privately owned systems to the Internet (Hempel & Kwong, 2001). Thus it has become a key priority for developing countries to ensure that their citizens have access to the Internet at a reasonable price.

The government of Botswana has committed itself to developing a National Information and Communication Technology (ICT) policy that will build on recent government initiatives (for example, Community Access Centres (CAC), Government Online, e-Health Botswana) and assist in achieving Vision 2016 (Presidential Task Force, 1997). Vision 2016 is a statement of long-term goals that identifies the challenges implied by those goals, and it proposes a set of strategies that will meet these challenges. The purpose of the national ICT Policy is, firstly, the creation of an enabling environment for the growth of an ICT industry in Botswana; secondly, the provision of a service and access to information and communication facilities in the country; and lastly, making Botswana a regional ICT hub so as to make the country's ICT sector globally competitive. In keeping with Vision 2016, it is anticipated that the national ICT Policy will position Botswana for sustained growth in the digital age by serving as a key catalyst in achieving social, economic, political and cultural transformation within the country (Maitlamo, 2005).

Botswana's current level of e-readiness is a contrast of extremes (Maitlamo, 2005). On the positive side it is already an active participant in the global information society and is ranked 55th in the world by the World Economic Forum (WEF) in terms of overall national connectivity. This is an indication of competitive aspects of ICT diffusion and the need to swiftly implement formal connectivity programmes (Maitlamo, 2005). The country has also invested heavily in infrastructure and telecommunications and is ranked 28th in the world (according to the WEF) in terms of overall infrastructure quality. It has a high penetration of fibre connectivity running to the urban areas and a sophisticated Government Data Network (GDN) delivering connectivity to all government departments and agencies via high-speed Internet and satellite links. The country has good internal coverage by optical fibre. It has routes running from the capital Gaborone to Francistown in the north east of the country and to Maun and Kasane near the Victoria Falls in the north of the country, a distance of approximately one thousand five hundred kilometres. On the telecommunications front, a Botswana Telecommunication Authority (BTA) study indicated that 31% (556 000) of the population were using mobile phones in 2004 (Maitlamo, 2005).

On the negative side, there is considerable disparity in terms of rural and urban access to information and services in Botswana. The majority of urban centres are relatively well supplied with radio, television, telephone and Internet access but the picture is significantly different in remote and rural areas, where even access to telephones and newspapers is problematic. The 2001 Census and the 2004 World Economic Forum Global IT Report (WEFGITR) both indicate computer ownership and Internet usage levels to be between three and five percent of the population. This is thought to be primarily due to prohibitive cost and limited access.

A survey of Botswana's ICT marketplace, completed in November 2004, suggests that annual expenditure on ICT hardware, software and support

services was close to $160 million, which is 3.5% (2004) of the Gross Domestic Product (GDP). This is a strong indication that organisations see great value in ICT. However, there is still significant potential for Botswana's public and private sectors to make better use of ICT as a productivity and efficiency enhancement tool.

Currently there are only modest levels of business-to-business (B2B) and business-to-customer (B2C) e-commerce transactions. Some of the traditional sectors such as mining, and more sophisticated sectors such as the financial services, make more use of ICTs and electronic business transactions than smaller industries. There is, however, a complaint that telecommunications services are inadequate, and this could become a barrier to additional business opportunities (Maitlamo, 2005).

In 2001 the Botswana Defence Force (BDF) implemented a local area network (LAN) in all its major camps and a wide area network (WAN) to link all its major units, was also implemented. The organisation has over 600 computers with licensed Microsoft operating systems and purchases around 150 computers annually. In its attempt to improve efficiency in logistics, a Logistics Information Management System (LIMS) was implemented in 2002. In 2005 the government introduced the Government Accounting and Budgeting System (GABS) into its departments, including the BDF.

Apart from the GABS and LIMS systems there are little other established ICT initiatives. The BDF accesses the Internet through the GDN. The Internet is mainly used as an information and communication tool to obtain information about products. It is not being used to engage in business transactions with suppliers. The organisation had no website and no plans to develop one at the time of this study.

To summarise, the context of the organisation under investigation can be described as lacking widespread ICT infrastructure, but with Internet connectivity available at the key locations. Within the framework of government ICT policy initiatives and increasing ICT infrastructure investments, it can be concluded that the technological preparedness of the BDF for e-commerce is more than adequate. The case study was therefore developed around the non-technological aspects of e-commerce readiness such as the readiness of people and the organisational culture in the BDF. The research approach was therefore designed to investigate these softer issues.

3.3 PART 2: LITERATURE REVIEW

3.3.1 E-commerce definition

There are many definitions of e-commerce in the literature (Laudon & Traver, 2003; De Klerk & Kroon, 2005) but in its broadest terms, e-commerce can be referred to as "the sharing of business information, maintaining business relationships, and conducting transactions by means of telecommunications networks" (Zwass, 2003). E-commerce "is not only limited to buying and selling over the Internet but it is also concerned with the transferring or exchanging of products/services and/or information via computer networks including Internet, Extranet and Intranet (Turban, King, Lee & Viehland, 2006). According to Turban *et al.* (2006), e-commerce, "includes activities such as servicing customers online, collaborating with business partners and exchanging business documents within the organisation over the Internet or other private networks".

According to Kalakota and Whinston (1997), from a communications perspective, e-commerce is the delivery of information, products/services or payments via telephone lines, computer networks or any other electronic means. From a business process perspective, e-commerce is the application of technology toward the automation of business transactions and workflows. From a service

perspective, e-commerce is a tool that addresses the desire of firms, consumers and management to cut service costs while improving quality of goods and increasing the speed of service delivery. From the online perspective, e-commerce provides the capacity of buying and selling products and information via the Internet and other online services. This thesis adopts this wider definition of e-commerce.

From the above definition, then, e-commerce includes the sell-buy relationships and transactions between companies, as well as the corporate processes that support commerce within individual firms. Therefore this definition encompasses the theme of this study, which is: "understanding factors that affect e-commerce adoption in the procurement process of the BDF". The procurement process includes exchanging business documents within the organisation over the Internet, as well as selling and buying using the Internet. E-commerce has further been classified according to different types of business transaction and this will be discussed in the next section.

3.3.2 Classification of e-commerce

Based on the parties involved in the business transaction, e-commerce can be classified into many different types (Laudon & Traver, 2003). These are described as follows: (1) Business-to-Customer (B2C) e-commerce refers to online business attempts to reach the individual. This is the most commonly discussed type of e-commerce. Even though it is comparatively small, it has grown exponentially since 1995 (Laudon & Traver, 2003) and examples are Amazon.com and Kalahari.com. (2) In Business-to-Business (B2B) e-commerce, the business focuses on selling to other businesses. This is the largest form of e-commerce. (3) Customer-to-Customer (C2C) e-commerce provides for consumers to sell to each other with the help of an online market such as e-bay. According to Turban *et al.* (2004), "auctions and classified ads are the major ways which C2C e-commerce is conducted on the Internet". (4) Another type of

e-commerce is Government-to-Business (G2B) e-commerce, which enables government to buy and sell goods and services and also to improve services to its business partners.

In this study, Laudon and Traver's (2003) view will be adopted by subsuming B2G e-commerce within the B2B e-commerce and viewing government as simply a form of business when it acts as the procurer of goods/and or services. Since the electronic tendering system e-commerce model uses B2B with a reserve auction mechanism, the rest of this thesis will focus on B2B e-commerce.

3.3.3 B2B e-commerce

There seems to be no standard definition of B2B e-commerce in the literature and this is confirmed by Moodley (2002) and Thatcher and Foster (2003). In its broadest terms, B2B e-commerce is defined as "any form of commercial transaction or structured information exchange that takes place between firms within the value chains via an ICT-based, computer mediated network" (Moodley, 2002). For the purpose of this study, this definition will be used as a starting point.

Turban *et al.* (2004) have classified five business models that arose in response to business pressure which are currently found in e-commerce as being: 1) Name-your-own-price; this model allows the buyer to state that he or she is willing to pay for a specific product or service. 2) Bidding using reverse auctions; in this model the buyer indicates a desire to receive bids on a particular item and would-be sellers bid on the job. This is a very common model and most government entities are mandating electronic bidding as the only way to sell to them. 3) Affiliate marketing is an arrangement in which marketing partners place a 'banners ad' for a company on their web site. 4) In Group purchasing, companies typically pay less per unit when buying more units. Using the concept of group purchasing where the purchase orders of many buyers are aggregated,

a small business or even an individual can get a discount. 5) E-market places: these are markets in which buyers and sellers negotiate online. They introduce operating efficiencies to trading, and well managed E-market places can provide benefits to both buyers and sellers.   Other older models were: e-shops, e-procurement, e-malls, e-auctions, virtual communities, collaboration platforms, third-party market space, value-chain integrators, and information brokerages. Each of these models has a different functional characteristic resulting in a different model being applicable or suitable to a particular industry, market or situation (Ng, 2005).   The following section discusses the potential benefits of e-commerce and how these benefits are realised in the context of developing countries.

3.3.4 E-commerce benefits

Piris, Fitzgerald and Serrano (2004) have pointed out that different motivators and benefits from e-commerce can be found in the literature. These authors indicated that there are clear differences between reasons observed in the 1990s and more recent studies. This is due to a clear change in the perception of e-commerce from the 90s as the Internet then was perceived to be a solution able to produce large benefits, giving the opportunity to reach clients more effectively than ever before. The perception today is to critically view e-commerce and some commentators maintain that the Internet is just an additional channel of communication.

The major reason for companies, irrespective of size, to participate in business is to extract some benefit from it.   E-commerce is no different.   The benefits of e-commerce identified from the literature are shown in Table 3.1 below.

Table 3.1: E-commerce benefits

Benefits to Supplier	Benefits to Seller
Expanded access to trading partners and market reach	Expanded access to trading partners and support services
Increased marketing and sales profile	Enhanced supplier relationships (contact and service)
Enhanced customer contact and service	Lower purchasing prices through improved price transparency and comparison
Reduced costs of sales, technical documentation, and customer service costs	Reduced operating costs and maverick spending
Reduced transaction handling / processing cost	Reduced procurement costs
Reduced working capital and inventory requirements	Improved sourcing and procurement process
Competitive advantages through improved efficiencies and process planning	Improved efficiencies and transaction flow, visibility

Source: (Moodley, 2003)

However, there is no reliable evidence of benefits realisation and little evidence of quantification of the potential benefits in developing country contexts to date. A study by Molla (2005), exploring the real benefits of e-commerce based on ninety-two businesses in South Africa, indicates that "e-commerce benefits are by large limited to intra- and inter-organisational communications". The study further posits that "strategic benefits such as improving relationships across the value chain, increasing market reach, and reducing market costs, operation and supply chain management costs are not widely found as the standard model of e-commerce would believe". Despite potential benefits, e-commerce has some limitations that slow its growth and acceptance and these will be discussed in the next section.

3.3.5 Limitation of e-commerce

To extract benefits from e-commerce, it is important for business to overcome the e-commerce inhibitors and challenges. E-commerce challenges identified from the literature are classified as technological, managerial and business related and are summarised and are presented in Table 3.2 below.

Table 3.2: Limitations of e-commerce

Limitations	Research Literature
Technological limitations	
Security Website issues	Turban et al, 2006 Rainer, Turban & Potter, 2004, Turban *et al.*, 2006
Other issues including training, infrastructure	Turban *et al.*, 2006, Rainer *et al.*, 2005
Managerial limitations	
People and organisational issues Obtaining senior management backing	Turban *et al.*, 2006 Iacovou, Benbasat & Dexter, 1995
Business limitations	
Customer service	Turban *et al.*, 2006
Customer's old habits	Rotchanakitumnuai & Speece, 2003
Legal issues	Turban *et al.*, 2006, Rainer *et al.*, 2005

An understanding of these limitations can assist an organisation to implement e-commerce more efficiently, as the discussion of e-commerce adoption drivers will show.

3.3.6 E-commerce drivers

According to Gibbs *et al.* (2002), drivers of e-commerce are those factors that "propel e-commerce growth, whereas enablers facilitate growth". Literature on innovation adoption and IS adoption have identified various drivers and enablers

of adoption. Table 3.3 provides a summary of the potential e-commerce drivers identified in the literature.

Table 3.3: E-commerce potential drivers

Potential Drivers	Research/ literature
Customer demands	Brousseau & Chaves, 2005, Crook & Kumar, 1998
Pressure from major competitors	Brousseau & Chaves, 2005, Mehrtens, Gragg & Mills, 2001, Crook & Kumar, 1998
Request from suppliers	Brousseau & Chaves, 2005
Request from Government for public procurement	Brousseau & Chaves, 2005, Tung & Rieck, 2006
Incentives provided by government	Brousseau & Chaves, 2005
The need to reduce cost	Brousseau & Chaves, 2005, Turban *et al.*, 2000, Crook & Kumar, 1998
Expand market for existing products/service	Brousseau & Chaves, 2005
Improve coordination between supplier and customer	Brousseau & Chaves, 2005, Crook & Kumar, 1998

For the organisation to implement e-commerce it must overcome some barriers and inhibitors to the uptake of e-commerce and these barriers and inhibitors are presented next.

3.3.7 E-commerce barriers

According to Gibbs *et al.* (2002), barriers prevent or limit growth whereas inhibitors slow down growth. Table 3.4 summarises barriers and inhibitors to e-commerce adoption which have been identified from literature.

Table 3.4: E-commerce potential barriers

Potential barriers	Research/literature
Need for face-to-face interaction	Brousseau & Chaves, 2005
Concern about privacy of data or security issues	Brousseau & Chaves, 2005, Timmers, 1999
Customers not using the technology	Brousseau & Chaves, 2005; Iacovou et al., 1995; Crook & Kumar, 1998
Difficulty in finding staff with e-commerce expertise	Brousseau & Chaves, 2005; Chircu & Kauffman, 2000; Thong, 1999
Costs of implementing e-commerce site	Brousseau & Chaves, 2005
Required organisational changes	Brousseau & Chaves, 2005
Low ability to use the Internet as part of a business strategy	Brousseau & Chaves, 2005; Zhu & Kraemer, 2002
Costs of Internet access	Brousseau & Chaves, 2005; Rainer et al., 2005
Business laws that do not support e-commerce	Brousseau & Chaves, 2005; Rotchanakitumnuai & Speece, 2003
The taxation of Internet sites	Brousseau & Chaves, 2005
Inadequate legal protection for Internet purchases	Brousseau & Chaves, 2005; Rainer et al., 2005

Even though there are numerous barriers to e-commerce adoption, organisations are still plunging ahead with e-commerce. Therefore organisations need to understand the barriers to their process of adopting technologies

3.4   ORGANISATIONAL ADOPTION OF TECHNOLOGIES

To study the adoption of general technological innovation, Tornatzky and Fleischer (1990, cited in Zhu et al. 2003), developed the technology-organisation-environmental (TOE) framework, "which identified three aspects of a firm's context that influence the process by which it adopts and implements technological innovation: organisational context, technological context and environmental context". Zhu et al. (2003) define organisational context by using

several descriptive measures, namely "firm size; the centralisation, formalisation, and complexity of its managerial structure; the quality of its human resources; and the amount of slack resources available internally". Technological context is described as "both the internal and external technologies relevant to the firm" (Zhu *et al.*, 2003). This includes technologies inside the firm, as well as the pool of technologies in the market. Environmental context, according to Tornatzky and Fleischer (1990, cited in Troshani & Doolin, 2005), "constitutes the arena in which adopting organisations conduct their business, and it includes the industry, competitors, regulations, and relationship with government." Zhu *et al.* (2004) point out that these three groups of contextual factors influence a firm's intent to adopt an innovation, and they affect the assimilation process and eventually the impact of the innovation on organisational performance.

Zakareya, Zahir and Sarmad (2004) studied the literature on adoption of IT innovations and identified that "the study of ICT innovation in a complex context like the public sector organisation requires factors such as external environment, the nature of the technology in the organisation, and the capabilities of the organisation". These authors noted that these factors are similar to the TOE framework. In addition, it has been found and is indicated in the literature (Kioses, Pramatari & Doukidis, 2006; Zhu *et al.*, 2003; Iacovou *et al.*, 1995; Kaun & Chau, 2001) that the TOE framework has a "theoretical basis of IS adoption, empirically tested, and is a useful starting point for understanding the adoption of technology innovations which can apply to any type of organisation". Based on the above, this study will focus on these three contexts of the TOE framework to identify the factors that affect e-commerce adoption in the Botswana Defence Force procurement process as a complex public organisation. These factors will now be identified from the literature.

