EXPERT ASSESSMENTS OF E-COMMERCE IN SUB-SAHARAN AFRICA: A THEORETICAL MODEL OF INFRASTRUCTURE AND CULTURE FOR DOING BUSINESS USING THE INTERNET

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Interdepartmental Program in
Business Administration
(Information Systems and Decision Sciences)

by
John Chituanya Okoli
B.S., Louisiana State University, 1996
M.S., Louisiana State University, 2002
December 2003

©Copyright 2003
John Chituanya (Chitu) Okoli
All rights reserved

I dedicate this dissertation study to all the bold entrepreneurs, experts and decision makers who strive to bring to fruition the promising benefits of electronic business in Sub-Saharan Africa.

I salute your courage in the face of many daunting challenges.

I hope this dissertation might prove helpful in your tenacious efforts.

ACKNOWLEDGMENTS

First and foremost, I return thanks to the Lord Jesus Christ whose grace has supplied me throughout my doctoral program. Although it has been a difficult and challenging journey, it has been a truly enjoyable one in Him. Every step of the way, he has been my steadfast source; he has revealed himself to me as the Resurrection and the Life; and he has dealt with me thoroughly to work himself into me as the Resurrection and the Life. This dissertation study, its results, and its impact will all eventually perish along with this world, but the Christ I have gained through this journey is an eternal weight of glory.

As for the instruments of his grace, I want to first of all acknowledge and thank my parents, Enoch N. and Josephine C. Okoli, for their faithful love and diligent care all the years of my life, including and through the years of my doctoral study.

Specifically related to my dissertation and doctoral study, I express my deep gratitude to Dr. Victor Mbarika, my dissertation chair. I sincerely say that I could not have asked for a better chair as the one whom God dropped into my lap the third year of my doctoral program. Indeed, without him I certainly could not have taken on such a formidable topic. Moreover, he has been the primary instrument of much of the dying and resurrecting I went through.

I also thank those who were so kind as to serve on my committee. I am particularly grateful to Dr. Ye-Sho Chen for helping me to develop the research questions and in define the sample issues of population and generalization. I also thank Drs. Suzanne Pawlowski and Sonja Wiley-Patton for their valuable help in framing the introduction, for their helpful methodological advice, and for their careful comb-picking through my dissertation to fine-tune it; and Drs. Chun and Moore for their service on my committee.

In addition, I thank those who helped me in every phase of my dissertation. I thank Mike Jensen for his instrumental role in helping me acquire data sources; M. Hamadoun Touré for his

letter of support on behalf of the International Telecommunication Union Bureau of Development; Lindsey Pinckard, Jared Bankston, Cori James, and Karina Noguera for their assistance in supplementing, cleaning, and organizing the contact databases; Drs. Peter Meso, Andy Schwarz, Terry Byrd, and Wynne Chin for helping me in my dive into the world of PLS; Drs. Scott McCoy, Peter Meso, Gregory Rose, Philip Musa, Detmar Straub, Terry Byrd, Robert Zmud, Robert Davison, Suk Rhee, and Jamshid Etezadi for their valuable feedback and input in designing the survey instrument; Lynne Estrada for carefully proofreading the dissertation (all errors are entirely my responsibility, though, including many changes after her work); the faculties of Washington State University, Wayne State University, and Concordia University, to whom I presented my research, for their numerous helpful comments that helped me refine and strengthen all aspects of the dissertation study, especially in the early stages; the Department of Information Systems and Decision Sciences (ISDS) at Louisiana State University for their academic and material support throughout my doctoral program; Concordia University for helping me with resources that let me complete the dissertation in a timely manner; and my fellow PhD students at the LSU ISDS Department for their morale support.

And finally, but by no means least, I sincerely thank the many experts and decision makers who responded to the survey. This last group *is* my dissertation: it is of them and for them. To them, I am sincerely grateful.

TABLE OF CONTENTS

ACKNOWLEDGMENTS iv

ABSTRACT viii

CHAPTER 1. INTRODUCTION 1
1.1 The Digital Divide 3
1.2 Sub-Saharan Africa within the African Continent 5
1.3 The Need and Potential for Research on the Internet in Sub-Saharan Africa 8
1.4 E-Business 11
1.5 National Infrastructure for E-Business in Sub-Saharan Africa 14
1.6 Cultural and Social Issues Affecting E-Business in Sub-Saharan Africa 15
1.7 Expert Assessments of E-Business in Sub-Saharan Africa 19

CHAPTER 2. LITERATURE REVIEW ON E-BUSINESS IN SUB-SAHARAN AFRICA 21
2.1 Overall Model of E-Business Outcomes in Sub-Saharan Africa 21
2.1.1 APIT and ACIT 22
2.1.2 Model of E-Business Outcomes in Sub-Saharan Africa 24
2.2 E-Business Outcomes 26
2.2.1 Dimensions of E-Business: Capabilities and Value 30
2.3 National Infrastructural Model of E-Business Outcomes 31
2.3.1 ICT Policies 32
2.3.2 ICT Infrastructure 36
2.3.3 Institutional and Commercial Environment 41
2.4 Cultural Model of E-Business Outcomes 48
2.4.1 ICT Transfer Implementation 49
2.4.2 Culture 50
2.5 Summary of Literature for E-Business in Sub-Saharan Africa 56

CHAPTER 3. METHODOLOGY AND INSTRUMENT DEVELOPMENT 58
3.1 Philosophical Basis for the Study 58
3.2 Data Sources and Sampling Procedure 59
3.2.1 Experts on E-Business in SSA 59
3.2.2 Databases of SSA E-Business Experts 61
3.3 Data Collection Procedure 63
3.3.1 Media-Specific Questionnaire Design 65
3.4 Operationalization of Constructs and Instrument Creation 67
3.4.1 E-Business Outcomes 69
3.4.2 ICT Policies 77
3.4.3 ICT Infrastructure 78
3.4.4 Institutional and Commercial Environment 78
3.4.5 ICT Transfer Implementation 79
3.4.6 Culture 79
3.4.7 Demographic Questions 80
3.5 Pilot Study 80

CHAPTER 4. ADMINISTRATION AND RESULTS OF THE STUDY 85
4.1 Survey Administration 85
4.2 Data Analysis Procedure 87
4.2.1 Descriptive Analysis 87
4.2.2 Tests for Response Bias 90
4.2.3 Tests for Normality and Outliers 91
4.2.4 Choice of Statistical Technique: PLS 91
4.2.5 Testing and Refining the Measurement (Outer) Model 93
4.2.6 Testing the Structural (Inner) Model and Hypotheses 99
4.3 Study Validation 109

CHAPTER 5. DISCUSSION OF RESULTS AND CONCLUSIONS 114
5.1 Interpretation of Results 114
5.1.1 ICT Policies 116
5.1.2 ICT Infrastructure 119
5.1.3 Institutional and Commercial Environment 120
5.1.4 ICT Transfer Implementation 125
5.1.5 Culture 126
5.2 Limitations of the Study 129
5.3 Contributions and Implications of the Study 131
5.3.1 Contributions 132
5.3.2 Implications for Practice 134
5.3.3 Implications for Research and Directions for Future Research 136
5.3.4 Implications for Teaching 141
5.4 Conclusion 142

REFERENCES 145

APPENDIX A: RTF VERSION OF SURVEY 158

APPENDIX B: WWW VERSION OF SURVEY 163

VITA 171

ABSTRACT

In spite of numerous socioeconomic problems in Sub-Saharan Africa (SSA), there has been an increasing growth of Internet connectivity, and much business activity has arisen to take advantage of this technology. This dissertation investigates experts' assessments of the pertinent factors affecting e-business in SSA from the dual perspective of national infrastructure and culture.

I review the literature related to e-business in SSA and develop three conceptual models that identify various pertinent factors and hypothesize their interrelationships in determining e-business outcomes. The first model includes all the factors I identify; the second model examines those factors that operate at the national level; and the third includes those that operate at the cultural level. For empirical insight into my research questions, I design and conduct a survey that empirically solicits information from business practitioners, government officials, officials of nongovernmental organizations, and academics that have expertise related to e-business among urban SMEs in SSA. I use the survey responses to test the research models and to help answer my research questions.

The overall model explains approximately 30 percent of the variation in e-business capabilities and in e-business value. I find that from a national infrastructure perspective, experts believe that non-specific general information and communication technology (ICT) policies are not very influential, while policies targeted specifically towards e-business are important in affecting e-business capabilities and in obtaining value from e-business, as well as ICT infrastructure. ICT infrastructure only affects e-business capabilities, but not its value. Experts believe that national governance institutions positively affect e-business value, but not capabilities. They do not believe that commercial infrastructure significantly affects e-business outcomes. Additionally, from the cultural perspective, experts believe that ICT transfer

implementation strongly affects both e-business capabilities and value, but that among SSA countries, there are no significant cultural effects of power distance, uncertainty avoidance, or technology culturation. Furthermore, they do not believe that there is any significant interaction between culture and transfer implementation within SSA. I conclude by discussing the findings in light of the existing literature related to e-business in SSA, and by noting implications for management, research and teaching.

CHAPTER 1. INTRODUCTION

> E-commerce is one of the most visible examples of the way in which information and communication technologies (ICT) can contribute to economic growth. It helps countries improve trade efficiency and facilitates the integration of developing countries into the global economy. It allows businesses and entrepreneurs to become more competitive. And it provides jobs, thereby creating wealth.
>
> Kofi A. Annan, Secretary General of the United Nations

This statement by the Secretary General (UNCTAD 2002) points to the paramount importance of electronic business (e-business or e-commerce) diffusion as a major impetus for socioeconomic development in developing countries. However, Petrazzini and Kibati (1999 p. 31) noted, "A closer look reveals great disparities between high- and low-income regions in terms of both Internet hosts and users. More than 97% of all Internet hosts are in developed countries that are home to only 16% of the world's population." Such disparities highlight the need to focus attention on these low-income regions of the world (Jarvenpaa and Leidner 1998).

In particular, numerous studies documenting the spread of the Internet in various parts of the world have highlighted the fact that Sub-Saharan Africa (SSA) is the region with the lowest level of economic, technological, and Internet development in the world (Odedra, Lawrie, Bennet and Goodman 1993; Petrazzini and Kibati 1999). The reasons for this state of affairs are numerous, but suffice it to say that this part of the world is probably the region most in need of research that can contribute to the reversal of its undeveloped technological state.

There has been a wealth of information systems research that has studied information technology on a global scale (Ives and Jarvenpaa 1991), in developing countries (Jarvenpaa and Leidner 1998), and in Africa (El Sherif and El Sawy 1988; Nidumolu, Goodman, Vogel and Danowitz 1996). A particularly notable stream of research has been an extended study of the effects of policy and culture on information technology (IT) in Arab nations (Straub 2001).

However, there has been little quantitative research that focuses on what factors contribute towards effective e-business in Sub-Saharan Africa.

In this study, I survey the critical literature to identify these factors. I develop theoretical conceptual models that identify various pertinent factors from the perspectives of natural infrastructure and culture, and I hypothesize their interrelationships in determining e-business outcomes in SSA. To verify the factors identified in my literature review, which are pertinent to e-business in SSA, I conduct a quantitative, broad-based survey of relevant experts and decision makers. I use the partial least squares (PLS) methodology of structural equation modeling to test my model (Chin and Newsted 1999; Falk and Miller 1992). My entire study focuses on answering two research questions:

1. What kinds of national infrastructure contribute toward effective e-business outcomes in Sub-Saharan Africa?
2. What cultural factors contribute toward effective e-business outcomes in Sub-Saharan Africa?

By conducting this research, I offer a number of unique contributions to information systems research. I present models that emphasize the effects of national infrastructure and cultural effects on e-business outcomes, and I quantitatively test experts' assessments of these effects with a survey. I distinguish between e-business capabilities and e-business value, and show that these related outcomes are distinct in their nature and in their contributing factors. I present a national-level model of infrastructure that produces effective e-business outcomes, and I include two important elements that have not been quantitatively tested before: the institutional and commercial environment, and a distinction between general policies on information and telecommunication technologies and those specifically tailored to e-business. I also present a

cultural model of factors which tests the effects of native culture on ICT outcomes, particularly e-business. I contribute to the literature by questioning the extent of the role of culture, particularly when examined within a region.

In this introductory chapter, I justify the need for this study on the factors that contribute to effective e-business in Sub-Saharan Africa. I first describe the digital divide in general, then describe the situation of SSA and justify the need for focused research on the Internet in SSA. Next, I specifically describe the unique potential of e-business as a specific application of the Internet. Then I further delineate national and cultural aspects of factors that affect e-business in SSA, and present the research questions I am trying to answer in this study. Finally, I explain and justify my focus on the assessments of experts.

In Chapter 2, I review the literature concerning e-business diffusion in Sub-Saharan Africa, focusing on the literature on national and cultural factors that affect e-business in SSA and present a theoretical model that offers an explanation of these effects. In Chapter 3, I describe the design of a study that empirically solicits information from experts, tests my hypotheses, and helps answer my research questions. In Chapter 4, I report the findings of my study, and in Chapter 5 I conclude by discussing the findings and their implications.

1.1 The Digital Divide

The digital divide is a widely discussed phenomenon wherein the rich in technology get richer with the rapid foray into the information age of the late twentieth century, while the technologically poor get poorer (Hoffman and Novak 1998; Lu 2001; Poku and Vlosky 2001)—if not absolutely poorer, at least relatively so, as the gap between the technological haves and have-nots widens. The term “digital divide” was popularized in reference to the disparity in Internet access between rural and urban United States of America (Lu 2001; TIA 1995). However, it is now more popularly used to refer to “great disparities in opportunity to access the

Internet and the information and educational/business opportunities tied to this access … between developed and developing countries" (Lu 2001 p. 1).

Unlike the case in many classical economic arguments of income disparity, there is no claim in this case that the advances in ICTs, which developed nations have been enjoying, have fed off the labor or resources of developing nations. Conversely, there is no claim that developing nations are faring absolutely worse *because* developed nations are doing better (Ein-Dor 2002). However, it is clear that developed nations with the resources to invest in and develop ICT Infrastructure are reaping enormous benefits from the information age (Bettis and Hitt 1995; Porter 2001), while developing nations are trailing along at a much slower pace. This difference in rates of technological progress is widening the economic disparity between the most developed nations of the world (primarily Canada, the United States, Japan, and Western Europe) and the underdeveloped and developing ones (primarily Latin America, Africa, and Southeast Asia), thus creating a digital (that is, digitally fostered) divide.

Development researchers have hailed the Internet as a "great equalizer" (Brynjolfsson and Smith 2000; Travica 2002), a revolutionary technological tool that enables efficient transfer of information on a global scale. This global information could be used for international trade, online digital libraries, online education, telemedicine, e-government and many other applications that solve vital problems in the developing world. The fundamental commonality of this class of problems is the realization that the developed nations have in abundance many of the resources that the developing ones could use to solve some of their problems, but geographical, political and cultural barriers exist that make it difficult or impossible for these solutions to be transferred effectively.

Other proposed solutions that the Internet promises for developing countries are the provision of efficient communications within and among developing countries, so that citizens

can effectively help each other to solve their own problems. Sources of widespread public information such as television broadcasting, telephone services, educational institutions and public libraries are taken for granted in developed countries. In developing countries, however, such infrastructure is seriously deficient, and this cripples citizens' ability to gather information and coordinate with each other to solve their problems. Through efficient information dissemination, the Internet promises a quantum-leap boost in internal communications in and among developing countries.

1.2 Sub-Saharan Africa within the African Continent

In studies of economic development, the continent of Africa is divided into three general regions based on general homogeneity of development patterns. In the north, there are Morocco, Algeria, Tunisia, Libya, and Egypt. These North African countries have an ethnic and cultural make-up that is far more similar to that of the Middle East than to any other region in Africa. Their peoples are not Negroid, as in most of the rest of Africa, and their economies are much closer to the Middle Eastern standards of living. Thus, North Africa and the Middle East are often classified together for socioeconomic purposes, even though they are geographically on different continents.

The Republic of South Africa, while technically "sub" of the Sahara desert, is also very different from the rest of the continent. There is a very large indigenous population of European descent, which has a European culture and a European standard of living. South Africa has strong economic ties to the Western nations, and the country's economy is by far the strongest on the continent. Ironically, most of the majority Negroid citizens of South Africa live in economic squalor, much like most of Sub-Saharan Africa. The discriminatory apartheid policy was eliminated just in 1994, and it is taking time for its effects to be unraveled and for all the people

at the wrong end of the former "apartness" policy to be fully integrated into the prosperous South African society. If the integration of the Blacks after the American Civil War is any indication, this process could take awhile.

Thus, I have three primary socioeconomic regions on the continent of Africa: North Africa, the Republic of South Africa, and the rest of Sub-Saharan Africa (SSA). In socioeconomic studies and reports, South Africa is sometimes considered as "Sub-Saharan", and at other times it is excluded from this group. Because of the many confounding factors, this research will not include South Africa as part of Sub-Saharan Africa. I believe that although there are citizens of this country who live in conditions similar to those in SSA, the pattern of the spread of e-business to these individuals would be significantly different from those in the rest of SSA.

Figure 1.1 displays a map of the African continent. The Sub-Saharan African countries are located south of the Sahara Desert in Africa, consisting of all those countries south of the Tropic of Cancer (latitude 23½° N). Table 1.1 groups SSA countries by their geo-economic sub-regions, based on a blending of the subdivisions used by the United Nations Economic Commission for Africa (UNECA 2000) and the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA 2003).

Table 1.1. Geo-economic sub-regions of Sub-Saharan Africa

Central Africa and Great Lakes	Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo (Zaire), Equatorial Guinea, Gabon, Rwanda, Sao Tome and Principe
East Africa	Kenya, Sudan, Tanzania, Uganda
Horn of Africa	Djibouti, Eritrea, Ethiopia, Somalia
Southern Africa	Angola, Botswana, Comoros, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, Swaziland, Zambia, Zimbabwe
West Africa	Benin, Burkina Faso, Cape Verde, Gambia, Ghana, Guinea, Guinea Bissau, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo

Figure 1.1. Africa

Table 1.2 lists some basic socioeconomic statistics for Sub-Saharan Africa, comparing them with the average of the nations that the World Bank (2003) classifies as “low-income”, the United States of America, and the world. Some details are particularly noteworthy. With 674 million citizens, SSA has 11.0% of the world’s population. However, with a gross domestic product (GDP) of just US$315 trillion, it only earns 1.0% of that of the entire world. The United

States, in comparison, with 4.6% of the world's population, earns 32.5% of the global GDP. The mean gross national income (GNI) per capita of SSA is US$470, compared to the world average of US$5,140, and the United States' US$34,870. Note that these numbers are adjusted for Purchase Power Parity (PPP), meaning that with these standardized numbers, $5 dollars of rice in the United States buys exactly the same amount of rice as $5 in SSA. Also noteworthy is the fact that, although SSA does receive a large amount of foreign aid, the average per citizen works out to US$20.42 per year PPP.

Table 1.2. Selected socioeconomic characteristics of Sub-Saharan Africa

	Unit	Year	Low income	SSA	USA	World
Surface Area	million sq. km	2001	34.2	**24.3**	9.6	133.8
Population	million people	2001	2,511	**674**	284	6,134
Urbanization	%	2001	31.0	**32.3**	77.4	47.2
GDP	$US trillion	2001	1,083	**315**	10,171	31,284
GDP Growth Rate	%	2001	4.3	**3**	1.2	1.4
GNI per capita	$US	2001	430	**470**	34,870	5,140
Foreign aid per capita	$US	2000	9.28	**20.42**		9.64
GDP composition	% agriculture	2001	23.0	**14.6**		
	% industry	2001	32.1	**28.8**		
	% services	2001	44.9	**56.6**		
Paved roads	% of all roads	1999	16	**13**	59	43
Telephone mainlines	per 100 people	2000	2.7	**1.5**	70.0	16.3
Cell phone subscribers	per 100 people	2000	0.5	**1.9**	39.8	12.1
3-minute local phone call	$US	2000	0.03	**0.06**		0.06
Personal computers	per 1,000 people	2000	5.2	**9.2**	585.2	78.3
Internet users	per 1,000 people	2000	3.8	**5.6**	338.7	60.5
Sources: World Bank (2001), ITU (2001), and UNDP (2001)						

1.3 The Need and Potential for Research on the Internet in Sub-Saharan Africa

There are a number of ways that ICTs—and the Internet in particular—could contribute towards solving some of the most important socioeconomic problems in SSA.

1. **E-business.** The business use of the Internet is critical for sustainable development. Rather than giving Africans the fish of foreign aid, it is critical that Africans learn to fish for themselves by developing viable economic models that fit well with their socioeconomic environment. The Internet, with its huge potential in general, has particular value to SSA. For example, tourism in Africa has already been rejuvenated, since tourist companies can use the Internet to advertise internationally now, without having to go through Western travel agents. Also, within Africa, Africans can establish electronic markets that inform them about the business opportunities with their own neighbors, encouraging internal trade. This particular application, e-business, is the focus of this entire study.
2. **Service industries/job creation.** Even for poorer Africans that do not have the resources of larger businesses, the Internet provides a number of viable opportunities. Organizations like PEOPLink (http://www.peoplink.org) provide digital photography equipment for craftspeople to post their work online, reaching an international market of buyers. PEOPLink provides the service infrastructure to ship and deliver crafts all over the world. Also, a very successful ICT measure in India has been the establishment of storefront phone booths for a relatively low investment (Ramani 2001). These are a kind of public phone, where an individual entrepreneur maintains a telephone booth and draws income from it. This has proven very successful in a country where most people cannot afford their own phone line. A similar, less structured system is employed in Cameroon whereby a cell phone subscriber lets people use the cell phone for a per-minute fee.
3. **Telecenters.** Community telecenters are locations in which a small center with different telecommunication devices can be placed to serve a community (Splettstoesser and Towry-Coker 1999). For example, a telecenter might have a telephone, fax, printer and

computer with e-mail and Web access. The operator helps illiterate citizens communicate. In rural areas, these telecenters can be connected via a satellite hookup, and they sometimes are solar powered. Thus, they are largely low-cost. These telecenters provide services that are vital to rural communities in less-developed countries, such as emergency medical contacts, communications connections for the farmers' cooperative, communications with relatives and friends in cities; agricultural, health, and educational information; and so on. Some telecenters are set up in a van, providing mobile access to the Internet that comes to people where they are (Mensah 2001).

4. **Telemedicine.** There is a dearth of medical professionals in Sub-Saharan Africa. There does not seem to be any sustainable solution in sight for training and deploying professionals in the near future, other than temporary assignments by outsiders. However, telemedicine services offer a promising hope for taking care of many medical needs such as conducting remote consultations, transferring X-ray information for examination, providing follow-up care, and generally providing many medical services that patients would have otherwise foregone if there were no other solution. There are already many systems in place that link medical centers and clinics in various African countries to better-staffed centers in other African countries or in the West (SATELLIFE 2001). Also, the rural areas can access telemedicine services through regional telecenters as I have described. These telemedicine units can conduct remote consultations; can transfer X-ray information for examination; can provide follow-up care; and can generally provide many medical services that the patients would have otherwise foregone if there were no other solution.
5. **Online education.** One of the unfortunate features of the poor economic situation in Sub-Saharan Africa is that with the poor educational infrastructure, there is little opportunity

for the poorly educated future generation to attempt to solve the region's current problems. Even though technology is rapidly transferring in developed regions of the world, there is little opportunity for this knowledge to be transferred for the benefit of SSA. However, with online education, Africans with Internet access can obtain world-class education from anywhere in the world. There have been a number of initiatives of various scopes in this direction (SAIDE 1999). For example, the African Virtual University (http://www.avu.org) organizes and collects Web-based courses for the benefit of Africans who are able to use this resource.

1.4 E-Business

E-business—business transactions or processes using the Internet—is just one dimension of the benefits that the Internet can bring to developing countries (Chifwepa 1998); I have described a number of other important dimensions above. However, e-business stands out in that it generates income from economic activities for citizens of a developing country who are engaged in commercial enterprise. Moreover, it provides employment and generates government revenues in taxes. Thus, e-business has the potential to be self-propagating and self-sustaining, the holy grail of development researchers and organizations on their quest for sustainable development, that is, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNDSD 2003). By fostering internal and external trade, e-business might create and attract wealth that could be used to develop structural infrastructure such as roads, telecommunication networks, and dams; and social infrastructure such as hospitals and schools. Hence, focusing on the commercial applications of the Internet in developing countries is a valuable perspective, since such applications potentially would have significant beneficial effects on all other applications of the Internet, such as telemedicine, online education, and electronic government.

Although the Internet has existed since the 1970s, it was not until the 1990s that it really took off. It can be argued that the Internet got its big break when it extended from primarily military and academic applications, past personal communications, and into commercial applications. This is primarily because commercial establishments have the funds to invest significantly in the infrastructure that enables the Internet to operate. Perhaps just as important is the fact that profit-minded citizens are most likely to have the entrepreneurial drive to come up with creative solutions for problems, and the motivation and clout to lobby the government to make things happen.

The term "e-business" is often used interchangeably with "e-commerce", both applying to all or most aspects of conducting business using the Internet:

> The term *commerce* is viewed by some as transactions conducted between business partners. Therefore, the term *electronic commerce* seems to be fairly narrow to some people. Thus, many use the term **e-business**. It refers to a broader definition of [electronic commerce], not just buying and selling but also servicing customers and collaborating with business partners, and conducting electronic transactions within an organization. (Turban, Lee, King and Chung 2000)

Others, in contrast, distinguish between the two terms, using "e-commerce" to refer to business-to-consumer (B2C) business transactions, and restricting "e-business" to business-to-business (B2B) transactions, as well as internal organizational use of the Internet for business operations (such as intranets) (Laudon, Laudon and Brabston 2002). Another, newer term that is also used is "Net-enablement" or "Net-enhancement", terms that represent "the ongoing changes in business processes brought about between organizations through the Inter-'Net' or through nonpublic 'Net'-works" (Straub 2002 p. 116).

In this paper, I follow the distinction between B2C-focused e-commerce and B2B-focused e-business for reasons I will explain shortly. B2C and B2B e-commerce have different impacts. In a report on global e-commerce, the United Nations Conference on Trade and

Development (UNCTAD) noted, "It is well known that e-commerce takes place essentially between enterprises, so that B2B amounts to around 95 per cent of all e-commerce in most estimates", (2002 p. 8). Although the report observed that B2B is presently very limited in developing countries, it argued (p. 9):

> Facilitating the take-off of B2B in developing countries is important because of the opportunity for growth that it represents. After all, if e-commerce matters for development it is not because it is a fancier or more convenient way to go shopping: e-commerce matters because it allows enterprises to generate efficiency gains at all the stages of their production and distribution processes. It is these gains, made essentially through the adoption of B2B and e-business practices, that count for development, because they translate into improved competitiveness for enterprises and higher levels of productivity, and hence incomes for the economy as a whole.

Moreover, with the current state of e-commerce in Sub-Saharan Africa, there were only 5.6 Internet users per 1,000 citizens in the year 2000 (ITU 2001) (compare this with the United States' 338.7 per 1,000). With such scant access, there is no meaningful degree of B2C e-commerce at this time—at least, not with SSA citizens as the consumers. While there is an electronically-accessible market of consumers outside SSA, a primarily foreign consumer base might not be able to sustain viable B2C e-commerce.

However, all e-commerce involves businesses on at least one end of the interaction; thus, I believe that studying the e-commerce—or e-business—between businesses in SSA would be more profitable at this initial stage of exploration. For this reason, I restrict the focus of my study to e-commerce (or e-business) conducted between businesses.

For this study, I base my definition of "e-business" on Zwass' (1996) definition of e-commerce, which I modify to focus on B2B specifically using the Internet:

> Electronic business (e-business) is the sharing of business information, maintaining business relationships, and conducting business transactions by means of the Internet between businesses.