3.4.1 E-commerce adoption factors

A significant part of the studied literature deals with identifying the factors affecting e-commerce adoption. Following from the TOE framework, Iacovou *et al.* (1995) formulated a small business-focused EDI-adoption model framework to investigate the factors that influence the adoption of EDI and tested its validity in seven SMEs in differing industries. The factors that were examined and found to be the main reasons for EDI adoption are the: technological factor (perceived benefits); organisational factor (organisational readiness); and environmental factor (external pressure). In a similar study, Kaun and Chau (2001), using the TOE framework, proposed a perception-based small business EDI adoption model for examining the factors affecting the adoption decision and tested it using a large sample (575) of small firms in Hong Kong. The model incorporated six factors as EDI adoption predictors: Technology factors (perceived direct benefits, perceived indirect benefits), Organisational factors (perceived financial cost, perceived technical competencies); and Environmental factors (perceived industry pressure, perceived government pressure).

In order to develop an integrated model of IS adoption in SMEs, Thong (1999) has used "theories from the technological innovation literature" to develop an integrated model of IS adoption in small businesses. This study specified four contextual variables as primary determinants of IS adoption. The four groups of variables are CEO, IS, organisational characteristics, and environmental characteristics.

Other researchers have identified a variety of factors that affect the adoption of e-commerce in organisations. Grandon and Pearson (2004), in a study concerning electronic commerce adoption in small and medium US businesses in the context of the technology acceptance model, found four factors that influence this adoption: (1) organisational readiness; (2) external pressure; (3) perceived ease of use; and (4) perceived usefulness. To assess organisational readiness, they

used "existing technological infrastructure and top management's enthusiasm to adopt e-commerce". To assess external pressure they used items like competition, social factors, and dependency on other firms already using e-commerce, the industry, and the government. Perceived ease of use and perceived usefulness were measured using a modified Davids' instrument. These authors also identified the perceived strategic value of electronic commerce on the part of managers as being crucial to having a positive attitude towards its adoption.

Zakareya *et al.* (2004) have pointed out that "many innovations studies have discussed the IT adoption to the perspective of the acceptance of and adoption of technology by individual-level such as consumers, user, and households (e.g Technology Acceptance Model)", whereas "not much has been done to study the adoption of ICT innovations that affect the entire organisation level, in terms of computing infrastructure, management process, management support, organisational structure, and external pressure". These authors argue that the studies by Iacovou *et al.* (1995), Thong (1999) and Kau and Chau (2001), even though they identify factors that influence adoption of IT, have been applied in small organisations which do not comprehensively address the different characteristics at organisational level.

In view of the above, some of the most prominent studies that address complex technological innovations, namely Zhu *et al.*, 2003; Hong and Zhu, 2005; Troshani and Doolin, 2005 and Kim and Galliers, 2004, will be examined.

Zhu *et al.* (2003) "developed a conceptual model for studying the adoption of electronic business at the firm level, incorporating six adoption facilitators and inhibitors, based on the technology-organisational-environment theoretical model". This model demonstrated four findings:

- Technology competence, firm scope and size, consumer readiness, and competitive pressure are significant adoption drivers, while lack of trading partner readiness is a significant adoption inhibitor.

- As e-business-intensity increases, two environmental factors, consumer readiness and lack of trading partner readiness, become less important, while competitive pressure remains significant.

- In high e-business-intensity countries, e-business is no longer a phenomenon dominated by large firms; as more firms engage in e-business, network affect works to the advantage of small firms.

- Firms are more cautious in adopting e-business in high intensity countries, which could suggest that the more informed firms are less aggressive in adopting e-business, a somewhat surprising result.

Hong and Zhu (2005) studied two ways in which firms move to the Internet: e-commerce adoption and e-commerce migration. The authors were interested in examining the importance of technology-related factors and obstacles associated with applying the technology. Their study demonstrated that "technology integration, web functionalities, web spending, and partner usage were significant adoption predictors". Furthermore, "the migration model demonstrated that web functionalities, web spending, and integration of externally oriented inter organisational systems tend to be most influential drivers in firms migration towards e-commerce, while firm size, partner usage, EDI usage, and perceived obstacles were found to negatively affect e-commerce migration". According to these authors, this suggests that "large firms, as well as those that have been relying on outsourcing or EDI, tended to be slow to migrate to the Internet platform".

In the literature on innovation adoption, several environmental factors that could influence adoption decisions are identified (Troshani & Doolin, 2005). These authors, in their study of the drivers and inhibitors impacting on technology adoption in Australia, used the TOE framework to investigate the experience with

eXtensible Business Reporting Language (XBRL). The study concluded: "current members of the XBRL community are waiting for a critical mass of either users or solutions to appear" (Troshani & Doolin, 2005). Cultural dimensions, according to Rotchanakitumnuai and Speece (2003), could also have a strong impact on the adoption of an innovation. Furthermore, these authors indicate that legal issues, including privacy protection and authentication, are other major concerns likely to arise when innovations are associated with the Internet.

Other researchers have identified organisational factors that could influence the adoption of innovation. Del Aguila-Obra and Padilla-Melendez (2006) in their study of Spanish businesses that already have Internet technologies, established that, "the size of the company does not have any effect on the availability of Internet technologies but the size does have an effect on the managerial capabilities". Rotchanakitumnuai and Speece (2003) also pointed out, in their study of barriers to Internet banking adoption among corporate customers in Thailand, that "management attitudes as well as their perceived benefits are of primary importance to innovation adoption". According to these researchers, negative attitudes have a possible consequence of failure to allocate necessary resources, which becomes a barrier to innovation adoption. In another study of the organisational factors affecting innovation adoption, Bruque-Camara, Vargas-Sanchez and Hernandez-Ortizi (2004) conducted a study of organisational determinants of IT adoption in the pharmaceutical distribution sector in Spain, to propose new organisational factors that might explain the difference in the extent and speed of IT adoption. These authors identified "frank and fluid communication between departments and members of the organisation, low level of conflict, the explicit support of top management towards IT adoption and learning and creative skills of IT staff" as factors that explain IT adoption.

Kim and Galliers (2004) have proposed a theoretical model of Internet technology diffusion among companies, with four groups of factors: (1) External market factors – Internet business, Global electronic markets, Dynamic market;

(2) External technical factors – Interactivity, Connectivity, Feasibility; (3) Internal organisational factors – Lower cost structure, near-zero inventory, high quality customer service; (4) Internal systems factors – secure payment system, order fulfilment system, shipping information system. Table 3.5 summarises some of the factors that have been identified in literature relevant to e-commerce adoption.

Table 3.5: Summary of organisational, technological and environmental factors

Organisational context factors	Technological context factors	Environmental context factors
Management attitudes	IT expertise	External pressure
Communication	Technological integration	Government pressure
Low level of conflict	Web functionalities	Legal issues
IT skills	Perceived relative advantage	Partner usage
IT user community	Interactivity, connectivity and visibility	Competitor pressure
Culture of the organisation	Perceived benefits	Nature of industry
Firm size and Scope	Secure payment system	

Although specific factors identified within the three contexts may vary across different studies, the TOE framework has consistent empirical support. Thus, according to Zhu *et al.* (2002), these "empirical evidences combined with literature review and theoretical perspectives" discussed earlier, clearly indicate that "the TOE framework is appropriate for studying e-commerce adoption because e-commerce is enabled by technological developments of the Internet, driven by organisational factors such as firm scope, and size, and influenced by environmental factors related to business partners as well as government pressures". We therefore adopted this theoretical framework. The next section discusses the conceptual model.

3.5 CONCEPTUAL MODEL FOR E-COMMERCE ADOPTION

Based on the TOE framework discussed above, the author proposed a conceptual model for e-commerce adoption as illustrated in Figure 3.1. The conceptual model consisted of six adoption predictors which will be discussed in the next section.

Figure 3.1: Conceptual Model for e-commerce adoption
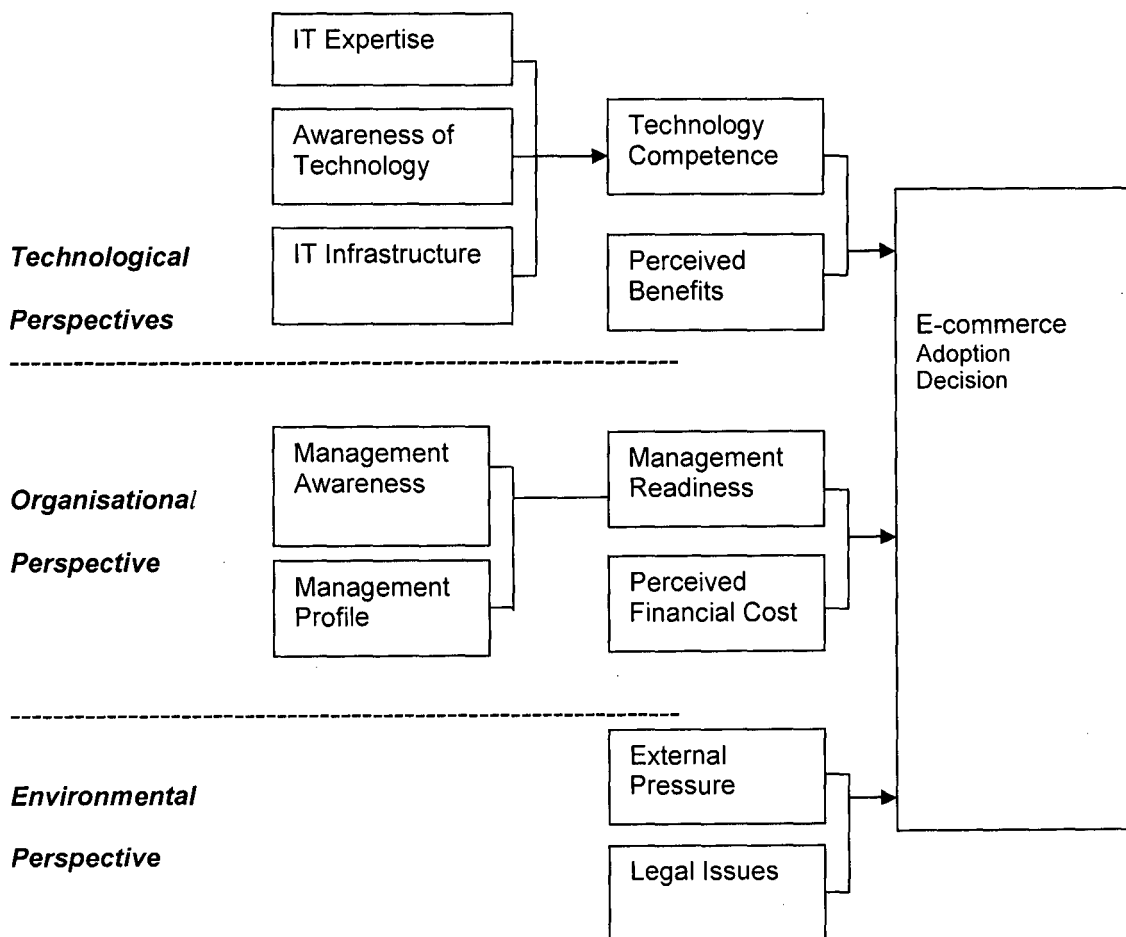
Source: Adapted from (Tung & Rieck, 2005: Zhu *et al*, 2003)

3.5.1 Technological context

Experts in the field are in agreement that implementation of e-commerce requires a substantial degree of technical competency for maintaining Information and Communication technologies, integrating distributed systems and providing necessary applications to ensure smooth and efficient adoption within an organisation (Zakareya *et al.*, 2004; Crook & Kumar, 2001; and Kuan & Chau, 2001). In this study, technological competence contains three sub constructs – IT infrastructure, IT expertise, and awareness of the technology. According to Zhu *et al.* (2003), technological competence constitutes both physical assets and intangible resources which are more likely to generate a competitive advantage for innovators since skills and knowledge are complementary to physical assets. Therefore Zhu *et al.* (2003) are of the opinion that one would expect firms with higher levels of technological competence to be more likely to adopt e-commerce.

Chwelos, Benbasat and Dexter (2001) and Kaun and Tan (2001) explain perceived benefits to be the anticipated advantages that an innovation, in this case e-commerce, could provide to the organisation. Perceived benefits from the adoption of e-commerce may serve as one of the main explanatory factors for the adoption. Tung and Rieck (2005) support this when asserting that "receptivity towards e-government services comes about when the new system is perceived as more beneficial than the paper-based system it supersedes, hence offering relative advantage to the agents of the organisation". The benefits of e-commerce identified in the beginning of the chapter are expected to provide relative advantages such as faster transmission of data, reduction in errors, reduced procurement cost and operating costs.

3.5.2 Organisational context

Internal organisational factors play an important role in the adoption of any innovation and therefore it will also influence the adoption of e-commerce applications. According to Rotchanakitumnai and Speece (2003), management's attitude towards innovation could be a decisive factor in the adoption process. The degree to which management is willing and prepared to provide facilitating conditions to adopt e-commerce is termed "management readiness" in this study of the model of Tung and Rieck, (2005).

Management readiness encapsulates two sub factors: management awareness, and management profile. Management profile refers to the capabilities that management itself has developed to understand and support a technological change to achieve organisational objectives. Another important 'facilitating condition', according to Tung and Rieck (2005), for the adoption of new technologies, concerns the importance that management gives to cost-reducing measures and hence to their willingness to employ new technologies in order to achieve cost reductions.

3.5.3 Environmental context

The literature on innovation adoption identifies several environmental factors that could influence adoption decisions. Environment factors are external to the organisation and they could vary due to pressure or encouragement with regard to recommendations.

External pressure, legal issues, competition, consumer expectations have all been major factors influencing the adoption of IT innovation. E-commerce adoption in the BDF may be influenced by environmental factors derived from the actions of other organisations and business. External pressure relates to the

efforts of government agencies or trading partners to encourage or coerce the adoption of e-commerce.

Legal issues are also included in the conceptual model to deal with the influences from a lack of proper legal support. Using the case of Internet banking among corporate customers in Thailand, Rotchanakitumnai and Speece (2003) argue that "legal issues, including privacy protection and authentication are the other major concerns likely to arise when innovations are associated with the Internet". The lack of legal support may become a barrier to e-commerce adoption. This study therefore posits that:

The above model was formulated on the basis of the literature review. In the model, the three perspectives of the Tung and Rieck (2005) and Zhu *et al.* (2003) studies are adapted for the context of this study.

3.6 SUMMARY

This chapter has presented the background information about the ICT infrastructure in Botswana and, in particular, in the Botswana Defence Force. The benefits of e-commerce and its limitations were discussed, as well as the drivers and barriers of e-commerce adoption. A comprehensive literature review was undertaken and this has served two major purposes. Firstly, it gave the researcher a better understanding of the issues involved when considering the adoption of e-commerce in an organisation. Secondly, it has enabled the researcher to derive a conceptual model that explains the relationships between the various constructs that the literature has identified. In the next chapter the description of the data collection and analysis will be presented and discussed.

CHAPTER 4

DATA COLLECTION AND ANALYSIS

4.1   INTRODUCTION

Chapter 3 highlighted the factors that affect e-commerce adoption that were identified in the literature. These factors appear to have been studied mostly from the perspective of the developed world. The current study focuses on these factors as they pertain to an organisation in a developing country.

Chapter 2 presented the rationale for using a qualitative methodology and, more importantly, the choice of the grounded theory methodology used for data collection and analysis for this study. This chapter will describe how the grounded theory methodology was applied in the study. The chapter will also cover ethical considerations and data collection methods. In addition, the procedure undertaken to ensure the trustworthiness, credibility, and transferability of the findings will be presented. Finally, the chapter will conclude with an overview of the study's major findings.

4.2   RESEARCH SETTING

The study was conducted in the Botswana Defence Force (BDF) procurement units. These units are responsible for the procurement of material stores for maintenance of equipment and associated equipment. The BDF also has a Directorate of Material Acquisition and Planning, the department responsible for procurement of all major equipment in the BDF.

In the year 2003, the Deputy Chief of Staff Defence Logistics Command promulgated what he termed "the tendering guidelines for the procuring entities in the BDF". The aim was to "ensure that high standards of professionalism,

transparency, and accountability" were maintained. In this document, the BDF tendering procedures were outlined, and a defence procurement flowchart, presented as Appendix A, was developed from this. In order to shorten the cycle of procurement and make the flowchart processes visible, the adoption of IT in the procurement process was required.

4.2.1 Selection of Participants

The researcher previously worked as a procurement officer in one of the procuring units of the BDF and during that time he had also encouraged the adoption of IT in the procurement process. This background experience helped the author to decide who to recruit, and how to ethically involve the participants.

The participants were selected by virtue of their positions as procurement officers. Although these members are highly skilled in terms of procurement, many showed a lack of knowledge of e-commerce. Knowledge of e-commerce was not a requirement to be a participant.