In Sub-Saharan Africa, a wide variety of businesses employ e-business. Many of these are technology-based organizations such as telecommunications providers, Internet service providers (ISPs), computer hardware providers, and providers of networking services. There are also many more traditional businesses that use the Internet to enhance their regular activities. These include handicraft businesses that use the Internet to sell their products overseas, banks that provide online services, businesses trying to implement knowledge management, and others. One possible business model that African business can follow is franchising. While SSA has not adopted this model widely, Africa Online, the continent's largest ISP and online content provider (roughly analogous to MSN in the United States), has set up numerous franchise-based Internet cafés called e-touch centers (Africa Online 2001).

There are two basic levels at which I can examine what contributes to effective e-business outcomes in Sub-Saharan Africa: the national level featuring national infrastructure, and the level at which culture operates. In the following sections, I describe these two levels as they relate to e-business in SSA, and present my specific research questions for this study.

1.5 National Infrastructure for E-Business in Sub-Saharan Africa

The UNCTAD (2002) report primarily identifies infrastructure that operates at the national level, such as the national ICT infrastructure and the government's attitudes and policies towards ICTs and e-business. In the opening quotation of this chapter, the United Nations Secretary-General directly linked e-business with economic development, a national-level construct. Indeed, the most fundamental motivation for this study is identifying e-business as a means for increasing economic development in Sub-Saharan Africa. As I have explained, I am most interested in e-business—as opposed to other applications of the Internet in SSA—because it provides the potential for Africans to generate income, employment, and other revenues.

Most development research and studies of ICT diffusion in the information systems literature operate on this level (Adam 1996; Adam 1997; Avgerou 1998; Javalgi and Ramsey 2001; Mansell 2001; Mbarika, Byrd, McMullen and Musa 2002; Mbogo 2000; Montealegre 2001; Powell 2001; UNECA 1999a). From these studies and from my own empirical investigation, I want to learn what this level of analysis can tell me about e-business in SSA. Specifically, I pose this as the first subject of investigation in this study:

Research Question 1: What kinds of national infrastructure contribute towards effective e-business outcomes in Sub-Saharan Africa?

1.6 Cultural and Social Issues Affecting E-Business in Sub-Saharan Africa

Another perspective from which to investigate e-business in Sub-Saharan Africa is to look at the effects of culture. An increasing number of studies in the information systems literature has discussed and studied the effects of culture on technology adoption and use (Baba 1995; Checchi, Sevcik, Loch and Straub 2002; de Vreede, Jones and Mgaya 1999; Hakken 1991; Hasan and Ditsa 1999; Hill, Loch, Straub and El-Sheshai 1998; Hofstede 1980; Ingold 1996; Korpela 1996; Okunoye and Karsten 2002; Powell 2001; Straub 1994; Straub, Loch, Evaristo, Karahanna and Srite 2002b; Straub, Loch and Hill 2001). It is helpful to specifically highlight some aspects of the cultural context of SSA that could affect the adoption of e-business. These examples illustrate that e-business in SSA would not simply involve the application of e-business and IT diffusion principles developed in the West to a new context. Rather, the cultural context of SSA is so sufficiently different that I would expect significant differences in the way e-business would be introduced and diffused in this region. I will discuss five unique cultural factors in the SSA context: credit cards, the marketplace culture, the incidence of corruption, female entrepreneurship, and community-based telecenters.

1. **Credit cards.** One of the most visible aspects of e-business in the West is B2C e-commerce involving ordering products online and having them shipped to you. This model is unlikely to work well in SSA for a number of reasons. First, the electronic payment systems are poorly developed in SSA (see Travica 2002). Most consumers operate with cash, and the few who work with checks are very cautious with them. They would not be likely to trust a website with their account number for an electronic check transfer. Even more untrusting would be the very few credit card users. Thus, consumer purchases would not likely be popular. This is a further reason why I focus on Internet-based commerce between businesses, for businesses might be more willing to arrange alternative forms of payment, such as purchase orders, that do not require rapid payment settlement.
2. **Marketplace culture.** Even if a consumer were to trust a website with such information, Africans do not typically have the culture of buying a product without tactile contact. The purchasing culture involves going to a market place with variable prices, where the consumer can feel and examine the product before haggling with the vendor on what price to pay for it (Steiner 1994). The e-business model developed in the West does not take variable prices into account. The Western model typically takes care of the physical examination concern by incorporating reasonable returns policies. Return policies are virtually unknown in SSA, as too many consumers would probably take too much advantage of them for the vendor to make a decent profit. Thus, B2C e-business is not likely to work well in SSA without major cultural adaptations.
3. **Corruption.** On the society level, one problem that hinders the progress of e-business infrastructure is corruption and nepotism (Easterly and Levine 2002; Eze 2002; Sachs and Warner 1997). This is actually a primary reason for the lack of significant development in

all economic dimensions, not just in the case of ICTs. Even when governments establish favorable policies such as free competition and budget allotments for ICT infrastructure development, the mismanagement and misdirection of funds often results in designated monies not being used for their assigned purposes. Moreover, it is hard to carry out many normal functions, such as getting a telephone line connected to your home, without bribing the workers to do what they are already being paid to do. With such a social atmosphere—and this problem pervades all levels of society in most SSA countries—it is difficult for socioeconomic progress to occur.

4. **Female entrepreneurship.** One interesting cultural feature in many SSA countries is the incidence of female entrepreneurship. The social structures are very male-dominated (especially compared to most Western nations). It is still quite common for a family to send the boys to pursue the highest quality education they can afford, and have the women do more practical work. One of these practical jobs assigned to women is selling products in the marketplace. As a result of being encouraged to get into business, a number of women develop quite a bit of business savvy and are able to become fairly successful (relative to the standard of living in SSA societies). Another aspect of this is that many women who do go to school are encouraged to do women's educated work, such as secretarial tasks. Since computers have keyboards like typewriters, they are often considered secretarial (this perception has been documented in the USA as well, in the earlier days of computing). Thus, there is a relatively higher proportion of computer literacy among women than would be expected in male-dominated societies. Combined with higher incidences of female entrepreneurship (though not necessarily or even usually would the same person be business- *and* computer-savvy), the cultural environment of SSA does give women a fairly equal footing in taking advantage of ICT

developments (UNCTAD 2002), relative to the gender balance (or imbalance in some Western nations).

5. **Community-based telecenters.** As described earlier, community telecenters with telephone, fax, printer and Internet-connected computer access provide a valuable resource to providing ICT services to Africans even in remote rural areas. Although these rural areas are geographically remote and the incidence of illiteracy within them is much higher, a few trained operators can bring in valuable services that could provide enormous benefits to the people who need them the most. The community telecenters model is particularly conducive to Sub-Saharan societies that tend to have a more communal culture than more technologically-advanced societies. Whereas the "personal computer" model assumes a situation where each user has a private computer, citizens of SSA are generally not as adverse to sharing computing devices among many people (Powell 2001). In another developing country context, the Simputer Trust (www.simputer.org) has designed a portable computer tailored for poor Indian societies, with a user model whereby a neighborhood or even an entire village might share a single computer. While this is somewhat different from the community telecenters model, it is similarly based on the collective culture of the computer users.

These are only a few examples of how cultural and social issues might affect the adoption and use of e-business in SSA. However, when studying e-business, a more pertinent aspect is the cultural effects that operate within organizations. A few studies have examined the cultural effects on technology in Sub-Saharan Africa, examining how culture affects the use of ICTs within organizations (de Vreede, Jones and Mgaya 1999; Hasan and Ditsa 1999). These studies have indicated that culture might play an important role in how organizations in SSA use technology. However, there has not been any research that examines its effect specifically on e-

business. In light of the probable importance of culture, I investigate a second question in this study:

Research Question 2: What cultural factors contribute towards effective e-business outcomes in Sub-Saharan Africa?

Before I conclude this chapter, I will explain and justify why I take a particular approach of studying experts and their assessments of e-business, rather than trying to study these effects more objectively.

1.7 Expert Assessments of E-Business in Sub-Saharan Africa

In this study I present three theoretical models: a national model of e-business in SSA, a cultural model, and an overall model that encompasses both national and cultural dimensions. For testing such complex theoretical models, there are two general approaches I could take. The first option would be to find objective measurements of each construct for the SSA countries. For example, I could use objective measures of ICT infrastructure from figures compiled from sources such as the International Telecommunication Union. However, this approach has some severe limitations for this present study. In particular, objective measures of e-business outcomes would be very hard to come by. While there is a fair amount of e-business activity presently going on in Sub-Saharan Africa, it has not developed to the extent that there is any sort of database of companies that use the Internet to do business. Thus, there is an insufficient population to make such a study practical at this time, if I were to use organizations as the unit of analysis. Another problem with taking an objective approach is that the dimensions of culture are inherently subjective; there is no "objective" measurement of culture (Hasan and Ditsa 1999; Hill et al 1998; Hofstede 1980). For these reasons, testing my model through purely objective measures does not appear tenable.

Alternatively, I could use a questionnaire-based survey to solicit subjective, perceptual responses from relevant individuals. Surveys are an established methodology for testing

theoretical models, since researchers can design questions tailored to their specific constructs. Also, they are not limited by the availability of objective measurements. The primary limitation, however, of survey research is that the responses are subjective, and might not always correspond to facts. Thus, I want to locate individuals who can accurately inform me about my research questions. A random sample of business people could not do this, not even those living in SSA. Rather, I could solicit the opinions of people who have expertise related to e-business in Sub-Saharan Africa. I would expect that the perceptions of relevant experts should be closest to the actual objective factors, rather than those of inexperienced persons who might also have an opinion on what affects e-business in SSA. I will adopt this latter approach, using a questionnaire-based survey of experts to solicit my data for this study.

With the purpose and direction of this study clear, I proceed by thoroughly reviewing the literature that sheds insight on what factors affect e-business outcomes in Sub-Saharan Africa. I draw from such diverse sources as information systems and economic development. From this review, I present specific hypotheses of what effects the factors I identify may have on e-business outcomes in SSA. In the following chapter I describe the methodology for a survey study to solicit information about these factors and relationships from pertinent experts. Next, I report the results of the study. I conclude by discussing my findings and their implications.

CHAPTER 2. LITERATURE REVIEW ON E-BUSINESS IN SUB-SAHARAN AFRICA

In this study, I draw from various streams of the information systems and related literature to identify key components that could help me understand the critical factors determining e-business outcomes in Sub-Saharan Africa. In this chapter I will first briefly describe the theoretical model I am proposing to explain the factors that produce favorable e-business outcomes in SSA. Then I will discuss each construct in the model in detail, and present specific hypotheses. As I examine the literature, I will explain how this review aids in answering my two research questions:

1. What kinds of national infrastructure contribute toward effective e-business outcomes in Sub-Saharan Africa?
2. What cultural factors contribute toward effective e-business outcomes in Sub-Saharan Africa?

2.1 Overall Model of E-Business Outcomes in Sub-Saharan Africa

Information systems research has produced many frameworks that examine different dimensions of factors necessary for supporting e-business (for a comprehensive review, see Ngai and Wat 2002). This research covers e-business applications, technological issues, support and implementation, and many other aspects. In addition, theories on technology and innovation transfer, adoption, and diffusion have emerged that are helpful in understanding how ICTs can spread in a country (Fichman 2000; Moore and Benbasat 1991; Rogers 1995). By investigating organizational characteristics—both individual and in the environmental context—analysts can assess the fit of the Internet to an organization's need and determine what would enhance its widespread adoption and use.

There has also been an increasing amount of literature on the factors that affect development of the Internet and e-business in developing countries (Dutta 1997; Mbarika 2001; Mbarika, Byrd and Raymond 2002; Montealegre 1996; Montealegre 1998; Montealegre 2001; Travica 2002; Wolcott, Press, McHenry, Goodman and Foster 2001). There have been mixed results about the similarities and differences in Internet and e-business diffusion between developing countries and developed countries, which I discuss in detail in this chapter. There is a strong need to understand the contextual settings of the developing countries being studied in order to effectively apply Internet and e-business technologies—developed in the West—to these countries (Heeks 2002; Schech 2002).

2.1.1 APIT and ACIT

In the midst of this breadth of research, one notable stream has been the research produced by the Arab Policy and IT (APIT) and Arab Culture and IT (ACIT) projects (Straub 2001). These projects are based on a research model of information technology transfer, which I represent in Figure 2.1. The APIT and ACIT projects have spawned a large stream of research that investigate various aspects of ICT outcomes in developing countries in general, and in Arab nations in particular (Checchi et al 2002; Hill, Straub, Loch, Cotterman and El-Sheshai 1994; Hill et al 1998; Loch, Straub and Kamel 2000; Meso, Checchi, Sevcik, Loch and Straub 2003; Rose and Straub 1998; Straub et al 2002b; Straub, Loch and Hill 2001).

The primary goals of the APIT/ACIT model are to answer the questions: "(1) How do national information technology (IT) policies affect IT transfer (ITT)? (2) Which transfer implementation factors affect ITT? and (3) What role does culture and technological culturation play in ITT?" (Loch, Nelson and Straub 2000). In the model, National ICT Policies positively influence ITT/ICT Outcomes. Transfer Implementation Factors also influence ITT/ICT Outcomes, but the effect might be positive or negative, depending on the specific factor. Culture-

Specific Beliefs and Values likewise have various effects on Outcomes. Technological Culturation, however, is theorized to have a positive effect on ITT/ICT Outcomes. In addition to these direct effects, the model argues that Culture-Specific Beliefs and Values and Technology Culturation both moderate the effects of Transfer Implementation Factors. I discuss each of these constructs in greater depth when I present the constructs for my present models below. The APIT/ACIT model also proposes that ITT/ICT Outcomes have a positive effect on both Economic Development and Socio-Cultural Change, but these relationships are outside the scope of the APIT and ACIT projects.