4.3   SELECTIVE AND THEORETICAL SAMPLING

Theoretical sampling refers to a data collection process which aims to create theory, which further means that coding and analysing serve as data collection in the next phase. When theoretical sampling is used, data collection is started by concentrating on the social processes that inherently appear to be the most interesting. After preliminary data collection and analysis, the sampling can be made more selective, because preliminary hypotheses which describe the phenomenon emerge from the data and promote further data collection. Selective/purposeful sampling involves "a calculated decision to sample a specific locale according to a preconceived but reasonable initial set of dimensions" (Cutcliffe, 2000) whereas, theoretical sampling has no such initial calculated decisions.

In this study sampling was more selective/purposeful than theoretical. Initially it was envisaged that all procurement officers of the Botswana Defence Force would be interviewed. As the interviews progressed and were transcribed, some questions started to arise from the data. For example, after interviewing six procurement officers questions arose about the possible data that could be illuminated by the IT personnel. The senior IT officer and his senior engineer were then interviewed. This gave rise to possible input from the BDF Tender committee's chairman and he was also interviewed. These participants were therefore purposefully selected.

Later in the study, during the analysis, other questions arose and additional data were collected by re-interviewing some participants. These participants were selected on the basis of theoretical sampling in order to fill in the gaps emerging from the analysis of the data.

Theoretical sampling is a feature of grounded theory where decisions about recruitment are made as the research progresses, rather than being predetermined (Glaser & Strauss, 1967; Strauss & Corbin, 1998). The phenomena under investigation were broadly identified at the beginning of a study, and the initial sample was planned. Subsequently, participants were recruited to help discover variations among concepts and exhaust categories.

4.4 THE ROLE OF LITERATURE

It is well documented that, when utilising the grounded theory method, the researcher should avoid conducting a literature review prior to the commencement of data collection and analysis (Strauss & Corbin, 1990). However, in this study, an initial literature review was undertaken when the research proposal was being written in order to determine the scope, range, intent, and type of research that had been conducted in the area under

investigation. During analysis of the data, a second review of the literature was conducted in order to build on the concepts. This is in line with Strauss and Corbin (1994) who argue that selective sampling of the second body of literature should be woven into the emerging theory during the third stage of grounded theory induction, the stage they call "concept development". The problem is that previous knowledge may direct the research and make it more difficult to find a new point of view. This requires bracketing, which means that "the researcher must identify and suspend what she/he already knows about the experience being studied and approach the data without preconceptions" (Backman & Kyngas, 1999).

The study involved an extensive literature review to gain sensitivity for the theory and to examine the degree to which the emergent theory fits reality. The preliminary review of the literature found little prior research on e-commerce adoption in the context of developing countries. Information technology is changing rapidly and exponential growth of the use of the Internet and the development of electronic commerce are relatively recent phenomena. Printed material soon becomes comparatively obsolete in an environment of this nature. Much of the relevant literature therefore is in the form of journals and conference papers.

Throughout the collection and analysis of the literature, the researcher remained aware of the purpose of the literature in grounded theory development. Literature plays a different role in grounded theory compared to the more traditional research methodologies. The literature serves as a source of data (Strauss & Corbin, 1998). It is important for researchers to maintain a sceptical and cautious attitude towards the literature to prevent premature acceptance of concepts or ordering of concepts that are not fully embedded in the data.

4.5 THE RESEARCHER'S BIAS

As a researcher, personal beliefs and values are reflected not only in the choice of the methodology and interpretations and findings but also in the choice of the research topic. In other words, what we belief in determines what we want to learn. The traditional positivist research paradigm has taught us to believe that what we are studying often has no personal significance or that the only reason driving our research is intellectual curiosity. But more often than not we have our personal beliefs and views about a topic either in support of one side of the argument, or on the social, cultural, political sub-text that seems to guide the development of the argument.

Historical position, social class, race, gender, religion, etc., all these factors interact and influence, limit and constrain production of knowledge. In other words, who the researcher is to a large extent determines what he wants to study. For example in this study the choice of the research topic was largely influenced by the researcher's academic background as a telecommunications engineer and his experience as a procurement officer. The researcher had eighteen years of work experience in the Botswana Defence Force with six of them as a procurement officer and four as an IT officer. In those years the researcher had gained a lot of experience in procurement processes and was instrumental in the computerisation of procurement processes. Based on this experience, the researcher had clearly formed an opinion on what is expected of IT adoption.

Being a member of the organisation also introduced some bias. Because the participants saw the researcher as a peer and knew that he was knowledgeable about procurement and computerisation in the organisation, they felt confident that the researcher understood what they meant when they talked about e-commerce adoption and their experiences. As a result, participants did not have to explain their opinions and experiences as thoroughly as they would to an

outsider. Similarly, the researcher did not probe the interviewees and did not ask them to explain as much as he could have because there was a perceived sense of understanding what was said and meant.

The researcher experienced some dissatisfaction with the interviewing that was undertaken. He used structured questions which sacrificed the richness of the feedback. Much more useful information could have been gathered with the use of more intuitive methods such as conversation and unstructured interviews.

4.5.1 Bracketing the researcher's bias

To bracket the bias, the researcher must identify and suspend what he/she knows about the experience being studied and approach the data without preconceptions (Backman & Kyngas, 1999). This could be particularly difficult for a novice researcher, because he/she has little experience of the emotions involved with data collection and analysis in qualitative research. However, it has also been said, from the grounded theory perspective, that the researcher is a social being who also creates social process. Therefore previous experiences are also data (Straus & Corbin, 1998).

In this study, the researcher listed some questions in an attempt to lay open the issue of potential bias.

1. What do you believe in, not as a researcher but as a human being? Do you think it is possible to be totally unbiased about the topic and to have no opinions one way or another?
2. How does the researcher keep out of the way when researching a topic that is of personal significance?
3. How could the researcher possibly expect to exert no influence?

Having remained conscious throughout the research process of the effect of potential bias, the researcher believes that adequate protection has been taken against unwanted bias.

4.6 THEORETICAL SENSITIVITY

All the above questions were useful in developing the researcher's theoretical sensitivity. Throughout this study, these questions were reflected on to determine how they impacted on data analysis. According to Glaser and Strauss (1967), theoretical sensitivity is developed in researchers over a period of time and they claim that this has two major characteristics: "first, it involves his personal temperamental bent. Secondly, it involves the sociologist's ability to have theoretical insight into his area of research, combined with an ability to make something of his insights" (46). Strauss and Corbin (1990) elaborate further that theoretical sensitivity refers to "the attribute of having insight, the ability to give meaning to the data, the capacity to understand, and capability to separate the pertinent from that which isn't" (42).

Glaser and Strauss (1967) imply that the virtual process of completing a grounded theory study increases the researcher's theoretical sensitivity. However, this process may be hampered if the researcher focuses on preconceived theory. Strauss and Corbin (1990) further support this notion, claiming that "we have to challenge our assumptions, delve beneath our experience, and look beyond the literature if we are to uncover phenomena and arrive at new theoretical formulations" (76). In this study, theoretical sensitivity was increased through self-awareness and acknowledging prior knowledge accumulated over many years as a procurement officer and as an IT officer. In addition, time was spent reflecting on the researcher's own assumptions about e-commerce adoption.

The researcher's ability to recognise assumptions or preconceived ideas concerning the object under investigation is a strength and leads to a more rigorous development of the study. Firstly, the researcher's knowledge in the area was detailed. For example, when writing the research proposal, the researcher was familiar with the literature on e-commerce adoption. The literature highlighted some of the organisational, environmental, and technological factors that affect e-commerce adoption in an organisation. In noting these pre-established ideas, the researcher also observed that the majority of studies undertaken in the field of e-commerce adoption used quantitative methodologies and these studies, which formed the basis of the researcher's preconceived ideas, therefore had not fully explored e-commerce adoption, particularly in developing countries.

Secondly, the researcher's experience during the implementation of the logistics information management system and the implementation of the wide area network and local area network gave the him sufficient exposure to IT adoption in an organisation. Therefore the researcher expected that the factors which were prevalent during those times would still emerge.

Finally, an article detailing the experiences of the researcher was submitted to various peer reviewed conferences during the course of this study, and the reviewers' feedback provided valuable insight into the use of the methodology. Even though the paper was not accepted by the South African Institute of Computer Science and Information Technology (SAICSIT) the reviewer's feedback was appreciated. Finally, the paper was admitted for presentation to *Quality and Impact of Qualitative Research* (Qualt2006) in Australia. In addition, regular meetings with the supervisor provided further mentorship and guidance in this area. Data collection for this research study will be discussed in the next section.

4.7   DATA COLLECTION

This section describes the methods used for data collection. Interviews were the primary source of information, and these were aided by documents and physical artifacts (availability of computers with access to the Internet). Sources of data were selected with the aid of theoretical sampling discussed earlier in the chapter.

Initially, a letter (Appendix B) outlining the proposed study and requesting permission to conduct the study was sent to the Commander, Botswana Defence Force via the office of the Embassy of Botswana, Pretoria, South Africa in the month of November 2005. Approval (Appendix C) was granted in January 2006 and a memorandum requesting all procurement entities to assist the researcher was circulated during the same period. Data collection, which was undertaken during the month of February 2006, took approximately one month.

Data were collected within a certain time period. This posed serious problems. If the data are collected at a certain time and not analysed simultaneously, it becomes difficult to determine the theoretical shape and recognise the saturation. Simultaneous collection and analysis of data and the emergent theoretical structure help to find key words and key persons, to outline the research phenomenon and to organise the process in an attempt to control the study. It was realised during data analysis that some further data analysis was required and this necessitated follow-up interviews.

The follow-up interviews commenced on the seventh of August 2006. Four procurement officers and one IT officer were interviewed.

4.7.1 Interviews

Ten participants from the same organisation were interviewed. These interviewees included seven senior procurement officers from procurement entities of the BDF, two senior IT specialists from the IT department, and one senior tender committee member who had knowledge of both IT and procurement. All the interviewees were involved to some extent in procurement.

The selection of the interviewees was based on purposeful sampling, limited by availability and time constraints. The decision to interview procurement officers was based on the belief that they had extensive knowledge of procurement.

Interview questions were open-ended and the interviews were structured with the aim of permitting the participants freedom in their responses and to avoid the imposition of a premature diagnostic structure on the research data (Strauss & Corbin, 1990). The full set of questions is attached as Appendix D.

An interview guide consisting of nineteen questions was developed. The guide was devised and prepared by means of the relevant literature within the field of e-commerce adoption. Although this was a departure from grounded theory methodology, other researchers have argued that the work of earlier investigations should also be taken into account (Hughes & Jones, 2003; Allan, 2003; Strauss & Corbin, 1998). This is in line with interpretive case study practices (Walsham, 1995). The reason for going back to the existing literature was to prepare the interview guide on which the interviews in the organisation were based.

The interviews were conducted in the respondents' offices. The researcher first made an appointment with the respondent to arrange a time for the interview to be conducted.

All interviews were recorded on a digital voice recorder. The recorded interviews were transcribed verbatim by the researcher himself, providing a full interview text. The written transcripts of the interviews were handed to the respondents and they had the option to approve and edit it. Before completing each interview, permission was sought from participants to contact them again to clarify or follow up on information given during the initial interview, if needed.

Due to the nature of the organisation, some respondents were reluctant to be tape-recorded, as they feared victimisation. In order to encourage openness, the respondents were assured of confidentiality and anonymity at the start of every interview. The majority of the respondents ultimately agreed to be tape-recorded. No recording was done during the follow-up interviews; the researcher noted down major concepts discussed by the participants.

As mentioned above, there were ten interviews, all conducted within a period of one month. The majority of the interviews lasted approximately one hour. Only one interview lasted for thirty-five minutes. The researcher was the only one participating in all the interviews. This was beneficial in the process of ensuring the accuracy, similarity and completeness of the data.

To enhance the validity of the answers, summaries of the major findings of each interview were verified by the participants after the end of each interview session. The following is an excerpt of a summary of the findings written immediately after the end of the interview.

> *I: Sir, you have indicated that the BDF has not made investment on e-commerce but rather they have invested in IT generally. You also mentioned that you do not think the BDF is technically able to maintain its infrastructure due to shortage of manpower and the level of training of its manpower.*

You also mentioned that the BDF is currently making use of electronic communication especially the officer cadre. You indicated that computers can enhance the relationship with clients and suppliers in terms of quicker payments using GABS which will actually improve relationships.

You showed your understanding of the B2B e-commerce and you went on to give the benefits of and the limitations of e-commerce. You also indicated that there could be some barriers to e-commerce adoption and cited lack of education as one and non-availability of infrastructure as the other. You are also of the belief that the BDF is thinking in lines of e-commerce since the government body which is controlling tenders is already going towards that direction. You mentioned that the BDF is partly using e-commerce because their tenders are already being published on the Internet.

You have given what you think are the benefits of using B2B e-commerce in the day to day processes of the BDF and you have indicated what you think are the external benefits. Thinking about B2B e-commerce obstacles you indicated that there might be some obstacles in terms of people being negative if they are not well trained. You also mentioned the financial implications to the BDF and that the business environment will also have to procure the infrastructure themselves as well.

Thank you, Sir (23/02/06)

During the follow-up interviews another set of interview questions was prepared. The set of question is attached as Appendix E. The guide was prepared by means of the categories which emerged during the analysis and which seemed to be less well developed. Tape recordings were not made during this phase and the researcher tried to capture what the interviewee said. No new concepts or categories seemed to emerge from these interviews, suggesting that theoretical saturation had been accomplished.

4.7.2 Documents

To supplement the interviews, documents obtained from the case organisation were studied. These studies gave the researcher an opportunity to supplement the interview guide during the interviews. Documents on tendering procedures – for example, guidelines for tendering – prompted the researcher to ask specific questions which were relevant to the case organisation during interviews. The examination of these documents also assisted the researcher in understanding respondents during interviews and to relate to the procedures in the tendering process. The documents also assisted the researcher in asking probing questions when interviewing the participants.

4.7.3 Field notes

During and following the interview process, information pertaining to relevant observations that were made was documented by the researcher. The focus of this information included the environmental setting and verbal and non-verbal communication that occurred during the interview, for example, the level of eye contact or the participant's tone of voice. In addition, if the procurement officers were well vested within the procurement processes, their impressions of the current procurement processes were noted. The researcher, for example, noted the following during an interview with one of the participants.

06/02/06: Participant three

The interview with participant three was very interesting. He seemed to be very passionate about adoption of e-commerce in the procurement. He even suggested EDI which clearly shows his knowledge about e-commerce technology. The participant seemed to be honest about his answers. He also has demonstrated a good knowledge of the BDF procurement processes.

4.7.4 Physical artifacts

The availability of computers in the organisation was noted. All offices that were visited had at least one computer and most of the computers had Internet access. Fax and telephone communication were still the predominantly used forms of communication. This helped the researcher to ask probing questions relating to the availability of infrastructure and access to the Internet.

4.8 ETHICAL CONSIDERATIONS

As the objects of inquiry in interviews are human beings, a researcher must take extreme care to avoid any harm to them (Fontana & Frey, 2000). Traditionally, ethical concerns revolve around the topics of informed consent, right to privacy and protection from harm.

Informed consent is the process by which the subjects of the research are informed that they are the subjects of the research and the topic of the research is explained (Christian, 2000). The process is often managed by means of a written statement, which the research participants sign. In this research, this was

deemed unnecessary. Instead, a memorandum signed by the highest authority was circulated to all procuring units to inform them about the research. All procuring entities were requested to provide full support to the researcher and all were informed that participation in the research was voluntary. Although this arrangement was deemed to be more appropriate for the organisation, the researcher, nevertheless, informed the participants that their participation in the research had to be voluntary. During the interview, participants were asked for their permission to tape record the interviews and, participants gave their consent by verbal agreement. The transcripts were forwarded to the participants by e-mail for modification and correction. All participants had the opportunity to review the transcripts.

Right to privacy refers to steps being taken to safeguard and secure the privacy and identities of research participants (Christians, 2000; Mouton, 2001). In this research, respondents' identities were protected by referring to them by way of their positions in the organisation and not by name. The interviews were conducted in their closed offices and all transcribed interviews were forwarded to them under their personal e-mail accounts. Some of the participants returned the transcripts with some changes, while others did not return them at all. The confidentiality of the organisation was not protected, as this was not deemed necessary by the organisation itself.

In order to conduct research like this, gaining the trust of the participants is paramount. As the researcher was a member of the organisation, gaining the trust of the participants was not a problem. He was regarded as a total insider and therefore gained the full trust of the participants. They were always ready to meet with the author and discuss the topic. In the process of gaining access to respondents, it was clearly stipulated that the research findings would be made available to the organisation on completion of the research, which the author is willing to do.

In this study, protection from harm was not a problem. The research was conducted in an organisation with a strong code of conduct and the researcher was well known to all participants. A matter of concern, however, was the degree of researcher involvement with the group under study as that created the possibility of influencing the objectivity of the research.