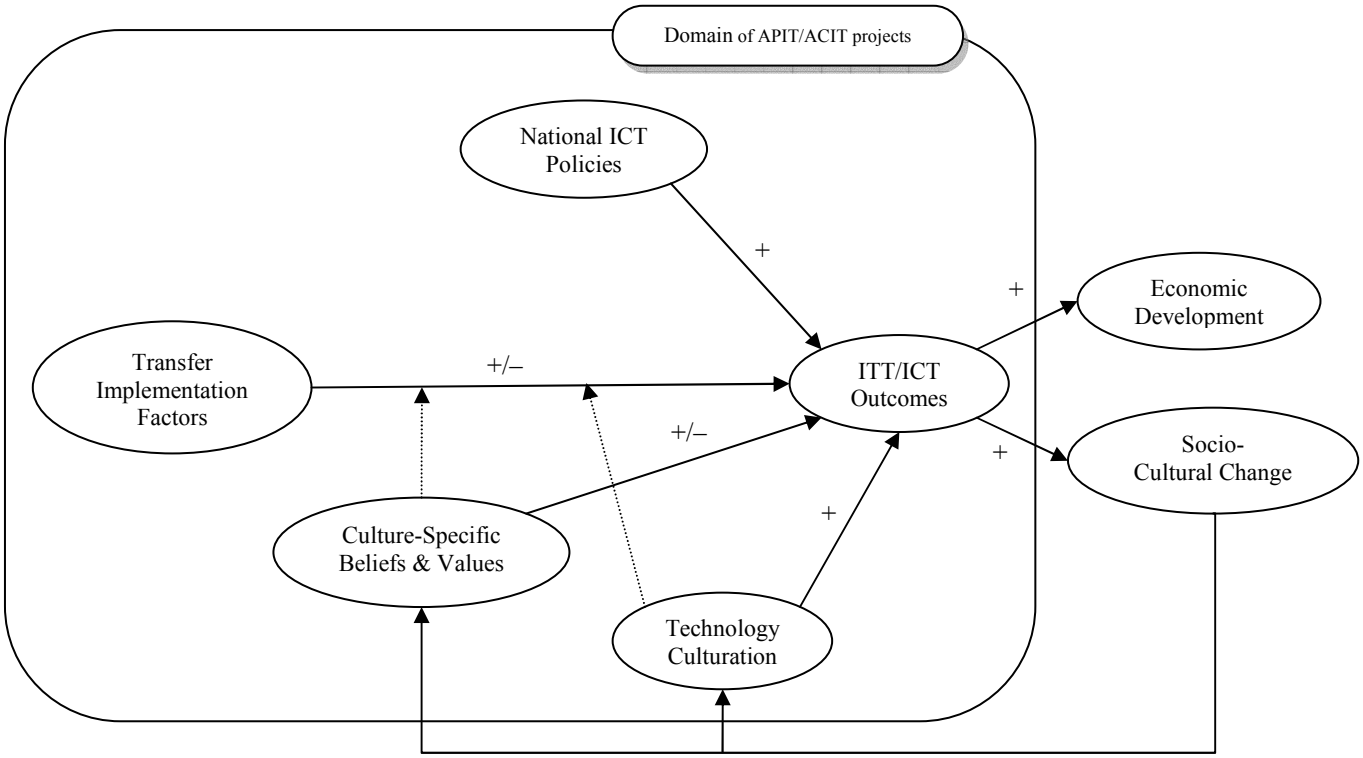

Figure 2.1. APIT/ACIT research model of information technology transfer (Checchi et al 2002)

This theory base is very helpful for my present study, particularly because its theoretical constructs decompose neatly into national-level and cultural components. National ICT Policies are obviously at the national level. Transfer Implementation Factors, Culture-Specific Beliefs

and Values, and Technology Culturation operate at the cultural level. Thus, for my overall, national infrastructure, and cultural models, I use the APIT/ACIT model of IT transfer as my primary theoretical base.

2.1.2 Model of E-Business Outcomes in Sub-Saharan Africa

Drawing from the different research streams of e-business frameworks, ICT diffusion, and ICTs in developing countries, I have developed a general model that explains what pertinent factors affect e-business in Sub-Saharan Africa. In my model, the primary endogenous (dependent or predicted) construct is **E-business Outcomes**, indicating the practice of e-business. This construct has two dimensions: **E-Business Capabilities**, the specific business functions that e-business is used for, and **E-Business Value**, consisting of measures of the benefits of using e-business.

The model has six predictor constructs that I postulate directly affect e-business outcomes: ICT Policies, ICT Infrastructure, and Institutional and Commercial Environment on the national level; and ICT Transfer Implementation, Culture-Specific Beliefs and Values, and Technology Culturation on the cultural level. On the national level, **ICT Policies** reflect the aspirations of government policy makers to prioritize ICTs for national development. This construct reflects both **General ICT Policies** and **E-business Policies**, that is, those specifically tailored to e-business. **ICT Infrastructure** is the telephone, wireless, and telecommunications infrastructure in a country that facilitates data communications. I postulate that both ICT Policies and ICT Infrastructure have a direct effect on e-business outcomes, and that ICT Policies also have a direct effect on ICT Infrastructure. Thus, ICT Infrastructure is an endogenous construct that is both a predictor and itself predicted. Next, I have the **Institutional and Commercial Environment** that affects the practice of business in general, and—in my model—e-business in particular. These factors include the effectiveness of governance in the **Institutions** dimension, and the conduciveness of the traditional commercial environment in the **Commerce** dimension.

On the cultural level, **ICT Transfer Implementation** affects the effectiveness of the process of adopting ICTs in general, and e-business tools and practices in particular. At this level there are two specific culture factors: First, **Culture-Specific Beliefs and Values** specifically includes the effects of **Power Distance** and **Uncertainty Avoidance** on E-business Outcomes. **Technology Culturation** is the influence of technologically-advanced cultures on an individual's attitude to technology. In addition to their direct effects on e-business, I propose that the cultural factors also moderate the effect of ICT Transfer Implementation.

All the factors in the model assert a positive influence on the construct they affect, except for Culture-Specific Beliefs and Values. In general, some such factors could be positive, while others might be negative, as I describe below. However, in my specific model where I use Power Distance and Uncertainty Avoidance, I propose that both of these effects (and corresponding interactions) are negative.

In the rest of this chapter, I will examine each construct in detail. I describe the theoretical development of each construct in the literature and derive the hypotheses I postulate in my model. Figure 2.2 graphically portrays the overall model I propose here.

It is important to note that, although this study assesses experts' perceptions of what factors are most pertinent for effective e-business in SSA, the models I present here can be used, as I do in this study, to represent either objective measures of the constructs or subjective perceptions. I explained in the introduction why I chose to focus on experts' assessments at this time, but in my concluding chapter I discuss testing this model using objective measurements of the constructs.

I continue this chapter by discussing my theoretical development of E-business Outcomes, the primary predicted construct. Next, I give a detailed review of the literature on each construct, first in the national model, and then in the cultural model. I conclude with a summary of my models for this study.

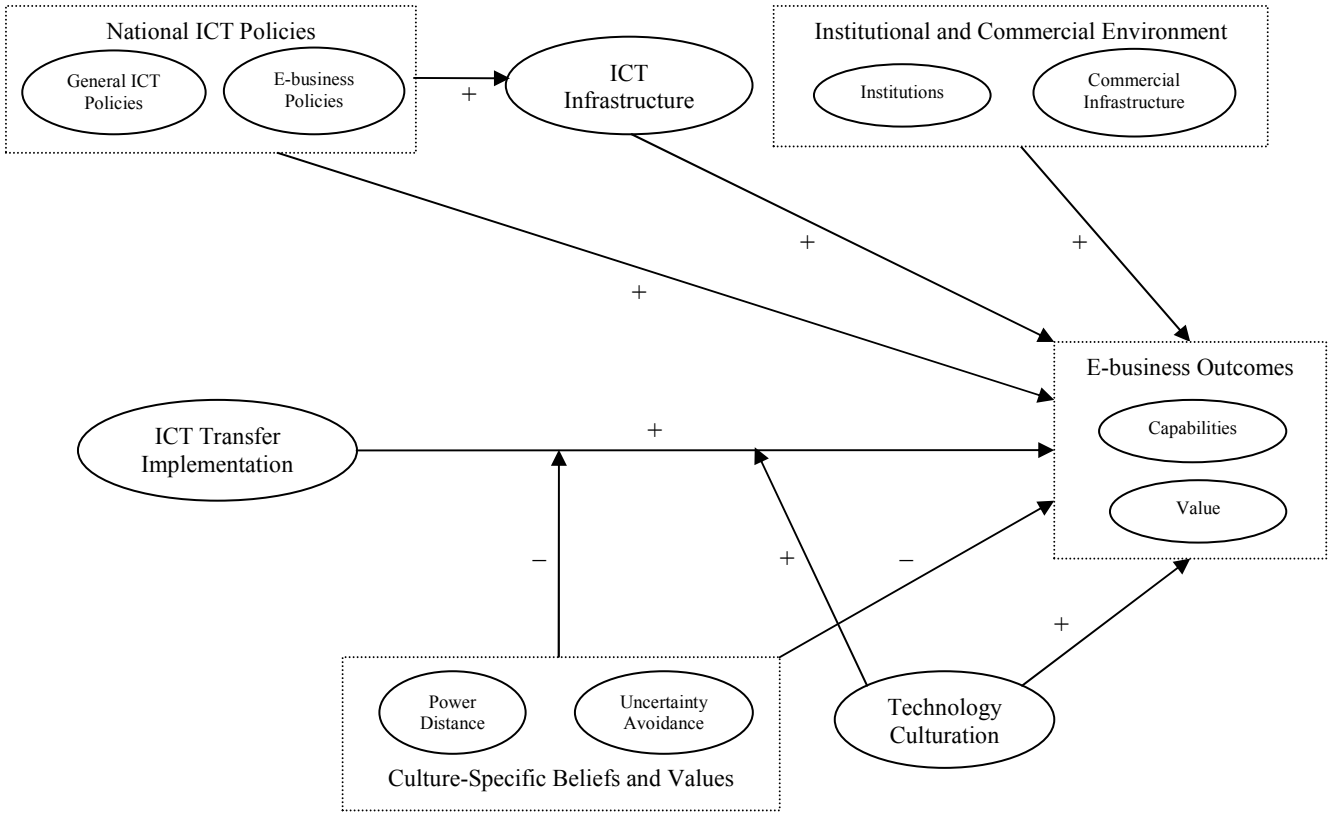

Figure 2.2. Overall model of e-business outcomes

2.2 E-Business Outcomes

Since 1993, there have been a number of frameworks developed that examine different dimensions of infrastructure, features, and factors necessary for the support of e-business. Ngai and Wat (2002) located 275 articles on e-business in nine prominent information systems journals. They found classified these articles into the categories of e-business applications, technological issues, support and implementation, and other.

In the midst of the abundant research on e-business (see Ngai and Wat (2002) for a comprehensive review), some studies have tried to understand what e-business actually *is*, attempting to arrive at definitions and conceptual frameworks that help get a grasp on this relatively new phenomenon (Dekleva 2000; Kimbrough and Lee 1997; Wigand 1997; Zwass

1996). Furthermore, various studies have tried to better understand the key issues that determine business use of the Internet (Vadapalli and Ramamurthy 1998) and how businesses can use the Internet for competitive and strategic advantages (Javalgi and Ramsey 2001; Sprano 2000).

In the inaugural issue of the *International Journal of Electronic Commerce*—"the first scholarly publication entirely devoted to E-business" (Zwass 1996)—Zwass presents a hierarchical framework that delineates various levels of what makes up e-business. This framework attempts to be generic and universally applicable. However, it is tailored to the context of a developed country, and implicitly assumes the social and legal backdrop of the United States of America. Although I am studying e-business in Sub-Saharan Africa—a very different context—I need to understand how e-business has been conceptualized in the contexts where it has proven most successful. Whether e-business in SSA will follow or deviate from its practice in developed countries depends on understanding frameworks such as Zwass' and using them as bases for comparison. Zwass' (1996) framework comprises seven levels grouped into three general layers. The physical layer, network layer, and hypermedia are listed as e-commerce infrastructure; secure messaging and enabling services are classified as e-commerce services; and products and services, and electronic markets and electronic hierarchies, are considered e-commerce products and structures. Here I list its categories, commenting on the current state of e-commerce in SSA in light of this framework:

1. **Physical layer**, pertaining to wide-area telecommunications infrastructure. SSA has a relatively poor wide-area telecommunications infrastructure (Odedra et al 1993; Petrazzini and Kibati 1999). The traditional Plain Old Telephone System networks provide the main data infrastructure, and this is currently concentrated in major cities, with little rural access. Currently, teledensity is still barely 1 land phone line for each 100

citizens in SSA (Mbarika, Jensen and Meso 2002). However—and largely for this very reason—wireless cellular networks are burgeoning, constituting the largest growth area in SSA telecommunications.

2. **Network layer** of public and private communication utilities. Few SSA countries have international Internet exchanges, with most countries connecting to the Internet via the United States and Europe. However, the number of ISPs is increasing, and these entrepreneurial ventures are proving very innovative in establishing various means of wired and wireless Internet access (Hamilton 2001b).
3. **Hypermedia** and multimedia object management. While different Internet services such as e-mail are increasing, the use of the World Wide Web—critical to e-commerce—is lagging behind for most SSA countries. This situation is made worse by the high costs of connecting to the Internet.
4. **Secure messaging** (e.g. e-mail and electronic funds transfer). While the use of e-mail is increasing, Short Message Service via cellular networks is the primary source of interpersonal messaging (Hamilton 2001b). There is currently a poor financial infrastructure for functional electronic funds transfer.
5. **Enabling services** (such as electronic catalogs and copyright-protection services). Important secondary Internet services that have potential to fuel e-commerce growth in SSA include speech-mail that can serve the high number of illiterate citizens (Hamilton 2001b), and digital libraries that could bring in a flood of previously inaccessible information.
6. **Products and systems** (such as online shopping and infotainement). One of the primary commercial uses so far is for journalism, with many African news sources available

online. Other applications in primitive stages include shopping (e.g. GhanaMall at http://www.ghanamall.com.gh) and banking (Hamilton 2001b).