4.9   DATA ANALYSIS

This section describes the process of examining categories and then interpreting data from the interviews. The reader is reminded that analysis occurred after the completion of the first round of interviews. Interviews were conducted one interview per day to allow the researcher to transcribe the interview and no analysis was performed during that period. This is a departure from grounded theory methodology, in which data collection and analysis should occur at the same time. This abnormally influenced the grounded theorising process as theoretical sampling could not be conducted after each interview and initial interviews could not inform later interviews. This process necessitated the process of conducting follow-up interviews, where theoretical sampling was used. However, the data was managed and analysed as follows:

4.9.1 Data management

The first aim of the qualitative data analysis was to reduce the large volume of text data into manageable units. This process is sometimes described as data reduction or data management. In the current study, each interview resulted in approximately ten pages of transcribed text, which, when multiplied by the total number of interviews, resulted in approximately one hundred pages of data. To manage such a large volume of data, a good management system is required. Therefore, after each interview had been transcribed and edited, the documents were imported into a Microsoft Excel spreadsheet for preparation for coding. This process will be discussed later in this chapter.

4.9.2 Computer- assisted analysis

Computer-assisted analysis refers to the facilitation, coding, indexing and sorting of data. Analysis has traditionally been managed manually, for example, by employing a 'cut and paste' method.   This method involves cutting up photocopied transcripts and putting text relating to each category in a separate folder, envelope or paper bag. Computers make the management of such data less onerous, particularly when large numbers of interviews are involved. The process of making comparisons between cases also becomes less onerous than when searching manually.

Goulding (1999) however pointed out that there is still some debate "regarding the use of computers in the analysis of qualitative material, particularly with the growing number of software packages designed to handle such unstructured sources of data" (for example NU.DSIT, Atlas.ti, NVIVO and many others). Proponents of software tools for computer qualitative data analysis (CQDA) suggest that qualitative researchers are experiencing increasing pressure to incorporate the use of computers in the analysis of their data, largely because computers are less concerned with emotional experiences and more concerned with structure, which equates to credibility in the eyes of many. Nonetheless, Goulding (1999) suggests that "an over-reliance on computer-aided analysis minimises the personal experiences of the researcher, the process, and the situational factors which serve to add depth, rather than detract from emerging developments".

In this study, the manual paper-based, cut-and-paste method was employed due to unavailability of the software package and lack of training in the use of such software packages. Initially, concepts were identified and text from the interview transcripts that relate to those concepts were cut and pasted under those concepts. Coding of interviews were done line by line during the first interviews and then through paragraphs as the analysis continued. Concepts were written

in the left hand margin of the transcript text and were later transported to manila paper with respondents' text pasted below. These concepts were later imported to Microsoft Excel 2003 in order to perform constant comparison between cases. This process will be described below.

4.9.3 Coding procedures

Interview transcripts were analysed using the constant comparative method (Glaser & Strauss, 1967). By the time open coding began, the researcher had been exposed to each interview about four times: first during the interview itself; the second time during replay prior to transcription; the third time during transcription as the researcher did his own transcribing; and the fourth after the transcriptions were sent back to the participants for editing, which many did not bother to edit or add to.

4.9.3.1 Open coding

Open coding was the first stage of the data analysis (Glaser & Strauss, 1967; Strauss & Corbin, 1998) and this involved "breaking down, examining, comparing, conceptualizing and categorizing data" (Strauss & Corbin, 1998). This involved carefully examining the data, selecting phrases, words, or stories that, taken individually, contained a single unit of meaning. For this study, open coding involved reading the interview transcript and making line by line notations in the margin. These notations picked up key words or phrases, such as: *The BDF has not made any investment in e-commerce.* Some notations comprised a single word while others were phrases or short sentences. This coding was manual, with handwritten notes being made in a wide right hand margin on the transcript. See Appendix F of the thesis.

The following excerpt (Figure 4.1) from an interview shows what the participant said, with relevant phrases underlined. Open coding is shown in the right hand

column, with codes in bold print. In the interest of preserving confidentiality, some "header" information in the following excerpt has been removed.

Figure 4.1: Interview excerpt showing open coding

State of e-commerce in the tendering process of the BDF

- Date:06/02/06
- Setting: one-to-one
- Date of transcription: 09/02/06

Acronyms

I: Interviewer

R: Respondent

Transcription	Open coding
I: *What IT/e-commerce investment has the BDF made so far?*	
R: *There has not been any e-commerce investment in the BDF. Nothing in e-commerce.*	**IT investment**
I: *Let's talk about IT in general.*	
R: *For IT we have LIMS which is used to manage spare parts, and maintenance of vehicles in MER. It is a database and*	**Software availability**
engineers at MER use it to store their records.	**Intensity of use**
For that we have a network covering six sites at 128Kps.	**Connectivity**
Secondly we have GABS used for payments of clients and suppliers.	**Software availability**
What is happening is that all departments are connected to Ministry of Finance of course via DTI. Payments were previously done manually but now they are done electronically.	**Connectivity**
Basically we are using oracle database and GABS (P2, question 1)	**Software availability**

As shown in Figure 4.1, above, the researcher chose to transcribe the tape recordings completely, which meant that both the researcher's questions and the respondent's answers were visible. This enabled the researcher to compare the individual statements with the context in which they took place and consequently to see which question or part of the conversation had led to which answer. Each interview transcript was numbered in order to identify the transcript from which the code came.

At the start, comparative analysis was conducted within each interview (Boeije, 2002). At this stage, every passage of the interview was studied to determine what exactly had been said and to label each passage with an adequate code. By comparing different parts of the interview, the consistency of the interview as a whole was examined. The aim of this internal comparison in the context of open coding was to develop categories and to label them with the most appropriate codes. Some of the names for the codes are the actual words or phrases used by the participants and these are known as *in vivo* (Glaser, 1978, cited in Strauss & Corbin, 1998).

The codes were then written up from the transcripts into code notes or a type of memo to ensure consistency in applying these codes to subsequent interview transcripts. Throughout the analysis, the researcher was comparing ideas or grouping ideas together under common headings so that similar ideas were given the same name. Once particular ideas in the area were identified, the researcher was able to apply the same code to similar ideas and thus reduce the number of codes he had to work with.

After grouping the codes together, the researcher used manila paper and labelled all categories, with their codes written below each theme. Codes from individual participants were listed under these categories and every code was numbered as per transcript number in order to indicate from which transcript it came. Quotations from individual participants were "cut and pasted" under each

code to indicate its source. The visual recording of codes allowed the researcher to identify the source of statements and simultaneously to view all statements in one place, which subsequently made it easier to find relationships between the different respondents' responses.

After the third interview, the charts had become populated with codes and categories and the comparison therefore was between interviews. A total of ten charts with about twenty-eight categories were created on manila paper. All new interviews conducted were treated as described above. The first six interviews were used to explore how procurement officers view the adoption of e-commerce in the procurement processes and to obtain a variety of research subjects. Once more, information had been obtained from four more transcripts that were analysed in order to answer the questions raised by the process of comparison.

On the basis of the codes, the researcher proceeded with an interactive process and created a range of categories under which the researcher could fit the different meanings behind the codes. At this stage, the researcher imported the entire transcripts, the codes and the identified categories into Microsoft Excel 2003, in order to navigate between transcripts, codes and categories to identify their properties and dimensions. The eleven categories and their properties shown in Table 4.1 were discovered after employing open coding.

Table 4.1: Categories, properties and dimensions

Category	Property	Dimensions
Internal Pressure	Intensity of work	Low – high
	Internet demand	Low – high
External pressure	Government	Low – high
	Changing of procurement	Stable – changeable
IS staff	Support	Lacking – absolute
	Skill level	Able – incompetent
	Manpower	Shortage – abundant
IT infrastructure	LAN and WAN availability	Limited – wide spread
	Investment in computers	Small – large
	Internet connectivity	Local – wide
	Software availability	Limited – widespread
IT use	Intensity	Low – high
Organisational characteristics	Decision making	Centralised – de-centralised
	Size	Small – large
	Secrecy	High – low
	Culture	Change – resistance to change
	IT investment	Low - high
	Technological ability	Able – incompetent
User characteristics	Knowledge	Low – high
	Resistant to change	High - low
	Attitude	Negative - positive
Security	Concern	Low – high
Top management characteristics	Awareness	Lacking – possesses
	Support	Lacking – absolute
	Resistance to change	High - low
	Decisions	Known – unknown
Benefits	Communication	Fast– slow
	Transparency	Increased – reduced
	Costs	Low – high
	Relationships	Enhanced – deteriorated
	Supplier base	Increased – decreased
	Paper work	Reduced - increased
Cost	Implementation cost	High – low
	Training cost	High – low

The process of open coding allows for the development of not only the code names, but also the properties and dimensions of the data which will form the basis for determining relationships between codes at the axial level with the identification of categories (Strauss & Corbin, 1990).

4.9.3.2   Axial coding

The next stage in the grounded theory process is to apply axial coding whereby the data, which have been "broken up" during the open coding process, are put back together in new ways by making connections between the codes (Strauss & Corbin, 1998; 1990). Categories listed in Table 4.1 were more clearly defined in terms of their properties and dimensions, and the relationship between categories was established.

In order to make such connections, the open codes must be linked to the context in which they appear in the interview/transcription (What was the interviewee talking about?); to the consequences (What did the interviewee think would happen as a result of this?); to the patterns of interaction (How does what the interviewee is saying link with other views?) and to causes (Why is this happening?). A coding paradigm involving conditions, actions and interactions, and consequences actualises this process.

The focus of axial coding is to create a model that details the specific conditions that give rise to a phenomenon's occurrence (Brown *et al.*, 2002). This is what Strauss and Corbin (1990, 1998) term the paradigm model. This paradigm model develops the categories further (that is, beyond their properties and dimensions) by specifying the relationships between each category and its sub-categories. As pointed out by the Strauss and Corbin (1998), the paradigm model (Figure 4.2) enables the researcher to think systematically about the data.

Figure 4.2: The paradigm model

Causal conditions ⇒ Phenomenon ⇒ Context

Action/interaction strategies ⇐ Intervening conditions

Consequences
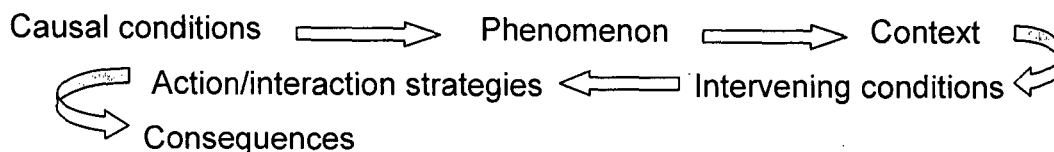
In the paradigm model the incidents or events that lead to the occurrence of the phenomenon are referred to as the *causal conditions*. *Phenomenon* represents the central idea or event. *Context* refers to specific properties of a phenomenon and also to a series of particular conditions that affect the action/interaction strategies. *Intervening conditions* can influence by facilitating or constraining the action/interaction strategies in a particular context. *Action/ interaction* strategies refer to the ways in which the phenomenon is managed, handled, carried out and responded to, in a certain context and under specific conditions. *Consequences* are the outcomes.

In analysing the data at the axial level, the researcher remained aware of the actual words used by the participants to describe their experiences while at the same time employing conceptual thinking in order to translate, define and interpret the data (Strauss & Corbin, 1998). It is a complex process in which the researcher must be cognizant of both what participants are talking about and why they describe what is happening in the way they do. This process will be explained in detail in the chapter on results and their analysis, of this thesis.

4.9.3.3   Selective coding

According to Strauss and Corbin (1990), selective coding, the last coding process in grounded theory methodology, elaborates on the relationship between categories, with the aim of determining a core category. Strauss and Corbin (1990) suggest a number of questions, the answers to which would indicate the identity of the core category, which integrates all other categories at the highest level of abstraction. They are in all the interviews or observations: What seems

to be the main story line, the pattern or theme the researcher sees happening over and over again? What category do all other categories seem to be pointing to or leading up to? Which category seems to be of a higher level of abstraction than the others are? Which category could others be subsumed under? The findings of this thesis will be explained in the next chapter.

4.10 TRUSTWORTHINESS

In the qualitative research paradigm, the concept of trustworthiness refers "to a conceptual soundness from which the value of the research can be judged" (Marshall & Rossman, 1995, cited in Brown, Stevenson, Troiano & Scneider,, 2002). This soundness is likened to a quantitative form of reliability and validity. However, the concepts of reliability and validity are inappropriate in grounded theory. Consequently, a more detailed and elaborate record of research process is required than might be expected for quantitative studies (Strauss & Corbin, 1998). A number of strategies are used to establish trustworthiness of qualitative research, including triangulation; prolonged engagement of the researcher in the field; researcher's background; member checking; and the use of member negative or deviant cases.

4.10.1 Triangulation

This refers to an approach to data collection in which evidence is deliberately sought from multiple sources but aimed at corroborating the same fact or phenomenon (Yin, 2003). The primary aim of triangulation is to enhance validity and reduce bias. In this study, the researcher believes construct validity has been adequately addressed. Firstly, multiple sources of information were used (Yin, 2003), while interviews constituted the primary source of information (some of the informants provided supporting documents like the BDF tendering process document). In addition, the researcher identified some physical artifacts like computer availability in the respondents' offices and their accessibility to some of

the applications used by the organisation. Secondly, the interviews were not only confined to the procurement offices but also included the IT officers and therefore would provide different perspectives. Data could be corroborated and compared across participants within and across cases.

4.10.2 The Researcher's background

Researchers who use interpretive methodology recognise that their own background can affect the credibility of a study (Strauss and Corbin, 1998). For example, it matters whether a researcher has special 'inside' knowledge and insights or, on the contrary, comes to the study as an 'outsider' with no prior knowledge or prejudices about a group. There are arguments for and against each. Insiders have the advantage of gaining easy access to participants through people they know and past associations with members of the group. These relationships can also work against a researcher and limit access to participants. Conversely, outsiders may take longer to recruit their sample and to become familiar with the culture, the language of a group, political issues and the like. While a researcher's gender, age, expertise or ethnic identity can limit or enhance study outcomes, the reality is that most researchers work with what they have, or with the resources they have in hand.

In the present study, the researcher was a member of the organisation, which was a distinct advantage in gaining access and identifying respondents. The researcher had a degree in telecommunication engineering. The researcher had worked as a procurement officer and an IT officer in the organisation and was instrumental in the computerisation of the organisation. The significance of exploring this area came about when the researcher read research findings about IT adoption in organisations which suggested that there are some organisational, environmental, and technological issues which can affect the adoption of an innovation. Due to the fact that the logistics information management system (LIMS) was not fully utilised in the organisation, the

researcher's perspective in commencing the study was to try and uncover the issues around IT adoption in the Botswana Defence Force.

4.10.3 Peer checking

To enhance the validity of the answers, summaries of the major findings were verified by the participants after each interview session. Furthermore, structured interview guides were used for all interviews to ensure consistency and reliability.

Lastly, the final strategy that was employed for checking the applied research methodology in this study was presenting the research design to professional peers at international conferences. The paper was presented at QualIT 2006 in November 2006. Feedback from reviewers had already been received and was incorporated in the thesis.

4.11 SUMMARY

The focus of this chapter has been to describe the specific methods used for data collection and analysis. The study was undertaken in the Botswana Defence Force, Botswana, and involved seven participants from the procurement entities, two from the IT department, and the chairman of the Botswana Defence Force committee.

Within this study, congruent with the grounded theory approach, theoretical sampling, theoretical sensitivity, the role of literature, constant comparison, researcher's bias and how this was bracketed, ethical consideration, as well as trustworthiness, have been discussed. The subsequent chapter explains the findings from the data, together with the eleven major categories that were identified.

CHAPTER 5

RESULTS AND ANALYSIS OF RESULTS

5.1   INTRODUCTION

The previous chapter described the method of collection and analysis of data and gave a brief description of the major findings of this study. In this chapter the application of the three coding processes to ultimately develop a substantive theory will be discussed. The coding processes will be discussed sequentially, but the process in practice was interactive.

As discussed in Chapter 4, there are three types of coding processes: open, axial, and selective coding. Open coding was used for the analysis of the data. This entailed labelling and categorising phenomena as indicated by the data. Axial coding is a set of procedures through which data is put back together in new ways after open coding. This is done by making connections between categories, using the coding paradigm involving conditions, context, actions strategies and consequences. Selective coding was used to choose the core category and formulate a story line.

This chapter is organised as follows: open coding will be discussed, followed by axial coding and, lastly, selective coding. To continue the discussion, the pictorial theoretical model and the theory as a story line will then be presented. Lastly, the discussion of the theory in relation to e-commerce literature will follow.