7. **Electronic markets and electronic hierarchies.** Products markets are presently very limited. However, "Africa has a unique competitive advantages [sic] in … Business-to-Business export teleservices, an area which happens to be one of the fastest growing markets" (UNECA 1999a).

Zwass' (1996) framework approaches e-business primarily from a technical and application perspective. It focuses on what e-business can do for its individual and organizational users, and what it practically takes to enable such functionality. His framework provides several valuable perspectives to my study by distinguishing levels of e-business technical infrastructure that need to be developed for the effective and advanced practice of e-business. His distinction between the physical and network layers of infrastructure is important, since the wired and wireless media that support the Internet might be originally set up for other telecommunications purposes, notably voice calls. To set up Internet exchanges and dedicated data lines is a distinct step in paving the way for e-business.

Levels 3 to 6 of the framework capture enabling technologies and applications of e-business of increasing complexity; these levels are similar to dimensions in the other frameworks I review here. However, Level 7 is unique among the frameworks I examine here, being the only one that discusses electronic markets and electronic hierarchies:

> Electronic marketplaces are created to facilitate transactions over telecommunications networks between multiple buyers and multiple suppliers. Electronic hierarchies are long-lasting supplier-customer relationships between firms, maintained with telecommunications networks and coordinated largely by management, rather than by market forces. (Zwass 1996 p. 8)

2.2.1 Dimensions of E-Business: Capabilities and Value

From my literature review, I observed that there are two general aspects to evaluating e-business, particularly from an empirical perspective. First, many studies examine the actual applications and functionality that e-business enables; that is, they emphasize the **Capabilities** that e-business enables, such as providing product information, interactive websites, online transactions, etc (Kardaras and Karakostas 2001; Vadapalli and Ramamurthy 1998; Zhu and Kraemer 2002). One of the challenges in harnessing the potential of e-business has involved understanding how best to measure it in order to maximize its benefits (Dekleva 2000). In 2002, *Information Systems Research* devoted two special issues (volume 13 issues 2 and 3) to research on metrics for e-business. These papers examined different aspects of e-business and their unique metrical considerations (Devaraj, Fan and Kohli 2002; Lee 2002; McKinney, Yoon and Zahedi 2002; McKnight 2002; Straub, Hoffman, Weber and Steinfield 2002a; Straub 2002; Wheeler 2002; Zahra 2002; Zhu and Kraemer 2002). While some of these studies look at technical performance metrics such as website speed and attractiveness, they also include metrics that indicate the extent of use of e-business features such as e-mail, informational versus transactional websites, and data interchange via Internet-based EDI or XML.

A second aspect of evaluating e-business involves assessing if it delivers its promised benefits; that is, if it provides **Value** to the businesses that employ it (Dekleva 2000). Value, or the success of e-business, can be measured from many different perspectives (Boon, Britz and Harmse 1994; Bridges.org 2001; CID 2000; Kardaras and Karakostas 2001; Zhu and Kraemer 2002). It can be evaluated in terms of increases in sales, profits, or customers. It can be seen from the perspectives of saving costs, increasing process efficiency, saving time, reducing personnel requirements, and so on.

In this study, I examine how various factors at the national infrastructural and cultural levels affect e-business outcomes. Although E-Business Capabilities and E-Business Value are closely related, I believe they are distinct enough that a factor might have different effects on these two dimensions of E-business Outcomes. For example, an ICT policy that increases the government's use of the Internet in government operations might increase the value of e-business by providing a larger market (the government), but it might be hard to detect how such a policy might significantly increase the incidence and implementation of any particular e-business capability. From another perspective, the availability of wireless networks might enhance mobile commerce capabilities, but this might not necessarily be economically valuable. For all the constructs in my models, I postulate their effects on each of these two dimensions of E-business Outcomes. Although I have pointed out that the effects might be different on the capabilities and value dimensions of e-business, I hypothesize in every case that they will be in the same direction; that is, either both positive or both negative. One of the contributions of this study is to explicitly make this distinction in a single theoretical model.

In the remainder of this chapter, I examine each individual construct in my models. First, I present my national infrastructure model and discuss the literature on each of its constructs: ICT Policies, ICT Infrastructure, and the Institutional and Commercial Environment. Next, I present the cultural model and discuss its constructs: ICT Transfer Implementation, Culture-Specific Beliefs and Values, and Technology Culturation.

2.3 National Infrastructural Model of E-Business Outcomes

The model I propose here has three predictor constructs that I postulate directly affect e-business outcomes on the national level. **ICT Policies** has two dimensions: **General ICT Policies** and **E-business Policies**. I propose that **ICT Infrastructure** is unidimensional, whereas the **Institutional and Commercial Environment** has two dimensions: **Institutions** and

Commerce. In addition to their direct effect on E-business Outcomes, I postulate that both ICT Policies dimensions have a direct effect on ICT Infrastructure. Figure 2.3 displays the national-level model with all the postulated paths labeled with the specific hypotheses I offer in the following sections.

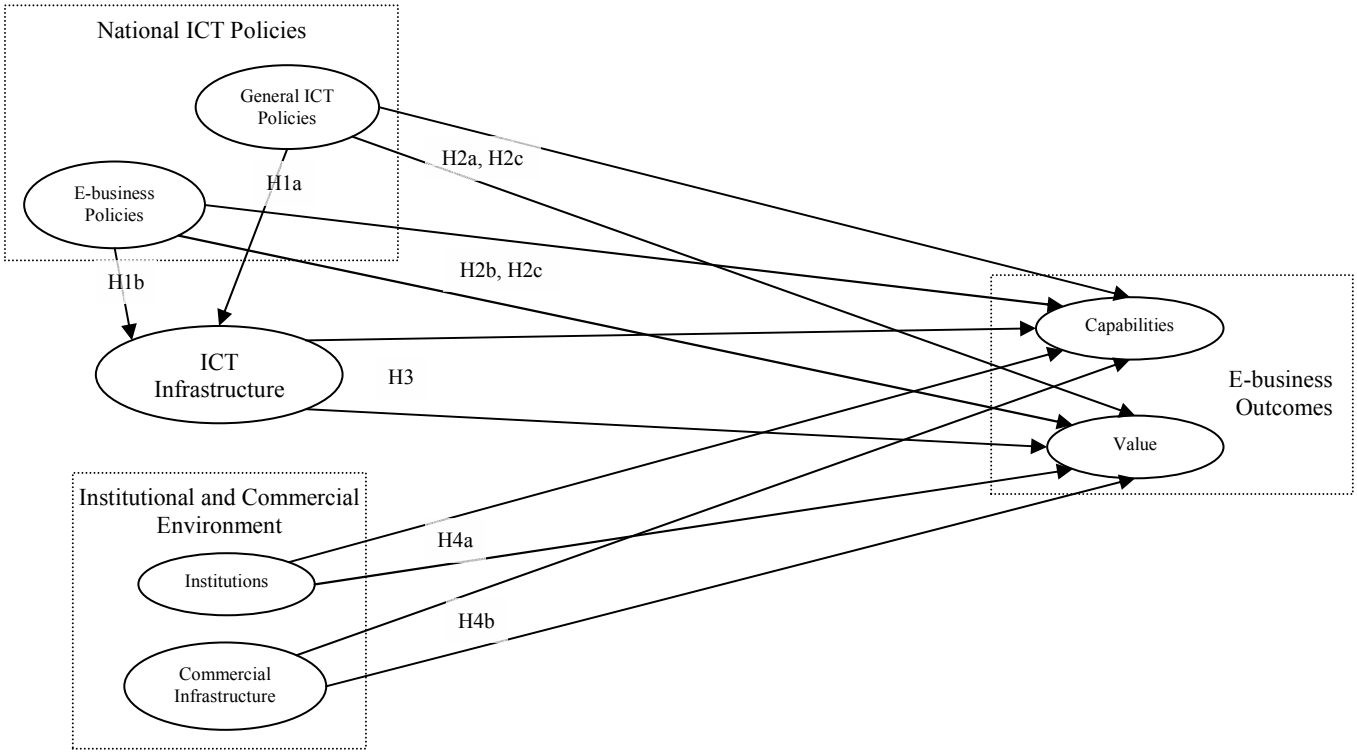

Figure 2.3. National infrastructure model of e-business outcomes

2.3.1 ICT Policies

The "specific technology policies that guide the development of information systems in a specific country", indicating "the level of support for technological development" (Loch, Nelson and Straub 2000 p. 5) is a widely recognized factor that affects both the diffusion of computers and the intensity of telecommunications (for example, see Kamel 1995; Kraemer, Gurbaxani and King 1992). There are many policy issues that affect the diffusion of ICTs in general and e-business in particular.

Mbarika (2001) reviewed the literature for policy issues that specifically concern ICTs in the least developed countries of Africa. It is often the case that the government exerts excessive control over the national telecommunications operator. The government often operates national telecommunications directly, largely because the private sector is often incapable of operating such an infrastructure (ITU 1994). Although there has been a move towards deregulation and privatization of telecommunications in many countries, the process is still slow, often being opposed by government telecommunications ministries (Chowdary 1992) and national security forces (Pisciotta 1994).

In combination with inefficient state-run telecommunications, another major impediment to ICTs in SSA comes from the onerous tariff structure. It works out that the average telecommunications revenue per subscriber line in SSA is twice as much as in Europe, and four to six times as much as in the United States (Paltridge 1994). Subscribers are charged up to twenty times the US rate for the same call volume (Mbarika 1999). Considering the huge differences in per capita income, this unbalanced system severely impedes the growth of ICT usage in SSA.

Mbarika (1999) further explains that some governments that operate telecommunications ban the importation of equipment, compelling users to use the equipment they provide. Other policy-related problems include lack of awareness of global trends by telecommunications administrators (Jensen 1995), poor telecommunications pricing and investment policy (Saunders 1982), and neglect of ICT infrastructure in rural areas (Mbarika 1999).

2.3.1.1 General ICT Policies

Various studies have examined the effects of ICT policy on the development of ICT infrastructure (Checchi et al 2002; Dutta 2001; Easterly and Levine 2002; Gurbaxani et al 1990b; Hakken 1991; IDRC 1998; King et al 1994; Kraemer, Gurbaxani and King 1992; Raman and

Yap 1996; Tractinsky and Jarvenpaa 1995; Wild and Mncube 1996). King et al (1994) frame ICT policies in terms of how national institutions either influence or regulate the demand or supply of ICTs and technology innovation. They argue that these institutional effects occur through acts of knowledge building, knowledge deployment, subsidies, mobilization, standard setting, and innovation directives. Montealegre (1999) used this framework to study the temporal progression of ICT adoption in four Latin American countries, affirming that societal institutions are important for successful adoption, and further arguing that the institutional effects occur progressively in time. Raman and Yap (1996), using the same framework, found that the Malaysian government's policies influencing the supply and demand of ICTs succeeded in creating an information-rich society. Gurbaxani et al (1990b) found similar results in Singapore.

In a survey of ICT policies in Egypt, Checchi et al (2002) found that one of the most fundamental policy-related measures that country implemented was to establish a Ministry of Communications and Information Technology in 1999. This provided a strong base of support to implement specific policies, such as reducing taxes on computer importation, increasing public awareness and computer literacy through training programs, privatizing telecommunications, and establishing tax-haven "smart villages" for high-tech firms.

These studies generally indicate that policies that favor the development of ICTs help the growth of national ICT infrastructures. However, there have been a number of studies that specifically examined or argued the specific effects of ICT policy on e-business with similar findings (Bridges.org 2001; Dekleva 2000; Kardaras and Karakostas 2001). From the literature I examined, I offer the following hypotheses:

Hypothesis 1a: National policies that favor the development of ICTs in general will increase the level of ICT infrastructure in Sub-Saharan Africa.

Hypothesis 2a: National policies that favor the development of ICTs in general will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

2.3.1.2 E-Business Policies

The literature on e-business policy is new and relatively sparse, so most of the existing literature I draw from focuses on ICTs in general. However, a few studies have examined the effects of ICT policy that focuses on issues peculiar to e-business, such as those concerning digital signatures and intellectual property rights for digital products (Bridges.org 2001; Jarvenpaa and Tiller 1999; Kardaras and Karakostas 2001). Jarvenpaa and Tiller (1999) call on managers to align their e-business strategies with the policy environments in which they find themselves, as such strategic alignment is critical for effective e-business outcomes. They pose a number of questions for research, asking researchers to explore and understand the current policy environment, and to find ways that e-business can "structure its assets and resources to take advantage of the uncertain policy environment" (p. 244). Checchi et al (2002) found that the Egyptian government has implemented a few policies specifically focused on e-business, including encouraging e-commerce activity within the government itself, and supporting the e-business legal framework by enacting laws concerning copyrights, digital signatures, and digital certificates. These studies indicate that such targeted policy is necessary for effective e-business outcomes, over and above the effects of more general ICT policy. Thus, I also hypothesize:

Hypothesis 1b: National policies specifically tailored to promote e-business will increase the level of ICT infrastructure in Sub-Saharan Africa.

Hypothesis 2b: National policies specifically tailored to promote e-business will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

Hypothesis 2c: National policies specifically tailored to promote e-business will (i) increase capabilities more and (ii) yield more valuable e-business outcomes than will general ICT policies in Sub-Saharan Africa.

2.3.2 ICT Infrastructure

To enable the use of the Internet, Sub-Saharan countries need solid telecommunications infrastructures (Adam 1996; Mbarika 2001). In the past, telecommunications development has usually been measured in terms of teledensity, the number of land telephone lines per capita (for a review, see Mbarika, Byrd and Raymond 2002; Mbarika, Byrd, Raymond and McMullen 2001). However, with the increasing spread of wireless telecommunications, I believe a broader perspective needs to be taken in identifying telecommunications infrastructures that enable the spread of the Internet (Kibati and Krairit 1999; Peha 1999). Following McLoughlin (2000 p. 2), an ICT Infrastructure is defined as a "physical system of telecommunications pathways and connections that transmit voice, video, and data, and encompassing a web of telecommunications, information, and computing technologies."