5.2   OPEN CODING

During open coding a total of 30 concepts were identified, as shown in Table 4.1 in Chapter 4. These were grouped into 11 major categories. The source of the concepts and their dimensions are shown in the following excerpts. For instance,

P3, 2 before the quote refers to participant number 3, question 2. The detailed interview transcripts are contained in a separate document to preserve the anonymity of the respondents. Some of the concepts have been explained to clarify the context in which they were said.

5.2.1 IT Infrastructure

All participants pointed to the availability of IT infrastructure in the organisation. In all instances they indicated that the organisation has invested in a local area network and wide area network, Internet accessibility and software availability, and that computers are purchased every year. The following excerpts conceptualise this theme very well.

P1, 1: A wide area and local area network were implemented in 2001. Computer and computer peripherals are purchased every year.... ***(Connectivity)***

P2, 1: For IT we have LIMS which is used to manage spare parts for maintenance of vehicles. It is a database and engineers at MER use it to store their records. For that we have a network covering six sites at 128Kps. Secondly we have GABS used for payments of suppliers.... ***(Software availability)***

P2, 1: For that we have a network covering six sites at 128Kps. ***(Connectivity)***

P6, 1: In general the BDF has invested much in IT. There is good IT infrastructure that the BDF has invested on.... ***(Investment in IT)***

P3, 2: There are servers and PCs and there is a WAN and LAN connectivity.... ***(Investment in IT)***

P1, 2: The Internet is being accessed through GDN ***(Internet access)***

5.2.2 IT Use

IT use emerged as the other theme during open coding. Most of the participants felt that, even though there is availability of IT infrastructure, it is not being effectively utilised in the organisation:

*P5, 3: These are relatively new ways of communication and do not think have yet found home here, we still use old ways of communication **(Intensity use)**.*

*P3, 3: The BDF has servers running on windows 2003. They are not being used to communicate both internally and externally…. **(Intensity of use)***

*P4, 3: Internet is available it is not being utilized…. **(Intensity of use)***

*P9, 3: I would say the system is there but the people are not using it to communicate…. **(Intensity of use)***

5.2.3 Organisational Characteristics

Most of the interviewed participants felt organisational characteristics played an important role in the adoption of e-commerce. The concepts of culture, size, IT investment, secrecy, decision making, as well as technical ability of the organisation were extracted from the following sources.

*P4. 3: …. then there is no way that change could be effected in bureaucratic organisation like the BDF….**(Decision making)***

Decision making here refers to the hierarchical level that has authority to make decisions. When top management makes decisions, the organisation is centralised.

*P2, 4: .... but the organisation is large....(**Size**)*

Size refers to the number of people in the organisation

*P6, 1: In general the BDF has invested much in IT (**IT investment**)*

*P4, 4: Sometimes we are dealing with classified information.... (**Secrecy**)*

*P5, 13: .... and may be the BDF has this thing about secrecy....(**Secrecy**)*

Secrecy here refers to the level of information security that the organisation expects from its employees.

*P5, 2: We are technically as good as any one in the market.... (**Technological ability**)*

*P3, 2: The BDF is ready technically as an organisation to be able to make use of e-commerce in terms of hardware and software. There are servers and PC'S and there is a LAN and WAN connectivity in all its major camps (**Technological ability**)*

Technological ability refers to the amount of IT infrastructure the organisation possesses.

*P8, 4: Culturally in the BDF we are not into IT we are still operating manually.... (**Culture**)*

Organisational culture here refers to the values, attributes, beliefs and behaviours that represent an organisation's working environment, organisation objectives and vision

5.2.4 User Characteristics

Another theme that emerged from the interviews was user characteristics. Concepts for this theme, extracted from the following quotes, were identified as knowledge, resistance to change, attitudes and skills levels.

*P6, 8: May be the negative characteristics that I have in mind is because people might feel negative about it because they do not know it (**Attitude**)*

*P6, 10: ....I think firstly there will be negative perceptions because people won't understand what the technology is all about.... (**Knowledge**)*

*P2, 10: .... Yes people will be drawn to e-commerce if they understand that they will have access to global markets.... (**Knowledge**)*

*P3, 16 :.... users may be reluctant to change....(**Resistance to change**)*

*P4, 10: People are always resistant to change.... (**Resistance to change**)*

*P9, 17: I think the major problem will be culture. For the people to change to new technologies, it's a problem. People like to stick to what they are used to doing.... (**Resistance to change**)*

Resistance to change is a phenomenon that hinders the process at its beginning or its development, aiming to keep the current situation.

*P10, 2: It is not ready in the sense that even if the hardware and software is available the people are not ready the level of computer literacy is low (**Skill**)*

5.2.5. Top Management Characteristics

Another theme that emerged from the interviews concerned top management characteristics. The following excerpts indicate sources of concepts such as involvement, support, awareness, resistance to change, as well as decisions on e-commerce adoption.

*P4, 10: I am of the feeling that for new technologies to be adopted top management involvement is vital…. (**Involvement**)*

*P1, 2: I do not understand why top management is not using IT but I think is only because they do not want to change…. (**Resistance to change**)*

*P3, 10: I think the main barrier to e-commerce adoption is lack of awareness of top management, which leads to lack of support in terms of budget allocation. (**Awareness**)*

*P3, 16: Management reluctance to change to new technologies may be an obstacle and also users may be reluctant to change due to power politics (**Resistance to change**)*

*P4, 16: Main obstacle is top management awareness of the technology…. (**Awareness**)*

*P8, 10: I would not comment much on that but as a procurement officer I think it will be an advantage to us to make a setup of that nature, but it is up to the authority. I do not know which direction they are taking the BDF to…. (**Decisions**)*

*P5, 15: I think the likeness will come from decision is on how far are we in the direction towards using the internet in the tendering process but that I would not be in a position to answer. Its management decisions.... (**Decisions**)*

5.2.6 IS Staff

The following concepts emerged from the interviews for the theme IS staff: support, skills and manpower. The following quotes are the sources of the concepts:

*P2, 17: The BDF does not have any expertise in e-commerce.... (**Skills**)*

*P2, 2: Yes the point is we are short on staff.... (**Manpower**)*

*P9, 2: they are having material capital high and human resource capital more in number and less in skills....(**Skills**)*

*P8, 3: Like I said we still have a problem with manpower, even if the IT is available it may not be effectively used when it comes to manpower. We still refer to very few people.... (**Manpower**)*

*P1: 2: The Internet could be used widely but the problem is we do not have enough manpower to configure the Internet for everybody (**Manpower**)*

*P7: We are still lacking in term of the support of WAN in the BDF so it is not efficient (**Support**)*

5.2.7 Security

Participants showed concern over security in transacting over the Internet, as illustrated by the following quotes:

*P4, 8: Hacking can also be a problem which might end with a loss of funds (**Concern over security**)*

*P2: Yes there will always be a problem of security.... (**Concern over security**)*

*P3: Since the BDF uses a lot of money hackers will be more interested in the e-commerce site (**Concern over security**)*

5.2.8 Benefits

Most of the participants were aware of the benefits of e-commerce. They indicated that there would be reduced costs for both the buyer and supplier, there would be improved relationships, there would be increased transparency, widespread access to markets and products, and that communication between all stakeholders would improve. The sources for these concepts are illustrated by the following quotes and were classified as internal benefits and external benefits.

*P6: I think one of the benefits will be speed, communication will be carried out through quickly .... (**Communication**)*

*P5, 10: Benefits like I said it would be less time to address issues. This is a more direct way of addressing issues. In the old manual systems there was bureaucracy because you had to send and follow a paper trail. These benefits are significant because they safe time and if you safe time you safe costs (**Transparency**)*

P9, 15: There will be less paper work between all stakeholders, which makes it cheaper. Communication between all internal stakeholders will be enhanced,

*because there will be no paper files moving from one office to the other. In fact less people will be involved reducing chances of corruption and increasing transparency (**Communication**)*

*P4, 7: The benefits of using B2B e-commerce are that the cost of overheads will be reduced in-terms of manpower and again the there will be reduced transaction costs because due to reduced paper work. Competition will be opened up due to increased supplier base, which will lead to choosing best product at a best price. Advertising online is cheaper and may lead cheaper product cost (**Costs**)*

*P6, 15: Well obviously it will cut their cost if they will not have to travel to Botswana if they are outside the country. They just have to simply retrieve the document from the machine (**Costs**)*

*P4, 5: The relationship between the supplier and the BDF will be enhanced because the mode of communication will be faster. Errors will be attended to quicker, and the cost of communication for supplier will be greatly reduced (**Relationships**)*

*P3, 7: Competition will be opened up due to increased supplier base, which will lead to choosing best product at a best price (**supplier base**)*

5.2.9 External Pressure

External pressure was also identified as a theme for this study, and the following concepts emerged: high pressure for government and changing dynamism of the procurement processes. This is illustrated by the following quotes:

P10, 8: Looking at the outside trends the BDF feels left out in terms of IT adoption. There is a pressure from the outside world to adopt IT in the BDF. For example the BDF is presently forced to use the newly introduced Government

*Accounting and Budgeting System (GABS) which is mainly used to facilitate payment of suppliers and budget control (**Government pressure**)*

*P9: I am aware the BDF tenders are already being published in the Public Procurement and Assert Disposal Board (PPADB) website. Most likely the BDF will be forced to start using the Internet…. (**Government pressure**)*

*P6: I think because of the dynamism of the procurement processes the technology is growing and people are starting to see the benefits of online transaction using computers and I think the BDF wants to improve productivity and also wants to jump on the bandwagon….(**Dynamism of procurement**)*

5.2.10 Internal Pressure

In this study intensity of work in the organisation and demand for internet connections by users were concepts for the theme internal pressure as illustrated by the following excerpts from the transcripts;

*P5, 12: I think the volume of work the BDF as an organisation does with the outside world. Since the BDF is involved in large scale with companies locally and abroad this can lead to a need for e-commerce (**Intensity of work**)*

*P1, 4: But by the way the request for Internet connection is overwhelming (**Internet demand**)*

*P5, 2: Generally the users are interested in IT more so that it reduces what has been done manually and cumbersome to do….(**Intensity of work**)*

5.2.11 Costs

The following excerpts from the interview transcripts illustrate the concepts for this theme:

P9, 18: The BDF obviously has to budget for the extra infrastructure development and of course budget for retraining of staff…. (Implementation)

P7, 20: But I should state that at the initial stage of implementation the BDF will have to pay a lot of money to implement the system…. (Implementation)

P3, 10: High costs of computer hardware may also be a barrier to e-commerce adoption and also high telecommunications costs (Implementation)

P9, 18: The BDF obviously has to budget for extra infrastructure and of course budget for retraining of staff (Staff training)

In axial coding the relationships between categories were established and the casual relationships emanating from them were listed for each category. This will be discussed in the next section.

5.3   AXIAL CODING

According to Strauss and Corbin (1998: 135), "the researcher beginning with the analysis of the first interviews, starts to notice that concepts relate to each other. In explicating these relationships, the researcher begins to link categories with their subcategories, that is, to notice that these seem to be conditions – these actions/interaction, these consequences". The statements should cover all the relationships between categories. The following statements were identified as relationships between categories. The propositions were identified and are reported for each category where they arise and for each proposition, the source

is shown by the preceding quote. Only causal conditions were identified. Intervening conditions were not explicit from the interviews and have not been identified.

5.3.1 Relationships from IT Infrastructure

The connectivity of **IT infrastructure** in the organisation leads to timely payments to suppliers being made and this enhances relationships (**benefit**) which could lead to e-commerce adoption.

P3, 4: Yes it is easy to pay suppliers using the government accounting and budgeting system

Even if **IT infrastructure** is widespread, **IT use** intensity is still low.
P10, 3: Although there is infrastructure available it is not being used.

If there is high investment in **IT infrastructure**, then the **organisation** will be technologically able to adopt e-commerce.

P10, 2: To me the BDF is ready on the one hand and it is not ready on the other hand to adopt e-commerce. It is ready because hardware in terms of PCs, servers, and software are available.

P3, 2: The BDF is ready technically as an organisation to make use of e-commerce in terms of hardware and software. There are servers and PC's and there is a LAN and WAN connectivity in all its major camps

The availability of the Internet (**IT infrastructure**) will allow for an increase in the supply base, which will lead to product costs going down (**Benefit**).

P4, 7: There will be an increase in the supplier base due to the Internet being world-wide

The availability of **IT infrastructure** will require highly competent **IS staff** to support the infrastructure.

P7. 2: We are still lacking in terms of the support of WAN in the BDF so it is not efficient.

5.3.2 Relationships from IT Use

There is low **IT use** intensity in the organisation, due to lack of **IS staff** support.

P8, 3: Like I said we still have a problem with manpower, even if IT is available it may not be effectively used when it comes to manpower.

As a result of low **IT use** communication internally and externally is not being enhanced (**Benefit**).

P3, 3: The BDF is not effectively using IT. It is not being used for what it is meant to do. There is no internal use of electronic communication in the form of Intranet.

There is low **IT use** intensity in the organisation tendering processes due to high levels of secrecy in the **organisation.**

P3, 11: I do not see the BDF using e-commerce tools in the near future. The reason may be attributed to sensitivity of data.

P4, 11: I am prepared to use e-commerce in the tendering process provided security and proper procedures and guidelines are in place....

There is low **IT use** intensity in the organisation due to lack of knowledge on the part of **users.**

P9, 5: I would say the system is there but the people are not using it to communicate. I just think it's because we are not used to it.

5.3.3 Relationships from Benefits

If there are anticipated **benefits** then **user's** attitudes will be positive towards IT.

P2, 10: ....Yes people will be drawn to e-commerce because they understand that they will have access to global markets.

5.3.4 Relationships from Top Management Characteristics

If **top management** support is lacking, then a centralised **organisation** will not change its culture.

P4, 16: If top management is not supportive then there is no way that change could be effected especially in a bureaucratic organisation like the BDF

As a result of lack of **top management** awareness of e-commerce technology, support in terms of financing (**cost**) e-commerce adoption initiatives will be limited.

P3, 10: I think the main barrier to e-commerce adoption is lack of awareness by top management, which leads to lack of support in terms of budget.

If **top management** decisions on e-commerce adoption are not known, then, in a centralised **organisation,** adoption of e-commerce is not likely.

P8, 10: I would not comment much on that but as a procurement officer I think it will be an advantage to us to have a setup like that, but it is up to the authority. I do not know which direction they are taking the BDF to.

If **top management** is resistant to change to new technologies, then **IT use** will be low.

P1, 2: I do not understand why management is not using IT but I think it's only that they do not want to change.

If **top management** is not aware of the benefits of e-commerce, then the **organisation** culture will not change.

P8, 8: It is the knowledge if top management is shown the advantage at the beginning then they will appreciate it. But people in control have to know that this is possible.... So if the people are shown the benefits then I do not see a problem for the organisation to change and adopt e-commerce.

5.3.5 Relationships from Organisational Characteristics

In a centralised **organisation, top management** support is vital for the **organisation** to change its culture.

P4, 16: The main obstacle is top management awareness of the technology. If top management is not supportive then there is no way that change could be effected especially in a bureaucratic organisation like the BDF

If an **organisation** resists change to new technologies there will be low **IT use** intensity among its employees.

P8, 4: Culturally in the BDF we are not into IT we are still operating manually. So the effect of computers is not being realized....

P8, 13: Simple culture cultural norms. After doing something for a long time it becomes culture, there is always difficulty to move away form culture.

Even though the **organisation** is technologically capable in terms of infrastructure, **IT use** intensity is still low in the organisation.

P3, 2: ....Although the BDF has servers running windows 2003, they are not being used to communicate both internally and externally with other departments or within itself. The main form of communication is through fixed line communication and mobile telephones and faxes.

If the **organisation** is large, then there is an absolute need for **IS staff** support.

P2, 3: We have in house staff who are able to give support but the organisation is large.

P1, 3: The BDF IT department is understaffed, therefore it makes it difficult to support whole of BDF

If the **organisation** has high levels of secrecy, **IT use** intensity will be low.

P5, 13: .... maybe the BDF has this thing about secrecy which might be a barrier to IT use

P3, 11: I do not see the BDF using e-commerce in the near future. The reasons may be attributed to the sensitivity of information.

The result of high **organisational** investment in IT is that there will be widespread **IT infrastructure.**

P10, 1: The BDF has invested quite heavily in IT in the last couple of years. There is the WAN and LAN in all major bases. The infrastructure is there.

5.3.6 Relationships from External Pressure

Rising **external pressure** from government for public procurement will influence the **organisation** to change its culture to adopt e-commerce.

P6, 11: I think PPADB is going e-commerce and if they are going e-commerce and they are the driver in the procurement I do not see how the BDF will be left out. So yes the BDF has to start thinking about e-commerce.

Changing **external pressure** due to the changing nature of procurement processes will influence an **organisation** to change its culture to adopt e-commerce.

P6, 9: I think because of the dynamism of the procurement processes the technology is growing and people are trying to see the benefits of online transaction using the computers and I think the BDF wants to increase productivity and also wants to jump into the bandwagon and do not want to be left behind. I think that will really make the BDF to also try to incorporate e-commerce.

Rising **external pressure** due to large-scale involvement with companies abroad and locally will influence **IT use** intensity in the organisation.

P5, 12: I think the volume of work the BDF as an organisation does with the outside world. Since the BDF is involved in large scale in companies locally and abroad this can lead to a need to adopt e-commerce.

5.3.7 Relationships from Internal Pressure

Internal pressure due to intensity of manual work will influence **users** to have a positive attitude towards IT.

P5, 2: Generally the users are interested in IT more so that it reduces what has been done manually and cumbersome to do. They love it.

High **internal pressure** due to demand for Internet connections will influence **IS staff** to provide better support.

P1, 3: Most of the people in the BDF use the Internet. The Internet could be used widely but the problem is we do not have enough manpower to configure the Internet for everybody

High **Internal pressure** due to anticipated **internal benefits** (less paper work, reduction in errors, and communication between stake holders) will influence the **organisation** to change its culture.

P9, 15: There will be less paper work between all stakeholders, which makes it cheaper. Communication between all internal stakeholders will be enhanced, because there will be no paper files moving from one office to the other. In fact less people will be involved reducing chances of corruption and increasing transparency.

5.3.8 Relationships for Costs

If there are high training **costs** the **organisation** will have to invest in manpower.

P9, 18: …. budget for retraining of IS staff is required

If there are high implementation **costs**, then the **organisation** will have to invest in the system.

P7, 20: …. But I should mention that at the initial stage of implementation the BDF will have to pay a lot of money to implement the system….

P9, 18: The BDF obviously has to budget for extra infrastructure development….

5.3.9 Relationships from IT Staff

If there is shortage of **IS staff** then the availability of **IT infrastructure** will be limited.

P1, 2: Generally the people would like to use IT to their advantage but since we are lacking in terms of manpower we end up having projects not completed.

P2, 3: Yes the point is we are short on staff.

If the **IS staff** levels of skill are low, then there will be a need for a training budget (**cost**).

P6, 2: I think IT is a new phenomenon in the BDF, even the staff that is available is undergoing training. Very few in numbers and qualifications are not that high.

P3, 16: There will also be costs for retraining the existing staff.

If there is a shortage of **IS staff** support, then **IT use** will be low.

P8, 3: Like I said we still have a problem with manpower, even if the IT is available it may not be effectively used when it comes to manpower.

If there is a shortage of **IS staff,** the **organisation** will have to invest in training.

P9, 16: ....and of course budget for retraining of staff.

P2, 3: The unit is growing and sending people for training abroad and locally. Ye we are short on staff and we are aware of it.

5.3.10 Relationships from users

If **users** are resistant to changing to new technologies, then **IT use** will be low.

P5, 18: I think the major obstacle will be the mindset, it will be difficult for many people to change their mindset. We saw what happened with Ellipse people kept using the old ways of doing things and the system almost collapsed. If e-commerce comes and people are not willing to use it then it might not work.

P9, 17: I think the major problem will be culture. For the people to change to new ways is a problem. People like to stick to what they are used to doing

If **users** are aware and knowledgeable about the technology, then there will be high **internal pressure** to adopt e-commerce.

P4, 9: If the BDF can establish a website then some of B2B e-commerce will be visible and a great enthusiasm among users. Awareness of the technology is important. If people are knowledgeable about the technology they will request for its adoption.

Users' attitudes will be positive to e-commerce if they understand that there will be access to more suppliers **(benefits)** when they adopt e-commerce..

P2, 10: yes people will be drawn to e-commerce because they understand that they will have access to global markets

Axial coding primarily entails the procedure of reassembling data that was broken down and conceptualised during open coding (Strauss & Corbin, 1998). In the next section selective coding will be presented.

5.4   SELECTIVE CODING

The final stage of data analysis in grounded theory is the selective coding, which builds upon the foundation of the previous open and axial coding efforts. Selective coding is "the process of selecting the central or core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development" (Strauss & Corbin, 1990:116). Strauss and Corbin, (1998) stated that this central or core category should have the analytical power to "pull the other categories together to form an explanatory whole" and "should be able to account for considerable variation with categories" (146). In this study a matrix table was used to select the core category.

Following from Brown (2004), the causal relationships identified between categories were summarised in a matrix table in order to identify patterns and to ascertain the density of the relationships between categories. Table 5.1 below shows a matrix analysis of the relationships. A total of 40 relationships were identified during axial coding. The last row indicates the number of times each category is being influenced by other categories. The last column indicates the number of relations that each category is influencing.

By way of example, top management (Top man) influences the organisational characteristics (Org) category through three different propositions, IT use by one proposition and cost category through one different proposition. The matrix also shows that the top management (Top Man) category is only influenced through one proposition.

Table 5.1: Matrix representation of e-commerce adoption theory relationships

	IT inf	IT use	Org	User	Top Man	Sec	Ben	Ext pres	Int pres	Cost	IS staff	Tot
IT inf		1	1				2				1	5
IT use	1		1	1			1				1	5
Org	1	3			1		1				1	7
User		1					1		1			3
Top Man		1	3							1		5
Sec												
Benefits				1								1
Ext pre		1	2									3
Int pre			1	1							1	3
Cost			2								1	3
IS staff	1	1	1	1						1		5
Total	3	8	11	4	1	0	5	0	1	2	5	40

From the matrix above the following can be observed:

a) The matrix illustrates organisational characteristics (Org) as the core category.

b) The factors influencing the organisational characteristics are primarily top management (Top man), Cost, and external pressure (Exp pre). This is evident from the large number of propositions influencing it.

c) The IT use category is impacted by a large number of causal conditions. This, as expected, represents the consequences of the core category.

Again following from Brown (2004), Table 5.2 depicts an alternative representation of the theory in terms of the category densities (number of concepts per category), number of propositions that are emanating form each (with number of categories impacted in brackets) as well as in terms of the number of impacts each category receives (with the number of source category again in brackets).

Table 5.2 Tabular representation of e-commerce adoption theory

Category	Concepts	Impacts	Impacted
IT infrastructure	4	3(4)	3(4)
IT use	1	5(5)	8(6)
Organisational characteristics	6	7(5)	11(7)
IS staff	3	5(3)	5(5)
Top management	4	5(3)	1(1)
Cost	2	5(3)	2(2)
Security	1	0(0)	0(0)
External pressure	2	3(2)	0(0)
Internal pressure	2	3(3)	1(1)
Benefits	5	1(1)	5(4)
Users	4	3(3)	4(4)
Total	**34**	**40**	**40**

From Table 5.2, above, the following have been observed.

a)   The organisational characteristics category has more concepts than any other category, confirming it as the core category.

b)   The organisational characteristics are impacted by more factors than any other category, further confirming it as the core category.

c)   The IT use category is impacted by more factors than any other category and, as such, confirms it as the consequence of the core category.

d) Top management impacts on more categories than it is impacted by, confirming it as the causal condition for the core category.

5.5   THE THEORETICAL MODEL

The turbulence, the continuous change in business environment, and the specificity of each particular organisation render the formulation of a universal prescription for e-commerce initiatives inevitable. Nevertheless, all e-commerce adoption cases more or less go through the same problems and issues. In this section, the theoretical framework shown in Figure 5.1 is described. The theoretical framework was developed from the themes identified in the analysis of the results described above. It is observed that some themes influence the core category more than the others and it was also noted that several of these factors appear interrelated. Not all relationships were shown, as this would defeat the purpose of the diagram, which is aimed at giving a high level overview hiding the details described earlier.

Figure 5.1: Factors affecting e-commerce adoption in the Botswana Defence
Force

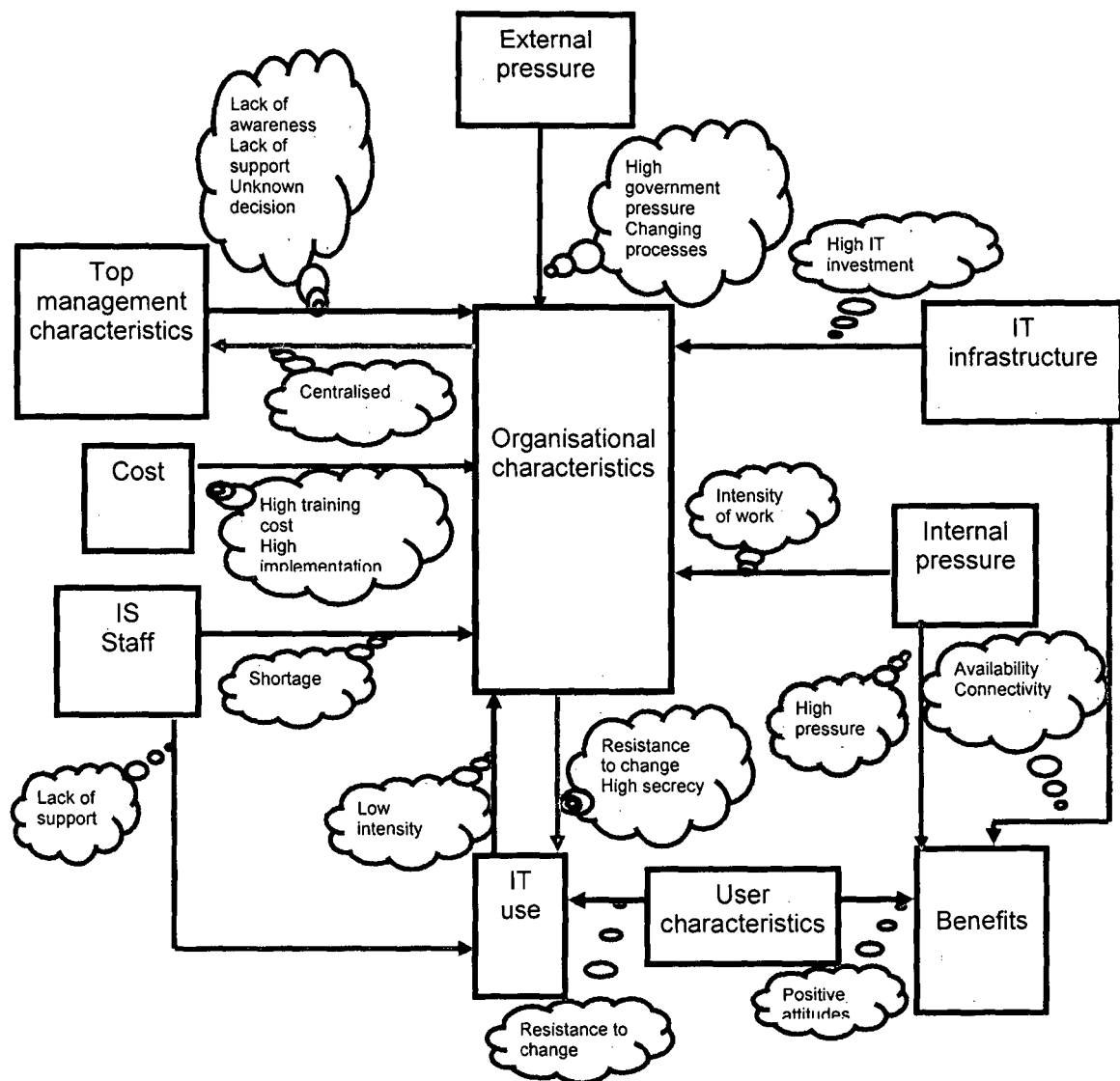Figure 5.1, above, illustrates the relationships between categories. The figure
shows that the core category is influenced by more categories that any other
category. The consequence of the core category is low IT use in the
organisation. The arrows indicate the interrelationships between
categories/themes. Concepts in the clouds indicate how the attributes associated
with one factor influence the other factors.

The framework shows that top management influences the organisation characteristics through three relationships. Firstly, lack of top management support leads to resistance to change in the organisation. Secondly, lack of awareness of the benefits of e-commerce also leads to the organisation's resistance to change. Thirdly, the model indicates that top management must spearhead e-commerce adoption in the organisation and that, if management decisions are not known, e-commerce adoption is not likely to occur.

Other factors also influence the organisation to adopt or not adopt e-commerce. High investment in IT infrastructure make the organisation technically able to adopt e-commerce, but shortage of IS staff requires that the organisation invest in training. In addition, the model indicates that high pressure from government, as well the changing nature of the procurement process, will influence the organisation to embrace e-commerce. Furthermore, the model indicates that there is high pressure from within the organisation to adopt e-commerce. Lastly, high costs of implementation and training also influence the organisation to invest in both the system and manpower.

On the other hand, the model indicates that organisation centralisation requires that top management should provide support for e-commerce adoption. Finally, the model indicates that the resistance to change to new technologies results in low IT use; in addition, the model indicates that the level of secrecy in the organisation leads to low IT use. The model also indicates that, regardless of the technological ability of the organisation, there is still low IT use. The next section will present the theory of factors affecting e-commerce adoption in the procurement process of the Botswana Defence Force.

5.6 THEORY OF E-COMMERCE ADOPTION IN THE BOTSWANA DEFENCE FORCE PROCUREMENT PROCESS

Lack of **top management** *awareness* of e-commerce technology in the BDF leads to lack of *support* in terms of financing e-commerce projects. **Top management** *decisions* about e-commerce adoption are not known and in a *centralised* **organisation** like the BDF it is less likely that there will be e-commerce adoption as management should give direction and shape e-commerce vision.

External pressure due to the *changing* nature of the procurement processes is pressurising the **organisation** to change its *culture* and embrace new methods of procurement or face being left behind. As a result of rising **external pressure** due to the *changing* nature of procurement processes, there is rising *pressure* from government for the **organisation** to change its *culture* and adopt e-commerce in its processes.

High **internal pressure** influenced by anticipated *internal* **benefits** to be gained from the adoption of e-commerce influences the **organisation** to change its *culture* towards e-commerce. Furthermore, high **internal pressure** due to *demand for Internet* connections from **users** influences **IS staff** to provide *support.*

Due to the centralised *decision making* in the BDF, **top management** support is vital for the adoption of innovation by the **organisation** in changing its *culture* towards such innovation. *Resistance to change* to new technologies by top **management,** on the other hand, leads to low **IT use** *intensity* in the organisation. Furthermore, a high level of *secrecy* in the **organisation** also leads to low **IT use** *intensity* in the organisation. Even though the BDF is *technically* able, in terms of infrastructure, in having servers and computers as

well as wide area and local area networks with Internet access which can stimulate e-commerce adoption, **IT use** *intensity* still remains low.

The **organisation** is *large* and there is a *shortage* of **IS staff** to support the entire organisation, which leads to limited *availability* of **IT infrastructure**. The consequence of this *shortage* of **IS staff** is that the **BDF** will have to *train* its staff, which has **cost** implications for the organisation. In addition, *high implementation* **costs** require the **organisation** to *invest* in e-commerce applications. Furthermore, the *shortage* of **IS staff** in the BDF leads to lack of *support* for end **users**, with the consequence of low **IT use** *intensity.* Finally, lack of **IS staff** *skills* also demands that the **organisation** should set aside a **budget** for *training* of staff, as well as new members.

In the BDF, *decision making* is centralised by nature of the organisation, leading to **users** being *resistant to change,* in most cases, to new ways of working that do not come from top management. The consequence of this *resistance to change* on the part of end **users** is that **IT use** *intensity* is low in the **organisation**. Conversely, there is high *demand for Internet* connection by **users** in the BDF, resulting in high **internal pressure** to adopt e-commerce. Furthermore, *knowledge* about the **benefits** of e-commerce results in **users** changing their *attitudes* towards e-commerce adoption.

The **BDF** has *invested* in **IT infrastructure**, which makes it *technologically able* in terms of infrastructure but **IT use** *intensity* still remains low. On the other hand, widespread *availability* of **IT infrastructure** has lead to a realisation of some **benefits**. The *availability* of GABS (**IT infrastructure**) has improved the payment processes in the organisation, leading to improved relationships with suppliers (**Benefit**).

The following section will discuss the findings of the study in the context of existing literature.

5.7   FINDINGS IN RELATION TO LITERATURE

This section refers back to the literature review regarding research into e-commerce adoption that was presented in Chapter 2. It will present an attempt to examine supporting and contradictory evidence and relate that to the research findings of this study.

5.7.1 Top Management characteristics

Support: The literature suggests that top management commitment ensures adequate resources for the implementation of an innovation (Premkumar & Rorberts, 1999). This view was expressed by participants as it was emphasized that lack of awareness of e-commerce technology by management will lead to lack of support in terms of financing IT projects.

Resistance to change: The findings suggested that if management does not change its mindset about IT adoption then there will be low IT use in the organisation.   This is supported by literature which suggests that top management commitment is critical for successful IS use (Crook & Kumar, 1998).