2.3.2.1 GDI Framework of Internet Diffusion

For a holistic perspective on the different components of ICT infrastructure, it is helpful to evaluate a country or region's infrastructural preparedness to engage in Internet and e-business activities. Since 1997, the Mosaic Group has undertaken the Global Diffusion of the Internet Project (GDI), an extensive investigation of the spread of the Internet into countries all around the world (Wolcott et al 2001). One of the primary products of GDI has been a framework for assessing the most pertinent dimensions of Internet diffusion at the national level. This GDI Framework is similar in concept to several of the e-readiness assessment tools created and gathered by non-governmental organizations such as Bridges.org and InfoDev, the World Bank's Information for Development program. However, unlike the other e-readiness tools, the GDI framework has been rigorously developed and refined over a long period of time, and has been conducted on almost 30 countries, representing every continent and every major socioeconomic group of countries. Among Sub-Saharan countries, GDI investigations have been conducted on Cameroon, Kenya and Uganda.

The GDI Framework has six dimensions that it uses to conceptualize the state of Internet diffusion in a country. As before, I briefly comment on the state of SSA in light of each category of the framework:

1. **Connectivity Infrastructure** "assesses the extent and robustness of the physical structure of the network" that supports the Internet (Wolcott et al 2001 p. 14). It includes the domestic backbone, international links, Internet exchanges, and methods of accessing the Internet. By the GDI system, most Sub-Saharan countries would probably be classified as "thin": there is frequently no domestic backbone, and most International links are less than 64Kbps (ITU 2001).
2. **Geographical Dispersion** measures the extent to which Internet use is spread throughout the country, ranging from being accessible in just a few major cities to rural access. In most SSA countries, there are only one to three cities with Internet access. In SSA, around 34% of the population lives in urban areas (World Bank 2001), and the rural majority have little if any Internet access, and hence few options for e-commerce. This economic divide is largely due to disparity in income and literacy between urban and rural Africans.
3. **Organizational Infrastructure** refers to the market environment for Internet service providers (ISPs), including the extent and nature of privatization of national telecommunications. Virtually all SSA countries would be classified as "controlled": there is usually just a single public telecommunications operator owned and controlled by the government. However, there is a widespread move for privatization and licensing for Second National Operators to allow for competitive, market-driven telecommunication markets (Hamilton 2001a).

4. **Pervasiveness** of use among individuals measures per number of Internet use per capita. Based on data from the International Telecommunication Union (ITU 2001), SSA had approximately 3.1 Internet users per 1,000 citizens (7.5 if South Africa is included).
5. **Sectoral Absorption** captures the commitment to Internet use (as measured by leased lines and Internet servers) in the four major sectors of academia, commerce, healthcare, and government. While the Internet is used to some degree in SSA in all four sectors, I estimate that fewer than 5% of these organizations have Internet connections beyond dial-up.
6. **Sophistication of Use** tries to measure how innovatively the Internet is used in a country, and to what extent the Internet transforms traditional practices for both individuals and organizations. Most SSA countries would probably be classified, "Minimal: The user community struggles to employ the Internet in conventional, mainstream applications."

The GDI Framework is unique in that it has two general emphases. On the one hand, it looks at the absolute degree to which the Internet is being used (as measured in Connectivity Infrastructure, Organizational Infrastructure, and Sophistication of Use). On the other hand, it has a strong diffusion focus, examining how widely the Internet is used geographically, among individuals (Pervasiveness), and among organizations (Sectoral Absorption).

The GDI Framework is one of the many e-readiness assessment tools compared in a report by Bridges.org (Bridges.org 2001). (The report refers to the GDI Framework as "Mosaic", the name of the research group that created the framework.) The report does not attempt to identify an overall "best" assessment tool, but rather notes which tools are best for specific goals. In their evaluation, the GDI Framework is distinctively valuable for the following reasons:

- It provides valid cross-national statistical analysis.

- "If the goal is to assess the current level of technology in a region as a basis to forecast future technology levels … the Mosaic method provides a detailed and deep understanding along six different axes."
- "If the goal is to understand the relative roles of political, economic, and social factors in technology's growth and usage … the Mosaic framework provides a detailed narrative analysis of these factors (though with less focus on the social factors), and conceptualizes the analysis with respect to another country."
- "If the goal is to understand the [reasons] why particular countries progress differently, the case-study method used by Mosaic … is appropriate."
- The Mosaic model takes the perspective "that the unique cultural and historical environment of a region must be taken into account as part of a national ICT policy to truly gauge the country's e-readiness for the future".

2.3.2.2 ICTs in Sub-Saharan Africa

Beyond the traditional conceptualization of teledensity as the number of land telephone lines per capita (Mbarika, Byrd and Raymond 2002), wireless telecommunications are increasingly becoming a significant factor in the ICT landscape of SSA. This trend can be seen in comparing land-line teledensity with cell-phone teledensity in SSA. In 2000, there was an average of 1.5 land lines for each 100 Sub-Saharan citizens, compared with the average of 2.7 per 100 for low income countries (UNDP 2001). In contrast, there were 1.9 cell phone subscribers per 100 in SSA, compared to 0.5 per 100 for low income countries. While these numbers are very low, it is remarkable that the cellular teledensity is higher than that for land lines. In fact, in 2000, SSA was the only region of the world where this was the case. With nearly no cellular services in 1990, this represents impressive growth in wireless media. Studies on ICTs in Africa will need to distinguish between wired and wireless media.

Sub-Saharan countries share a common set of problems regarding telecommunications. These problems include a huge gap between supply and demand, a strong distribution imbalance favoring urban over rural areas, poor quality of service, a long waiting time for new service, and peak traffic demands that exceed network capacity (Mbarika 2001). One reason for the problem is that in many Sub-Saharan countries, the government is still the main provider of national ICT infrastructure. Unfortunately, government officials are not always the most astute visionaries in understanding and implementing what businesses need.

Beyond general Internet use, for e-business in particular to be successful, a country needs the personnel and computer equipment (hardware and software) to build and maintain Internet applications. Sub-Saharan Africa has been called "the lost continent of the information technologies" (Odedra et al 1993 p. 25). It has fewer computers and lower ICT expenditure per capita than any other geographically comparable region (Odedra et al 1993). Similarly, there are few schools with computer science programs to develop an indigenous base of software developers. As a result, in its current state SSA is ill equipped to develop complex e-business websites and support software. Even in cases where e-business packages can be purchased off-the-shelf, Sub-Saharan Africa lacks professionals who can customize the systems for their unique company needs, and the unique cultural needs of Sub-Saharan Africans (Darley 2001). As a result, many of the major African websites are hosted from abroad, especially the United States.

The International Development Research Centre pointed to the over-dependence of most Sub-Saharan countries on foreign technicians and consultants in the maintenance of telecommunications infrastructures and the development and enactment of key telecommunications policy guidelines respectively (IDRC 1998). In many developing countries, technical experts from the West are preferred for maintaining systems. The dependency on

expatriates to do the maintenance may not help to develop the necessary know-how among the nationals for the development and maintenance of the systems. The expertise of nationals will not be affected by the local conditions such as poverty or political instability that might compel expatriates to leave the country, or discourage them from coming. Thus, I expect that the degree of dependence on domestic technical capabilities, as opposed to foreign resources, would significantly affect the telecommunications intensity of Sub-Saharan countries.

There has been a considerable amount of research arguing that ICT infrastructure is a necessary prerequisite for effective e-business outcomes (Bridges.org 2001; Dekleva 2000; Kardaras and Karakostas 2001; Mbarika and Byrd 2003; Mueller 1999; UNECA 1999b; Zwass 1996) . Other research has argued more generally about the effects of ICT infrastructure on economic development (Dutta 1997; Dutta 2001; Gilbert 1996; Mbarika et al 2001; Meso and Duncan 2000; Odedra-Straub 1993; Raman and Yap 1996; Salem 1986; Splettstoesser and Towry-Coker 1999), but I could argue, in the context of this present study, that this relationship is at least partially mediated by e-business outcomes. Based on this body of research, I hypothesize:

Hypothesis 3: Higher quality ICT infrastructure will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

2.3.3 Institutional and Commercial Environment

Institutional theories are helpful in understanding how the Internet and e-business might become successful in Sub-Saharan Africa. King et al's (1994) study that I described under ICT Policies helps in understanding the different kinds of institutional action that affect the diffusion of information technologies. Their framework explains how governments, academic institutions, industry consortiums, international development organizations, and other institutions that affect a large number of organizations are very important in affecting the diffusion of IT at regional and

national levels. Montealegre's (1999) empirical investigation of the temporal institutional factors that have contributed to the development of Internet infrastructure in four Latin American countries identifies specific institutional actors. He found that governmental agencies, academic institutions, private institutions, telecommunication providers, and international institutions all served important roles in advancing ICT adoption in these countries. Also using the King et al (1994) framework, Raman and Yap (1996) evaluated the influence of IT policies in Malaysia. They found that the government's explicit dedication to establishing an information society was critical to the success of ICT advancement in that country.

In general, I can identify two kinds of institutions that operate at the national level that would affect e-business outcomes in Sub-Saharan Africa: Governance Institutions and Commercial Infrastructure. **Governance Institutions** refer to the effectiveness of the government that lays a background for all kinds of social interactions, including business using the Internet. The **Commercial Infrastructure** refers specifically to those aspects of the institutional environment that provide support for business to go on effectively. At this level, I am looking at traditional business systems, rather than e-business. In the following sections, I discuss what literature has to bear on the Institutional and Commercial Environment, and I develop hypotheses of the effects on e-business in Sub-Saharan Africa.

2.3.3.1 Governance Institutions

Some research in developmental economics has studied the factors that contribute towards economic development in Sub-Saharan Africa (Easterly and Levine 2002; Sachs and Warner 1997). These studies measure the quality of institutions in terms of factors such as government regulation and bureaucracy, the rule of law, and corruption and graft. Sachs and Warner (1997) found that poor quality institutions contribute to low growth in gross domestic product (GDP), along with poor economic policies, disadvantageous geographic locations, and

unhealthy tropical climates. Easterly and Levine (2002) found that while the tropical situation did have an effect on SSA's poor economic performance, this effect was entirely mediated by the institutional infrastructure.

Although the institutional environment is recognized as an important factor in economic performance in general (Easterly and Levine 2002; Sachs and Warner 1997), as well as in the ICT literature (King et al 1994), it has not been a common factor in the e-business literature. For example, Splettstoesser and Towry-Coker (1999) pilot and present a model of information and decision centers as a solution to address the weak infrastructure in African developing countries resulting from ineffective national institutions; however, their focus is not specifically on e-business. Nonetheless, e-business, like traditional business, is set in an institutional context that might facilitate or hinder its successful operation. Although Sub-Saharan countries might enact far-reaching ICT and e-business policies, strong governance institutions are necessary to implement these visionary policies, otherwise they amount to little more than ineffectual politicking. Thus, I include this construct in my model, believing that high quality institutions are conducive to effective e-business. I hypothesize:

Hypothesis 4a: More functional and stable national governance institutions will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

2.3.3.2 Commercial Infrastructure

In presenting the E-business Outcomes and ICT Infrastructure constructs, I used Zwass' (1996) and Wolcott et al's (2001) models of e-business and ICT dimensions as bases to frame my discussion. One shortcoming of these frameworks is that they are not specifically tailored to a developing country context. While many of the factors these studies highlight are universally applicable, developing countries face a number of unique issues that are not major factors in the developed countries in which most theories of e-business and IT diffusion are set (Bingi, Leff,

Shipchandler and Rao 2000; Travica 2002). In his study of e-business diffusion in Costa Rica, Travica (2002) provides a valuable framework that captures many of these issues in dimensions that foster more careful analysis. He explicitly incorporates many important factors that the other frameworks take for granted, such as infrastructure for physical transportation of goods and consumer culture pertinent to e-business. His framework is based on six layers of infrastructure required to support e-business in a developing country:

1. Transportation for delivering physical goods and documents;
2. A reliable delivery system such as effective postal services;
3. Internet-enabling telecommunications, including both physical and legal infrastructure to facilitate the efficient operation of the Internet;
4. A functional software industry to develop and support the necessary Internet applications;
5. E-payment infrastructure, which includes a widespread and effective credit card system, as well as secure and efficient banking; and
6. A cultural layer, which refers to the various cultural aspects of consumer behavior that will incline individuals to use the Internet for commercial activity.

Using this framework, Travica (2002) found that Costa Rica has many challenges in its transportation and delivery systems. Telecommunications is gradually increasing, and the software industry is growing encouragingly. There are some e-payment options, but they are limited, restricted, and not widely used. Customers have not yet culturally adapted to the model of purchasing products online.

Conspicuously absent from Travica's analysis are those aspects that support B2B e-business. Moreover, Travica's perspective assumes the model of physical delivery of goods; it does not really address the online provision of services to consumers. In spite of these

limitations, unlike the other frameworks for the Internet and e-business I have discussed in detail (Wolcott et al 2001; Zwass 1996), Travica's is uniquely suited as a lens for understanding the multiple layers of physical, legal, socioeconomic, and cultural infrastructure for supporting goods-based B2C e-business in Sub-Saharan Africa. Thus, in this section I will use his framework as an outline to examine the context for e-business in SSA. However, as I have already discussed the telecommunications and software industry levels under ICT Infrastructure, I will focus here on transportation, delivery, and e-payment systems. I will discuss customer propensity towards e-business when I present the development of the culture constructs. Table 2.1 lays out the details of Travica's (2002) framework with the conditions in SSA.