Decisions: This study indicated that, if top management decisions about e-commerce adoption are not known, then, in a centralised organisation like the case organisation, e-commerce will not be adopted.   In this context, top management support is vital for sponsoring projects, ensuring the availability of technical and human resources and eliminating unnecessary bureaucratic procedures (Tarafdar & Vaidya, 2006).

Awareness: The analysis reveals that lack of awareness of the technology by top management will influence the organisation to resist change to new technologies. This view point is supported in literature which emphasizes that top

management's positive attitude is required to overcome resistance to change – a normal feeling towards e-commerce technologies (Premkumar & Rorberts, 1999).

5.7.2 Organisational Characteristics

Size: The literature suggests that the size of the organisation has a direct relation to human and financial resources (Bruque-Camara, Vargas-Sanchez & Hernandez-Ortizi, 2004). This view was expressed by participants as they emphasised that, due to the large size of the organisation, the IS staff could not give absolute support due to the shortage of manpower.

Culture: The data indicates that, in a centralised organisation, top management support is vital for the organisation to change its culture and adopt e-commerce. The findings are supported in the literature, which suggests that top management's commitment is required to overcome the resistance to change that is normal in e-commerce adoption (Premkumar & Rorberts, 1999). In addition, the data also indicates that IT use will be low if there is resistance to change to new technologies. These findings are supported in the literature, which suggests that organisations are more likely to adopt a technology if they perceive it as being consistent with their culture, values, preferred work practices and existing IS infrastructure (Beatty, Shim, & Jones, 2001).

Decision making: The findings reveal that, in a centralised organisation, there will be resistance to change to new technologies if top management support is lacking. The findings are supported by literature which emphasises that e-commerce adoption is expected to be low if leadership characteristics are not favourable.

Secrecy: The data indicates that high levels of secrecy in the organisation lead to low IT use in the organisation. This is a unique characteristic of the organisation and therefore not supported in literature.

Technological ability: The findings suggest that the organisation is technologically capable in terms of infrastructure to support e-commerce adoption but IT use still is low. The findings confirm the assertion by Vatanasakdakul, Tibben and Cooper (2004) that "access to telecommunication technologies and associated hardware and software is not in itself the primary barrier to the adoption of the Internet"

IT investment: The analysis reveals that, if the organisation invests in IT, there will be widespread IT infrastructure. This is supported by literature which suggests that organisations that can afford more costly infrastructure will benefit from e-commerce (Iacovou *et al.*, 1995).

5.7.3 IT Infrastructure

Availability: The findings indicate that, if there is widespread availability of IT infrastructure in the form of Internet accessibility, it can allow for an increase in the supply base, leading to low costs of product. This view is supported by literature which suggests that widespread IT availability is required to transact with a substantial network of business partners (Iacovou *et al.*, 1995).

Investment: It was pointed out by the participants that, if the organisation invested in IT infrastructure, it would become technically able to adopt e-commerce. This view is supported in the literature which asserts that IT infrastructure is strongly related to e-commerce adoption. This implies that the organisation has to commit certain resources to its deployment (Teo & Ranganathan, 2004)

Connectivity: The findings indicated that the organisation has a wide area network and local area network linking all its major bases, leading to widespread connectivity and high IT use. This is supported by literature which emphasises that, the more widespread access to computers/the internet, the greater the possibility of use (Sathye, 1999).

5.7.4 IT Use

Intensity: The analysis revealed that IT use intensity in the organisation is low due to lack of user support by IT staff. This view is supported in literature which suggests that end user satisfaction with IT is strongly correlated with the number of systems analysts present within the firm (Fink, 1998). Furthermore, the analysis also revealed that there is low IT use intensity in the organisation due to the lack of awareness/knowledge of the users. According to the literature, better IT knowledge would help the organisation in adopting new technologies (Fink, 1998).

5.7.5 Internal Pressure

Intensity of work: The data indicates that high internal pressure due to the intensity of work will influence users to adopt e-commerce. This view is supported in the literature which indicates that the level of intensity of information may influence top management to adopt e-commerce (van Akkeren & Harker, 2003)

Internet demand: The findings reveal that internal pressure will result from demand by customers. This is consistent with the literature that customer demand for e-commerce may influence the organisation to adopt e-commerce (Crook & Kumar, 1998).

5.7.6 External Pressure

Government pressure: The findings reveal that government has taken initiatives to publish the organisation's tenders on the web. This is supported in literature which indicates that the impact of government policies and initiatives have been shown to result in direct and indirect stimulation to the supply of information which produces faster technological diffusion (Ling, 2000).

Dynamism of procurement: Literature has shown that a commonly cited hypothesis in the context of technology adoption is the so-called "bandwagon hypothesis", i.e. that the probability of adoption by a firm at a given date is related to the proportion of firms in the industry which have already adopted. The analysis indicates that the organisation does not want to be left out, due to the dynamism of the procurement process, and would like to also "jump on the bandwagon". Furthermore, internal pressure due to large-scale association with outside companies will influence IT use in the organisation. This view is supported by literature which strongly emphasizes that firms that buy and sell internationally are under pressure to adopt and use e-commerce (Gibbs *et al.*, 2002).

5.7.7 User characteristics

Attitude: The findings reveal that users will develop positive attitudes to the technology if they are aware of the benefits of e-commerce. This is supported in the literature by Troshani & Doolin (2005) who assert that "a lack of awareness of the benefits is likely to fuel concerns about an innovation".

Resistance to change: The findings reveal that users may be resistant to change to new technologies, leading to low IT use in the organisation. This view is supported by literature, which also suggests that adoption of new technologies

often come across a certain amount of resistance from those involved with current ways of operating (Sathye, 1999).

Knowledge: The data indicates that awareness of e-commerce technology will lead to high internal pressure to adopt e-commerce. This view is emphasised by Sarosa & Zowghi (2003), who assert that "better IT knowledge would help employees in adopting the new technology". Furthermore, if users are knowledgeable about the technology there will be internal pressure to adopt it. The literature asserts that employees who have knowledge of technological innovations are likely to make more use of the innovation (Thong, 1999).

5.7.8 IS Staff

Skills: The analysis reveals that there is a lack of e-commerce expertise in the organisation. This view is supported in the literature which suggests that inadequate knowledge about e—business is the primary factor why organisations lack initiative in e-commerce adoption (Vatanasakdakul *et al.*, 2004).

Support: The findings reveal that lack of IS staff support will result in low IT use in the organisation. This view point is supported in the literature which suggests that organisations with a distributed structure of IT facilities and support, as well as sophisticated IT experience, are associated with high IT usage (Ang, Davies & Finlay, 2001).

Manpower: The findings reveal that IT use is low in the organisation due to a shortage of manpower. This is supported in literature which suggests an organisation's low usage level is mainly caused by insufficient resources, i.e. human, allocation (Ang *et al.*, 2001). Furthermore, if the organisation has a shortage of skilled IS staff, it has to invest in training. This viewpoint is supported in literature that suggests that availability of human and financial resources are critical in all types of projects (Shah & Siddiqua, 2006).

5.7.9 Cost

Implementation costs: The data suggests that investment in the form of e-commerce applications will be required for the implementation of e-commerce. This view is supported by literature which suggests that having e-commerce requires investment in IT infrastructure (Al–Qirim & Corbit, 2001). This view is also supported by Fink (1998), who asserted that the cost of IT hardware and software is relevant to IT availability.

Training costs: The findings reveal that, if the cost of training is high, the organisation will have to budget for it. This is supported in the literature which suggests that, for organisational innovation, especially for adopting advanced technologies, financial support is indispensable in procuring and developing adequate levels of hardware and software and training end-users (Kamal & Themistocleaus, 2006).

5.7.10 Benefits

Internal benefits: The analysis has suggested that anticipated benefits will influence users to have positive attitudes towards e-commerce adoption. This is supported in the literature which emphasises that the primary motivation for business to adopt new technologies is the anticipated benefits that the technologies are expected to bring to the organisation (Premkumar & Roberts, 1998).

The relationships identified in axial coding were supported by literature on e-commerce adoption. Overall, e-commerce literature mentioned each of the axial codes identified and supported the majority of them.

It is interesting to note that wide availability of IT infrastructure has not stimulated IT usage in the organisation, as expected. Similarly, the findings strongly

emphasize a lack of awareness of the technology among both management and user as the main facilitator of organisational resistance to change to new technologies.

Another interesting finding worth mentioning is the lack of emphasis on security by respondents. This may be attributed to lack of knowledge of e-commerce technology among the participants.

5.8 SUMMARY

This chapter has presented the findings of the analysis of the data obtained from the interviews. It showed that 11 axial codes were generated from 30 open codes. From both the open codes and axial codes, the core category emerged. A pictorial theoretical model that presented the relationships identified among axial codes was developed to illustrate the findings and a detailed story line was used to describe the theory.

Lastly, the discussion of the theory in relation to the literature review on e-commerce was presented. In the next chapter the findings of the research will be summarised and the implications for practice will be presented. The research contributions and lessons that have been learned, as well as directions for future research will also be discussed.

CHAPTER 6

CONCLUSION

6.1   INTRODUCTION

This thesis presents an attempt to identify the factors that affect e-commerce adoption in the procurement process of the Botswana Defence Force.   The objectives of the study were to understand the factors that could drive or inhibit the adoption of e-commerce in this Defence Force, and to develop a substantive theory concerning the factors that affect e-commerce adoption in procurement process.

The study appeared to be pioneering work in investigating the extent to which various IT applications, particularly e-commerce applications, were being adopted in the Botswana Defence Force.   Current patterns of adoption and non-adoption of various e-commerce applications for the procurement process were identified.   The reasons for adopting or non-adopting IT applications were examined, using e-commerce as a focus for the subsequent study.   The study was carried out in a developing country, Botswana, which currently enjoys high ranking by World Economic Forum in terms of IT infrastructure quality and overall national connectivity.   It is anticipated that this study will make a significant contribution to the literature on e-commerce adoption and other IT-based innovations in developing countries and that it could be of practical benefit to IT managers in adopting organisations.

This chapter is organised as follows: Firstly, a brief discussion of the findings of the research, followed by a discussion of the implications for practice is presented. The limitations of the research are pointed out and the lessons that were learned are discussed. The definition of the possible contributions of this

research is then presented and, lastly, the recommendations for feature research are stated.

6.2   SUMMARY OF THE FINDINGS

The aim of the research was fulfilled. The grounded theory method that was used helped to explain the factors that affect e-commerce adoption in the procurement process of the Botswana Defence Force. Furthermore, it helped to interpret the patterns of adoption in the organisation and explain the reason for adopting and not adopting e-commerce. Since the hypothesis were not developed using theory as a guide prior to data collection, this study revealed surprising findings and identified a range of contextual aspects that have affected e-commerce adoption in the organisation.

The findings associated with each of the objectives in section 1.6 are summarised here. Many interesting ideas arose as a result of the research. These findings will be explored here in relation to the objectives of the research. The research objectives were:

- To identify the benefits and limitations of e-commerce adoption
- To identify the barriers and drivers of e-commerce adoption
- To review the existing technological capabilities of the BDF that impinge on the adoption of e-commerce
- To identify organisational, environmental, and economic factors that influence the adoption of e-commerce in the BDF
- To extract a set of recommendations based on the synthesis of e-procurement theory and the BDF organisational context

The key findings for each of the objectives will be summarised.

6.2.2 Benefits and limitations of e-commerce

The benefits and limitations of e-commerce are well documented in the literature (Brousseau & Chaves, 2005 and Turban *et al.*, 2006). For this study, participants were asked to list the benefits and limitations of using e-commerce in the procurement process. The next section presents the findings.

6.2.2.1 Benefits

The following are the benefits of e-commerce that were identified form the data obtained from the interviews:

- Access to a wider range of markets
- Enhanced communication between all stakeholders
- Reduced overhead costs due to reduced manpower
- Improved competition due to an increased supplier base, which could lead to choosing the best product at the best price
- Reduction in paper work
- Promotion of transparency

6.2.2.2 Limitations of e-commerce

The following list represents the participants' perspectives on the limitations of the adoption of e-commerce:

- Security of sensitive information
- Concern over message delivery
- Lack of face-to-face discussion

Documentation and dissemination of information about the potential benefits and limitations of the use of e-commerce can be beneficial and useful for the BDF. This will also increase awareness of the potential risks and rewards of using e-commerce. Following from here, the next section presents the key findings of the next objective, which was concerned with identifying the barriers to and drivers of e-commerce adoption.

6.2.3 Barriers and drivers of e-commerce adoption

Literature on the adoption of innovation has identified various e-commerce adoption barriers and drivers. The next section will discuss the barriers and drivers of e-commerce adoption in the BDF from the participant perspectives, first focusing on the barriers, followed by the drivers.

6.2.3.1   Barriers to e-commerce adoption

In spite of the all the benefits that e-commerce provides, there are concerns that need to be addressed in order to take a decision to adopt e-commerce. The barriers to e-commerce adoption identified by participants in the procurement process of the BDF were as follows:

- **Resistance to change**: Adoption of any technology brings about change and is likely to be met with resistance. Participants mentioned that resistance to change by users was a major barrier to e-commerce adoption in the BDF procurement process.

- **Level of secrecy in the BDF**: The BDF is charged with the security of the nation, and by its nature does not encourage unnecessary risk of divulging classified information. This characteristic of the organisation provides little incentive for investing in e-commerce and was mentioned by participants as a barrier to e-commerce adoption.

- **The decision-making process**: The decision-making process in the BDF is centralised and participants saw management as not supportive of e-commerce due to their lack of awareness of the technology, which therefore functioned as a barrier to e-commerce adoption.

- **Cost**: Participants mentioned the high cost of initial investment associated with building the e-commerce infrastructure and training personnel as another barrier to e-commerce adoption.

- **Lack of awareness of e-commerce technology**: The participants also indicated that lack of awareness of e-commerce technology in the organisation among both top management and users was a barrier to e-commerce adoption.

- **Security**: Although there was some concern about security among most participants, it did not deter use of e-commerce technologies, and concerns were based on long-standing misconceptions rather than reality.

An interesting finding that has been made is that lack of IT infrastructure in developing countries has been cited as a major barrier to e-commerce adoption in developing countries (Molla, 2004; Molla & Licker, 2005). In this study, though, participants did not mention lack of infrastructure as a barrier to e-commerce adoption. Another, interesting finding concerns cultural issues associated with the transition from traditional methods of working to the use of new technologies, which was seen as a major barrier to e-commerce adoption.

6.2.3.2   Driver of e-commerce adoption

As the BDF has already adopted some IT applications like LIMS and GABS, it was important to identify the key drivers in its adoption of these applications. The identification and dissemination of these drivers are important to promote e-

commerce for the BDF procurement process. Several factors have been mentioned as influencing the adoption of e-commerce within the procurement process of the BDF. The following were identified by participants as drivers of e-commerce adoption:

- **Government pressure**: Government has taken the initiative to publish most tenders on the PPADB website for all prospective bidders to see. This was viewed by participants as pushing the BDF in some way to also publish their tenders on a website, thereby adopting e-commerce. The introduction of the GABS system was also seen as pushing for e-commerce adoption by the government.

- **Dynamism in the procurement processes**: The participants indicated that changes in the procurement process warranting the adoption of e-commerce in the BDF and the BDF risking being left behind as a driver to e-commerce. Quoting one response:

> *"I think because of the dynamism in the procurement processes the technology is growing and people are trying to see the benefits of online transactions using computers and I think the BDF wants to improve productivity and also jump into the bandwagon"*

- **Intensity of work**: The intensity of manual work in the procurement process was mentioned as one of the key divers to e-commerce adoption.

- **Awareness of the benefits**: The participants also mentioned awareness of the benefits of e-commerce as drivers of e-commerce adoption. Having

used the GABS system of the BDF, they could see the benefits of IT and recognized that IT adoption is way forward.

The findings show that supplier pressure, although important as espoused in the literature (Iacovou *et al.*, 1995) is not directly influential in the BDF. E-commerce adoption in the BDF is mainly driven by pressure from the government. The participants identified top management buy-in as a key factor to encourage wider adoption of the technology in the procurement process in the BDF.

One of the objectives of this study was to review the technological capabilities of the BDF that impinge on the adoption of e-commerce. The findings related to this objective will be discussed in the next section.

6.2.4 Technological capabilities of the BDF

The following were identified by the participants as the technological capabilities of the BDF that impinge on the adoption of e-commerce:

- **Availability of IT infrastructure**: The BDF has invested in LAN and WAN networks. The BDF purchases computers and computer peripherals every year. The participants also pointed out that the BDF has implemented a Logistics Information Management Systems (LIMS) and the government has introduced the Government Accounting and Budgeting Systems (GABS). Finally, Internet is being accessed through the Government Data Networks (GDN). Again, quoting from one participant:

> *"The BDF is ready technically as an organisation to be able to make use of e-commerce in-terms of hardware and software. There are servers and PC's and there is a LAN and WAN connectivity in all its major camps"*

- **IS staff support**: The findings reveal generally low IS staff support in the organisation, due to shortage of manpower and lack of knowledge on the part of IS staff in the organisation. This finding concurs with literature that postulates that lack of e-commerce expertise is a barrier to e-commerce adoption (Zhu *et al.*, 2003).

It may be concluded that BDF technological preparedness for e-commerce adoption in terms of ICT infrastructure is more than adequate. This finding suggests that IT infrastructure availability alone is not the only motivator for e-commerce adoption.

Another objective was to identify organisational, environmental and economic factors that influenced the adoption of e-commerce in the procurement process of the BDF. This research objective was pursued through the application of grounded theory methodology. The outcome was a theoretical model of the factors that affect e-commerce adoption in the BDF procurement process. These findings will be summarised in the next section.

6.2.5 Theoretical model

Concepts for the theoretical model were generated using open coding process. These concepts were derived from data gathered through the interviews. The process has been elaborated in Chapter 4 and Chapter 5 of this thesis. The concepts were further related and grouped into categories. Eleven categories were identified out of the 34 concepts generated. During axial coding the categories were related to each other. This process is also elaborated in Chapter 5. A total of 40 causal relationships were identified. Finally, a core category was selected by applying selective coding. In order to select the core category, a matrix table (Table 5.1) was used to display the causal relationships between categories. The matrix indicated organisational characteristics as the core category since it was influenced by more categories than any other category

and it also influenced more categories than all other categories. Figure 6.1 shows a theoretical model developed from the categories during the analysis developed in Chapter 5, for ease of reference. Additionally, a story line was developed to describe the theory of e-commerce adoption in the procurement process of the BDF procurement process.

Figure 6.1: Factors affecting e-commerce adoption in the Botswana Defence Force
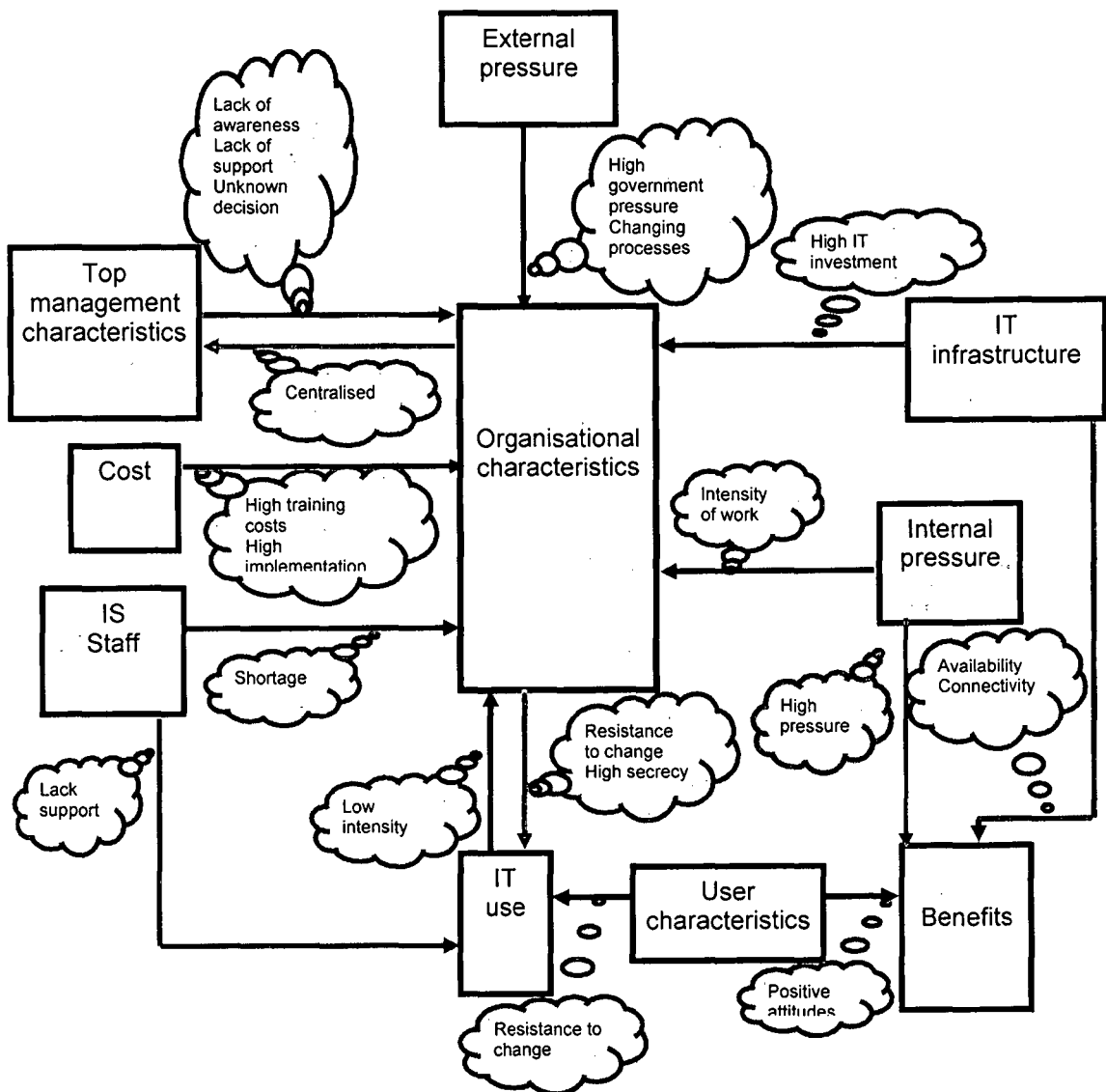
The key findings for the model and the story line of the research are:

- External pressure from government is the major driver of e-commerce adoption.
- High pressure due to the dynamism of procurement is a driver for e-commerce adoption.
- Internal pressure due to intensity of manual work is a driver for e-commerce adoption.
- The availability of IT infrastructure due to high IT investment is a driver for e-commerce adoption.
- Lack of awareness by to management is a barrier to e-commerce adoption.
- Lack of support by top management is a barrier to e-commerce adoption.
- Unknown decisions by top management result in a barrier to e-commerce adoption.
- High costs of training are a barrier to e-commerce adoption.
- High implementation costs are a barrier to e-commerce adoption
- Shortage of IS staff is a barrier to e-commerce adoption.
- Top management characteristics, cost, and IS staff are the major barriers to e-commerce adoption.
- High levels of secrecy in the BDF leads to low IT use.
- Resistance to change by users leads to low IT use.
- Lack of IS support leads to low IT use in the BDF.
- Positive attitudes among users lead to the realisation of benefits.

Finally, the findings were compared with the literature and discrepancies between the findings and literature were noted. The major discrepancy that was noted between the findings and the literature was that IT infrastructure has been noted as the major barrier to e-commerce adoption in the developing countries, whereas the findings, instead, indicated IT infrastructure as a driver to e-commerce adoption.

6.3   IMPLICATIONS FOR PRACTICE

The findings of this research have significant implications for practitioners in the procurement process of the Botswana Defence Force. Firstly, this is the first study to establish the factors that affect e-commerce adoption in the procurement processes of the Botswana Defence Force. Despite the growing emphasis on the Internet and e-commerce in procurement there has not been a deliberate attempt to establish the factors that affect its adoption in the procurement process of the Botswana Defence Force. However, this study has established a conceptual model of e-commerce adoption in the Botswana Defence Force procurement process.

The result could contribute to the Botswana Defence Force IT strategy policy. The current IT adoption pattern can help policy makers to focus on problem areas and create an environment that will foster IT adoption in the Botswana Defence Force.

Secondly, to deal with lack of awareness of the technology in the organisation, the findings suggest that the IT department should make a deliberate attempt to institute mechanisms to increase awareness of e-commerce technology in the organisation. The strategy should focus on the benefits that could be realised by adopting e-commerce in the procurement process.

Thirdly, to deal with negative attitudes associated with lack of awareness of the technology, the findings suggest that the IT department should provide training to end users. Users should be trained to understand how e-commerce technology works. Intense user resistance to change should be reduced and suspicion should be dispelled if users could gain a clear idea of how IT would have an impact on them.

Fourthly, literature has shown that obtaining top management commitment is critical to the successful adoption of an innovation (Crook & Kumar, 1998). The analysis indicated that there was a general lack of commitment among top management in IT initiatives. Therefore, the emphasis should be to try and influence top management attitudes towards the adoption of e-commerce. The strategy would be to ensure that IS staff are favourably inclined towards e-commerce and then institute mechanism to increase the extent of interaction between IS staff and top management. The combined effects of these, over a period of time, could increase e-commerce adoption.

Fifthly, the BDF would need to have a change in the management system as a key component of their business strategy because it would need to implement considerable organisational changes in order to adopt e-commerce. These changes would include re-engineering their business processes and modifications in the management structure to speed up decision-making processes. They would also need to promote e-commerce within the organisation, which will help with its acceptance by staff. Therefore an e-commerce champion is required.

Lastly, the implications of the findings, for managers and project leaders, are that these factors can be used to draw up a check list to assist the organisation in the effective adoption of e-commerce and the maximisation of opportunities

6.4 LIMITATIONS OF THE RESEARCH

The limitations of this research concern the fact that the primary focus of the research was on one research site. Cross-case analysis could therefore not be conducted in this study. Although substantive theory has been generated, it would have been interesting to research several sites and perform cross-case analysis to develop a more generalised theory that incorporated a variety of business processes. The theory, however, is ready for further testing and

development beyond the procurement process of the Botswana Defence Force. Consistent with the grounded theory principles, no claims are made about the generalisability of the findings.

The process of grounded theory research is extremely time-consuming and volumes of data generated by applying this approach can be overwhelming, to put it mildly. In the present study, it was essential to manage the volumes of data within the parameters of practical constraints. While only a small number of people could consequently be enrolled in the research, a massive amount of material was still generated by the approach, which proved very challenging for the researcher as a "lone researcher".

Lastly, another limitation of the study relates to the fact that the researcher performed coding on his own, which could have led to omission of some important concepts. It would have been proper for another researcher to perform the open coding as well and to have compared the concepts that emerged, which would have allowed for conclusive saturation of the concepts.

6.5   LESSONS LEARNED

In this section, the lessons that were learned in this study about the choice of a qualitative interpretive case study using Grounded Theory data-collection and analysis methods for IS research are presented.

As Trauth (2001b) states, "it is important to distinguish the philosophical underpinnings from the methods that are employed to enact them". It is also necessary to distinguish the qualitative/quantitative dichotomy from the positivist/non-positivist debate. The use of qualitative methods does not necessarily imply interpretive research. This therefore means that choosing an approach requires knowledge of the full body of work to understand the different philosophical perspectives. In order to choose the interpretive approach, the

researcher needed to understand these debates. In Chapter 2, the researcher noted that the epistemological orthodoxy of a particular context may determine which research methods are deemed acceptable for use.

Choosing a research site can be a problem. A novice researcher should choose a site in which he or she will feel comfortable. The researcher in this particular study was a member of the organisation and therefore received good co-operation from the respondents and management. This kind of research is intense and makes enormous demands on the researcher. Navigating your way around an unknown organisation and convincing people you do not know to give you their time and information can be daunting. The researcher's view is that it is necessary to choose a case in which the researcher feels he/she can learn the most.

Collecting data from many sources allows for triangulation and adherence to the Klein and Meyers (1999) principle of suspicion. In this study, data were collected from interviews, documents and physical artefacts (such as available IT systems and organisational structures). This allowed for identification of inconsistencies and arriving at deeper insights. This point was elaborated in Chapter 4, Section 4.10

A semi-structured interview involves the preparation of an interview guide that lists a pre-determined set of questions or issues that are to be explored during an interview. In this study, the literature was reviewed in order to prepare the interview guide on which the interviews in the organisation were based, by adopting seed categories. This raised the issue of the correct use of Grounded Theory methodology. However, Hughes and Wood-Harper (1999), Mackay *et al.* (2004) and Rowlands (2005) consider it a legitimate way to give initial focus to the interview. Miles and Huberman (1994), cited in Hughes and Wood–Harper (1999), established seed categories for the interview used in their study.

Transcribing interviews is time consuming and demands a lot of focus and resources. The researcher conducted the interviews in this study and also transcribed all of them. The problem in transcribing interviews is the clarity of the tape recordings and time required. It nevertheless is advisable for novices to do their own transcription in order to develop a feel for the data from the outset. For this study, a whole day was allowed for each interview so that the researcher could have some time to transcribe the interview directly afterwards.

Using Grounded Theory in the analysis of qualitative data can be time consuming, particularly in transcribing, coding and comparing categories. This is usually cited as a criticism of the method. The researcher decided to use software tools to assist in the process. Yet it was still felt that, even with such tools, a good deal of time and attention need to be devoted to these processes (Hughes & Jones, 2003). Even initial training in the use of the tool would be required.

Training in Grounded Theory is recommended for novice researchers. Strauss and Corbin (1990) have also noted that careful study of the procedures and techniques and practice in the use of Grounded Theory methodology are required. In this study, the early coding sessions were not undertaken due to lack of training on the part of the researcher. The researcher resolved this problem by undergoing some training on theme building, which is the basic element of open coding. This process delayed the data analysis. The researcher therefore concurs that more extensive training in the use of the method is required.

6.6 DEFINITION OF THE CONTRIBUTION OF THE STUDY

The study's contribution to research can be viewed from two perspectives: practical and theoretical. These are discussed with the use of a set of concepts developed by Barrett and Walsham (2004) for constructing a contribution to the

information systems body of knowledge. The framework has been used in IS literature (Moswetsi & Renken, 2006; Brown, 2004). It consists of four concepts: structuring intertextual coherence, problematising context for contribution, positioning as translating interest, and qualitative generalisation as a context of contribution

The theoretical contribution of this research is that the theory is built to improve understanding of the factors affecting e-commerce adoption in the Botswana Defence Force. Building a theory about the factors affecting e-commerce adoption provides insights and improved understanding of e-commerce adoption factors that, to date, are lacking in the literature in the context of developing countries, especially Sub-Sahara Africa. Therefore incompleteness is claimed.

A degree of non-coherence emerged between the findings of this study and the existing literature. Literature postulates lack of IT infrastructure as a major barrier to e-commerce adoption. The findings indicate that cultural issues associated with resistance to change form the major barriers to e-commerce adoption in the BDF. It can therefore be argued that this study confirms the need for more investigation into barriers related to these softer issues.

The aim of the study was to develop a better understanding of the factors that affect e-commerce adoption in the BDF procurement process, especially the interaction and relationships between organisational, technological, environmental and economical factors. The contribution was therefore framed to be of interest to those concerned with e-commerce adoption in the BDF. These would include IT managers, procurement officers, finance officers and the top management of the BDF.

Grounded theory methodology was used to develop concepts and for the generation of theory. The researcher therefore is convinced that grounded

theory methodology was suitable for the study of e-commerce adoption in the BDF procurement process and that a contribution has been made.

The primary practical contribution of this research is that it provides feedback to the BDF. Feedback consists of the most strongly emphasised themes, which emerged during data analysis – open, axial and selective codes, as well as the theoretical model to illustrate the factors affecting e-commerce in the Botswana Defence Force. Feedback also includes how discussions of these findings relate to e-commerce adoption factors in the literature. In general, the practical contributions of the research rely on providing a better understanding of the factors affecting e-commerce adoption in the BDF procurement process

6.7 RECOMMENDATIONS FOR FUTURE RESEARCH

Further research could proceed in several directions. While interpretive qualitative research using the grounded theory approach for data collection and analysis was used in this research, it would be interesting to use an alternative research approach to help improve our understanding of e-commerce adoption in the Botswana Defence Force procurement process. To test the generalisability of the model, a quantitative survey research strategy is suggested. Once generalisability of the model has been tested, the model could be used to indicate the necessary conditions for e-commerce adoption in the organisation.

A similar qualitative study could be conducted in another government procuring institute to determine whether there are any differences between different organisations that affect e-commerce. Moreover, comparative studies could be conducted to examine particularly the differences and similarities of the factors that affect e-commerce adoption among military procurement entities in the Southern African Development Community (SADC) defence forces.

6.8 CONCLUSION

In brief, the chapter has presented a discussion of the findings of the research and has shown the contradictions between the findings and literature. It has also presented the implications of the research for practice, as well as the contribution of this research. The limitations and directions for future research, as well as lessons that were learned were also presented.

The grounded theory presented in this thesis is a substantive theory generated to provide better understanding of how participants view the factors that affect e-commerce adoption in the procurement process of the Botswana Defence Force. It is not claimed that this one study explains the factors that affect e-commerce adoption in the BDF. However, it provides an incentive for further research in this area.

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