Table 2.1: Infrastructural conditions for B2C e-business in SSA

Infrastructure layer (Travica 2002)	Diffusion condition (Travica 2002)	Sub-Saharan condition
Customer e-commerce propensity	Remote ordering, payment and customer support Standard quality assurance Adoption of e-mail	High potential for fraud Absence of mail-order consumer culture E-mail still novel
E-payment	Capabilities for and adoption of non-cash payment Credit card culture Secure telecommunications Software industry support Customer trust in financial institutions	Credit cards not widespread
Software industry	Support to diverse foreign and own software products for e-business	Poor system for computer development education Many African sites hosted in the U.S.
Telecommunications	Broad availability of telephone and Internet access Faster and secure Internet lines Deregulation and privatization Affordable Internet access	Unstable telephone systems Internet access expensive for populace Increasing privatization
Delivery	Dependable postal service Alternative delivery services Absolute buildings addressing Broader reach Increased volumes Irregular patterns	Postal services are slow and insecure Courier services are popular, but expensive
Transportation	Diverse safe means Functionality catering to delivery needs (reach, volume, patterns)	Poor roads Low urbanization Universal access is problematic

2.3.3.2.1 Transportation

In Sub-Saharan Africa, only 15% of the roads are paved (World Bank 2001). Good roads are an essential necessity for a vibrant internal trade system. This fact is not minimized by e-business that involves the delivery of physical goods. Thus, because of the poor physical infrastructure, shipping is bound to be slow and expensive.

Another transportation-related problem is that only about 34% of the population lives in urban areas (World Bank 2001). This means that most people live in rural areas that are not well connected by transportation systems. While some might argue that those who are disconnected from the economic centers of the countries should be given secondary consideration, it is these very people who often stand to benefit the most from e-business. Thus, their physical inaccessibility via transportation systems limits the potential benefits of e-business to rural Africans.

2.3.3.2.2 Delivery

Virtually every country in SSA is reached by a postal system (with the sole exception of Somalia). However, these systems do not reach every citizen, nor necessarily even the majority of citizens, as around 66% of Sub-Saharan Africans live in rural areas (World Bank 2001), and might or might not be on the postal network. Even in cities where the postal system is well established, services are relatively slow. Thus, consumers would prefer to buy products from a physical store if at all possible. Another serious concern is that there is a rather high incidence of theft among postal workers, so it is common for people to register their mail at higher expense to ensure its security.

In response to the deficiencies of the public postal system, a number of international courier services, most notably DHL, serve SSA. These couriers are well known and trusted. However, they are considerably expensive, and are used primarily for the delivery of high-value goods and important documents.

2.3.3.2.3 Electronic Payment

Payment systems are a critical piece of an effective e-business infrastructure. Credit card payments have become the de facto standard for e-business implementations, because they can be electronically transmitted and verified. However, credit cards are not used widely in Sub-Saharan Africa, largely for two reasons: First, the relatively low incomes do not permit most citizens to live credit-based lifestyles, as in the Western consumer culture. Second, associated with the low standards of living, fraud is rampant. Thus, few people would be willing to risk giving a vendor their credit card number. Even less likely would a Sub-Saharan African entrust their credit card to an abstract, digital website. Nonetheless, a few Sub-Saharan Africa websites do accept credit card payments (for example, see GhanaMall, http://www.ghanamall.com.gh).

Although credit cards are so widespread in B2C e-business, they are not the only payment method. Most sites also accept checks and money orders, though these methods significantly extend the time between when a customer places an order and when the purchase is finally received. Some innovators are experimenting with payment systems tailored to the African socioeconomic context. For example, Nairobi-based Africa Online, SSA's largest ISP, is establishing a debit card system that will permit pre-paid Internet access, and also a means to pay for online purchases (Bray 2001).

From the preceding analysis of the commercial infrastructure, I hypothesize:

Hypothesis 4b: Higher quality commercial infrastructure will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

The Institutional and Commercial Environment is the last construct in the national infrastructure model of my study. In the rest of this chapter, I present a cultural model of e-business outcomes in SSA.

2.4 Cultural Model of E-Business Outcomes

In additional to the national level of analysis, the e-business model I present here has another three predictor constructs that I postulate directly affect e-business outcomes on the cultural level: ICT Transfer Implementation, Culture-Specific Beliefs and Values, and Technology Culturation. **ICT Transfer Implementation** is the basic factor here, upon which the cultural factors operate. In this specific model development, I include two dimensions of **Culture-Specific Beliefs and Values, Power Distance** and **Uncertainty Avoidance**. **Technology Culturation** is the other cultural construct that I postulate to influence E-business Outcomes. In addition to their direct effects on e-business, I propose that the cultural factors interact with ICT Transfer Implementation to give a composite effect. Figure 2.4 displays the cultural model with all the postulated paths labeled with the specific hypotheses I offer in the following sections.

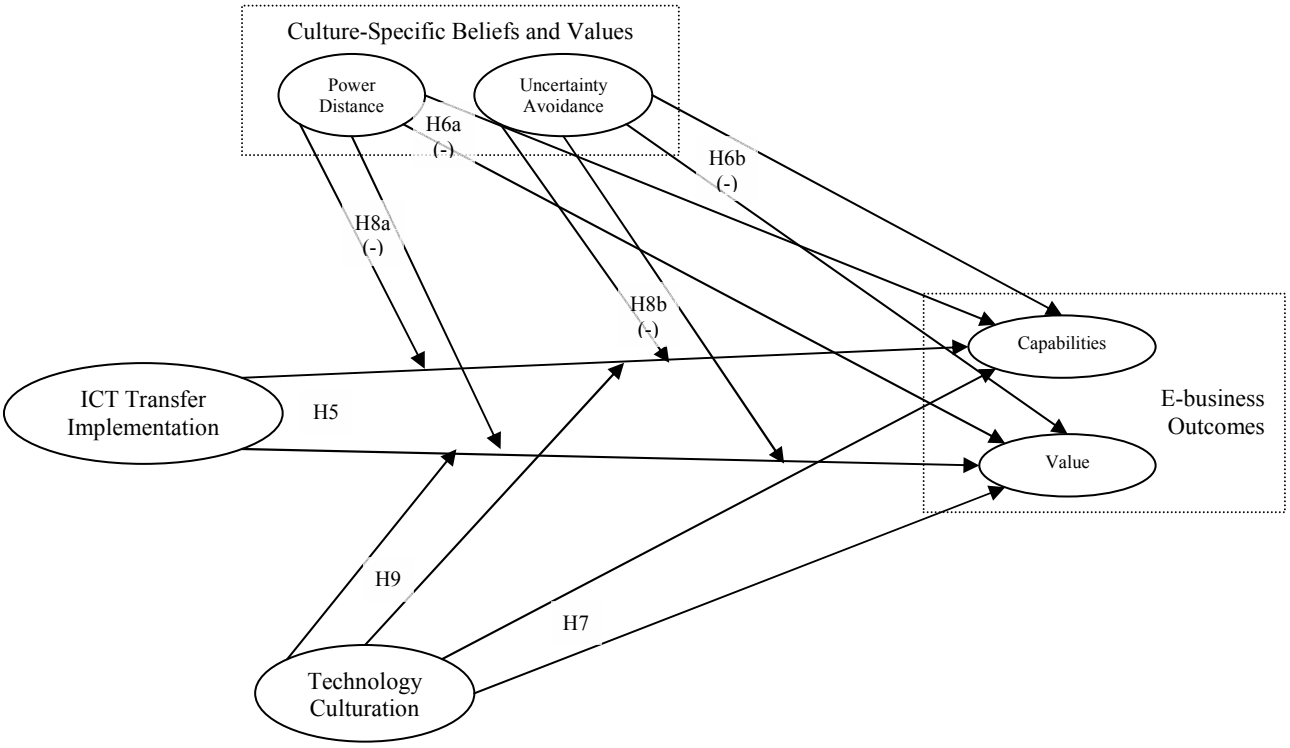

Figure 2.4. Cultural model of e-business outcomes

2.4.1 ICT Transfer Implementation

My primary interest in the cultural model is to examine how culture affects e-business outcomes in SSA. However, "culture" does not operate in a vacuum; rather, it operates in the context of trying to implement, maintain, and support systems. Thus, I include ICT Transfer Implementation in my model, as did Loch et al (2000), to provide a base for studying cultural effects:

> Our research approach is to include selected implementation factors in our study, not only because they are likely to be important in their own right, but also because the way a new technology is implemented is subject to the same cultural influences as are systems outcomes. In short, implementation factors can provide a useful comparison to the other explanations being advanced for ITT.

ICT implementation is one of the oldest streams in information systems research (Schultz and Slevin 1983). Over the years, various studies have provided evidence that both the presence of critical success factors in the implementation process and the process of project implementation are important to assure the success of an ICT project. Loch et al (2000) lists the following commonly identified factors: top management support, individual differences, system quality, firm characteristics, and user-developer interactions.

A related research stream has been the study of factors that contribute towards the failure of software projects. The Standish Group's CHAOS report of 1994 tried to identify how often and why software projects failed, and to suggest ways to prevent failure (Standish 1994). They surveyed 365 large, medium and small companies from a broad range of industries, and conducted four focus groups and numerous personal interviews. The Group found that of 175,000 ICT application development projects costing $250 billion each year in the United States, the implementers completed only 16.2% on time and on budget, and eventually cancelled 31.1%. Managers surveyed indicated that the top three reasons they perceived why projects succeed (that is, are completed on time, on budget *and* with 100% of goals met) are user

involvement, executive management support, and a clear statement of requirements; these are similar to the critical success factors identified in IS implementation research. Other research on software risk factors (Schmidt, Lyytinen, Keil and Cule 2001) has identified similar factors.

A number of studies have investigated if these factors identified in developed countries also apply to developing countries (Bingi et al 2000) and Sub-Saharan Africa (Eze 2002; Mursu, Soriyan, Olufokunbi and Korpela 1999). In general, most of the factors are equally applicable in both contexts. However, Bingi et al (2000) identified several issues that developing countries have to face that are not quite as important or common in developed countries: human resources, technical concerns, and socio-political challenges. Regarding human resources, ICT workers in developing countries are limited in their opportunities for career advancement. Regarding technical issues, there are concerns about the quality, security, and availability of data. Socio-politically, there are challenges that arise from illiteracy, the language barrier, and vulnerability to foreign control.

Based on the importance of these widely recognized factors, I offer the following hypothesis in my model:

Hypothesis 5: Effective implementation of ICT transfer projects will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.

2.4.2 Culture

There has been a considerable amount of research examining the cultural dimensions of IT diffusion. The beliefs and values that people have ingrained in them by their cultural context significantly affect their thinking and perspectives, and hence their approach to using technology (Baba 1995; Bertolotti 1984; Hofstede 1980; Ingold 1996; Kransberg and Davenport 1972). There have been a number of studies that have theoretically examined the effects of culture on ICT development in general (Baba 1995; Hakken 1991; Hill et al 1998; Straub 1994; Straub et al

2002b). In the context of ICTs and Internet technologies, Straub (1994) compared the diffusion patterns of e-mail and fax technologies in Japan and the United States, based on cultural differences between these countries. He found that the relatively high uncertainty avoidance of the Japanese and the graphic attributes of the Japanese *kanji* writing system led them to favor fax over e-mail technology.

A few studies have examined the cultural effects on technology in Sub-Saharan Africa (Hasan and Ditsa 1999; Korpela 1996). Studying the root causes of organizational obstacles to IT diffusion among the Yoruba ethnic group in Nigeria, Korpela (1996) concluded that culture per se had little influence on the effectiveness of ICT in that society. Rather, he argued that a historical political economy that hindered true democracy played far more of a role. In contrast, Hasan and Ditsa (1999), comparing Australian, West African, and Middle Eastern information systems development environments, found that cultural predisposition did play a part in differential results. I discuss their findings in more detail below as I examine Culture-Specific Beliefs and Values.

Although none of these studies specifically examines the effects of culture on e-business, I can borrow these insights and build on them to understand what such effects might be in Sub-Saharan Africa. One aspect of e-business that is often taken for granted is the consumer behavior associated with shopping online and making purchases based on the information obtained from a website. In the Western world, business-to-consumer product sales took off rapidly on the Internet largely because these cultures were already used to making purchases from mail-order catalogs. They were accustomed to making a trust decision based on the information presented, and to ordering items that would be delivered after several days. In SSA, virtually all consumer purchases are made in a market context where the consumer can physically inspect the goods and

make a judgment based on seeing, touching, tasting, and otherwise trying out the goods. It might be difficult for them to quickly make the transition to virtual shopping.

Since e-business involves using personal computers that are connected to the Internet to engage in business, the existence of a critical mass of personal computers is necessary for people within a country or community to effectively use the devices in exchanging information. As in the case of faxes and e-mail (Straub 1994), there must be a large existent user base before the substantial benefits of the technology can be garnered. This can be a challenge considering the low levels of telecommunication equipment in SSA. Another relevant consumer culture characteristic is the use of e-mail. E-mail is an essential part of smooth e-business transactions, as it is used to maintain smooth communication (which establishes trust), and resolve misunderstandings. However, when consumers do not regularly use e-mail as a matter of habit, as is the case in SSA, an important aspect of the e-business infrastructure is missing (Oyelaran-Oyeyinka and Adeya 2002).

There are numerous cultural effects that I could test, but for a study of this scope, I can only focus on a few of the most pertinent ones. In the following sections, I examine the specific cultural effects that I will test, explaining why these are particularly relevant in a study of this nature.

2.4.2.1 Culture-Specific Beliefs and Values

There is an inherent problem in trying to conceptualize Culture as a monolithic construct. Hofstede (1980) empirically conceptualized culture into distinct sub-constructs, with his four-dimensional scheme of Power Distance, Uncertainty Avoidance, Individualism-Collectivism, and Masculinity-Femininity; later (1990), he added Long-term Orientation.

Power Distance is the social distance between authorities and subordinates, indicating how much respect superiors expect and subordinates give. Uncertainty Avoidance is the aversion

to risk, and indicates how much people prefer stability over risky possible benefits. Individualism-Collectivism relates to how much people value the group's interest over individual interests. Masculinity-Femininity is the relative valuation in a culture of "masculine" values such as a drive for success and pursuit of achievement and recognition, in contrast to "feminine" values of seeking healthy relationships and non-materialistic valuations of quality-of-life. Long-term Orientation (also called Confucian Dynamism) regards how much people are willing to sacrifice present benefits and enjoyment for long-term rewards.

While these dimensions all influence the work context, their effects are not equal. Shore and Venkatachalam (1996 p. 22) observe:

> Of these four dimensions [not including Long-term Orientation], power distance (PD) and uncertainty avoidance (UA) are emphasized by Hofstede (1991) in studying organizations within a particular culture. The empirical evidence suggests that a country's PD-UA score best reflects the way decision-making power in organizations is distributed, rules and methods followed, and uncertainty accepted. The influence of PD and UA on the management of organizations is further confirmed by the Aston studies (Pugh and Hickson, 1976).

A somewhat different approach, with a particular view to how culture influences the use of technology, comes from Straub et al (2002b), who divided the Culture construct into two dimensions. First, there is **Culture-Specific Beliefs and Values**, which represents specific beliefs or values that a person might hold because of the influence of their cultural background. The emphasis here is not the cultural background—a multidimensional concept, but the beliefs and values that follow as a result. The ACIT project has investigated the effects of culture on technology adoption and use among Arabs (Checchi et al 2002; Hill et al 1994; Hill et al 1998; Loch, Straub and Kamel 2000; Meso et al 2003; Rose and Straub 1998; Straub et al 2002b; Straub, Loch and Hill 2001). The researchers found that Arabs' preference for face-to-face communications sometimes detracts their estimation of the value of groupware that makes virtual

interaction more effective (Hill et al 1998). In addition, Arabs' polychronic view of time ("time is fluid, not rigid") makes them more resistant to software for long-range planning (Straub, Loch and Hill 2001). From the Arabs' perspective, a project being past the deadline is not an abnormal thing that needs to be militated against.

Rather than being opposing views of how to conceptualize culture, Hofstede's and Straub et al's perspectives complement each other quite well. Hofstede's dimensions of culture can be seen as specific beliefs and values that fit as dimensions of Straub et al's Culture-Specific Beliefs and Values construct. Like Shore and Venkatachalam (1996), in this study I focused on Hofstede's culture dimensions of Power Distance and Uncertainty Avoidance within the context of Straub et al's (2002b) first dimension of culture, Culture-Specific Beliefs and Values. Hasan and Ditsa (1999) studied the effects of these, among other cultural dimensions, on the success of IT projects in Australia, West Africa, and the Middle East. They found that high power distance (as in West Africa and the Middle East) impeded business managers from taking sound advice on technology issues that more qualified subordinates might have, which, in West Africa often resulted in "disastrous results of unwise IT decisions without proper consultation with IT staff in the organisations" (p. 10). They also found that, since ICT projects can be quite risky, low uncertainty avoidance (as in Australia and West Africa) enabled managers to take on more ICT projects—though this did not guarantee the success of the projects. De Vreede et al (1999) found that, while the high power distance of East African culture did not stop managers from using groupware, they did neglect some of the democratic decision-making features of the software in order to retain their authority when they deemed it necessary. Based on these findings, I make the following specific hypotheses regarding Culture-Specific Beliefs and Values:

Hypothesis 6a: Less power distance between managers and subordinates will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

Hypothesis 6b: Less avoidance of uncertainty in business decisions will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

2.4.2.2 Technology Culturation

The second dimension of Culture that Straub et al (2002b) conceptualize is **Technology Culturation**, which represents a person's exposure to a relatively high technology-intense culture. This construct assumes the perspective of a culture lacking certain technologies that receives these technologies from an outside culture. In the context of studies of ICT diffusion in developing countries, this could indicate the degree to which a citizen of a developing country has been exposed to more technologically advanced cultures such as Europe or Japan (Checchi et al 2002), whether by traveling to these countries or by exposure to media such as computer magazines and television. In their studies of ICT diffusion in Arab nations, Straub et al (Checchi et al 2002; Straub et al 2002b; Straub, Loch and Hill 2001) found that Technology Culturation did indeed provide a consistently positive influence on ICT outcomes, particularly when conceptualized as traveling to such countries.

In light of their findings, I make the following specific hypotheses regarding the effect of Technology Culturation on e-business outcomes:

Hypothesis 7: Greater exposure to business ICTs from advanced nations will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes in Sub-Saharan Africa.

2.4.2.3 Interaction between Culture and Transfer Implementation

In their studies, Straub et al also proposed that both cultural sub-constructs, Culture-Specific Beliefs and Values and Technology Culturation, might have a moderating effect on ICT Transfer Implementation. In other words, beliefs and values and culturation might affect the effectiveness of ICT Transfer Implementation, in addition to their direct effects on ICT outcomes:

> Besides the hypothesized direct link between CULTURE and/or [Technology Culturation] and [Information Technology Transfer], there may well be a moderating effect on transfer implementation factors …. It is conceivable, for example, that Arab sensitivity to authority may strengthen the influence of top management support on successful outcomes. As a further example, training may be far more effective when trainees have been technologically culturated, or previously exposed to similar systems originating abroad. (Loch, Nelson and Straub 2000)

In line with these propositions, I include the following hypotheses in my model:

Hypothesis 8a: Power distance between managers and subordinates will dampen the effect of better ICT transfer implementation, thus (i) reducing the capabilities of e-business and (ii) reducing the value of e-business outcomes in Sub-Saharan Africa.

Hypothesis 8b: Uncertainty avoidance in business decisions will dampen the effect of better ICT transfer implementation, thus (i) reducing the capabilities of e-business and (ii) reducing the value of e-business outcomes in Sub-Saharan Africa.

Hypothesis 9: Exposure to business ICTs from advanced nations will enhance the effect of better ICT transfer implementation, thus (i) further increasing the capabilities of e-business and (ii) further increasing the value of e-business outcomes in Sub-Saharan Africa.

2.5 Summary of Literature for E-Business in Sub-Saharan Africa

I have discussed the literature pertinent to e-business in Sub-Saharan Africa, and I have developed a comprehensive model that hypothesizes the relationships among the most important constructs. My primary dependent variable is E-business Outcomes, comprising both the Capabilities and Value of e-business. At the national level of analysis, I have ICT Policies; ICT Infrastructure; and the Institutional and Commercial Environment, all of which I propose to have a positive effect on E-business Outcomes. ICT Policies also directly increase ICT Infrastructure. At the cultural level, ICT Transfer Implementation and Technology Culturation positively impact E-business Outcomes, while Power Distance and Uncertainty Avoidance have a negative effect. I propose that the three sub-constructs (Power Distance, Uncertainty Avoidance, and Technology Culturation) also have a moderating effect on ICT Transfer Implementation. Table 2.2 summarizes the hypotheses in my overall model.

Table 2.2. Hypotheses for model of e-business in Sub-Saharan Africa

H	Hypothesis
1a	National policies that favor the development of ICTs in general will increase the level of ICT infrastructure.
1b	National policies specifically tailored to promote e-business will increase the level of ICT infrastructure.
2a	National policies that favor the development of ICTs in general will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
2b	National policies specifically tailored to promote e-business will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
2c	National policies specifically tailored to promote e-business will (i) increase capabilities more and (ii) yield more valuable e-business outcomes than will general ICT policies.
3	Higher quality ICT infrastructure will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
4a	More functional and stable national governance institutions will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
4b	Higher quality commercial infrastructure will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
5	Effective implementation of ICT transfer projects will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
6a	Less power distance between managers and subordinates will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
6b	Less avoidance of uncertainty in business decisions will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
7	Greater exposure to business ICTs from advanced nations will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.
8a	Power distance between managers and subordinates will dampen the effect of better ICT transfer implementation, thus (i) reducing the capabilities of e-business and (ii) reducing the value of e-business outcomes.
8b	Uncertainty avoidance in business decisions will dampen the effect of better ICT transfer implementation, thus (i) reducing the capabilities of e-business and (ii) reducing the value of e-business outcomes.
9	Exposure to business ICTs from advanced nations will enhance the effect of better ICT transfer implementation, thus (i) further increasing the capabilities of e-business and (ii) further increasing the value of e-business outcomes.

This comprehensive literature review has served two main purposes. First, it gives me better understanding of the issues involved when considering what is necessary for e-business to be effectively practiced in Sub-Saharan Africa. Second, it has enabled me to derive a conceptual model that explains the relationships between the various constructs that the literature has identified. This has enabled me to hypothesize several relationships that together address each of my two research questions. In the next chapter, I will describe the design of a survey study that tests the model and empirically verifies this model's soundness. Then, I follow with the actual survey.

CHAPTER 3. METHODOLOGY AND INSTRUMENT DEVELOPMENT

This study aims to answer the following research questions, which I listed in the introduction:

1. What kinds of national infrastructure contribute toward effective e-business outcomes in Sub-Saharan Africa?
2. What cultural factors contribute toward effective e-business outcomes in Sub-Saharan Africa?

I have already started answering these questions in Chapter 2 by surveying the relevant literature and deriving an explanatory conceptual model that answers each question. The next step towards answering my questions involves testing this model with empirical data. In this chapter, I describe the methodology for a survey-based study that attempts to accomplish this. I begin by briefly stating my positivist philosophical basis for this study, and then I justify my decision to use a questionnaire-based survey to test my models. Next, I describe my sampling and data collection procedures. I follow by discussing how I conceptualized the constructs to develop a measurement instrument. The last section of this study describes a pilot study that prepared me for conducting the main study.

3.1 Philosophical Basis for the Study

This study of the factors affecting e-business in Sub-Saharan Africa will adopt a positivist philosophical approach. I am assuming that there actually are some objective factors that are pertinent to the progress of e-business, and that there are others that are detrimental. As I describe in the section on Sampling Procedure, I will solicit responses from individuals whom I believe to be most relevant to my inquiry, and whose responses would be closest to the actual objective factors. In this particular study, I am not seeking to understand the subjective realities

that the respondents might construct for themselves, as I might in an interpretive study, but rather I am adopting the scientific method as my guide: First, I made observations of the empirical world by surveying the empirical literature, as well as the theoretical. Second, I derived an explanatory theory of the phenomenon of e-business in SSA. Third, I generated hypotheses of expected observations based on the theory. Finally, as I describe in the next chapter, I tested the hypotheses with empirical data. In this chapter, I describe my positivist methodology in detail.

3.2 Data Sources and Sampling Procedure

As I have already discussed in the introductory chapter, my study solicits experts for their assessments of factors that affect e-business in SSA. In this section I explain what kinds of experts I solicited, and the databases that I used to identify these experts

3.2.1 Experts on E-Business in SSA

In the introduction, I explained why I used subjective assessments to obtain data for this study because of the dearth of e-business activity in SSA, and why I am using expert assessments because they are more qualified than a random sample of SSA business people. A number of studies in information systems research have taken a somewhat similar approach in soliciting responses from experts (or "professionals" or "stakeholders") to answer about the behavior of organizations. In investigating the integrity of security mechanisms with midrange computer systems, Boockholdt (1989) surveyed experts whom he argued were most qualified to answer on the subject. Nidumolu et al (1998) surveyed senior managers and marketing managers for their expertise in specifying the effects of customizability and reusability in studying the competitive performance of firms. When investigating how organizations enhance user technological innovativeness, Nambisan et al (1999) first surveyed IS managers as expert users, using a Delphi study to identify the appropriate factors to ask a broad range of users in the second stage of the study. In a design very similar to the one I use here, Mbarika (2001) surveyed various

stakeholders in ICTs to determine the problems that challenge the diffusion of land telephone lines in SSA, and strategies for addressing these problems.

For this study, we identified four relevant categories of experts who would have important and valuable knowledge about e-business in Sub-Saharan Africa. These are essentially the groups identified by the United Nations Economic Commission for Africa as stakeholders for African telecommunications (UNECA, 1999b): practitioners (UNECA's "private sector" and "IT experts"), government officials ("government and parastatals" and "regulatory bodies"), officials of non-governmental organizations (NGOs) ("international and regional organizations"), and academics ("academia" and "research centres"). Practitioners are those who actually work in businesses that employ e-business related to Sub-Saharan Africa. These are those who actually evaluate the business case for adopting e-business, plan the strategic connection between e-business and the main line of business, organize the resources for e-business adoption, implement e-business, or support e-business systems. They are the frontline e-business users who have first-hand experience of whether or not e-business is feasible or fulfills its promises. Government officials involved in e-business might be practitioners that use e-business in government, but they also include policy makers who lobby for, design, implement, or administer policies that have impact on the effective practice of e-business in Sub-Saharan countries. An NGO is a not-for-profit national or international organization that provides social or economic support to people. The United Nations, World Bank, United Way, and Children's Miracle Network are examples. As with government officials, NGO officials might be those who practice e-business in carrying out the work of their organizations. They also include those who work with governments and businesses to promote the use of e-business in SSA, help implement e-business systems, or generally help the potential of e-business to become realities. Academics are those who teach and research about e-business in SSA They read about current developments

and interact with businesses, governments, NGOs, and users to better understand the issues surrounding e-business in SSA. They also write articles and books about this subject to disseminate their knowledge. For this study, I also included ICT workers, such as network administrators, who are knowledgeable about e-business and work in academic institutions.

Although e-business in Sub-Saharan Africa is the expertise in which I am interested here, the experts do not necessarily need to be located in SSA. Many businesses are located in countries outside the region, such as in the Republic of South Africa, Europe, or the United States, but conduct business with Sub-Saharan countries. Such businesses often find that e-business offers promising opportunities to extend the effectiveness of their business relationships, so they have researched the potential of and barriers to e-business in this region. Government officials are less likely to have expertise outside their own countries or geographic regions, but international NGOs that focus on African development are very often located outside the continent, especially in Europe and the United States. Likewise, academics are not generally bound by geographic location, and many researchers of e-business in SSA are based outside the region. One significant source of experts is the African diaspora who work in countries all over the world in organizations of all four categories. Such expatriate Africans often remain interested in the developments in their home countries, and many have developed significant expertise in e-business issues related to their countries and regions.

3.2.2 Databases of SSA E-Business Experts

It is generally challenging to obtain comprehensive information about organizations in Sub-Saharan Africa. It is even more difficult to identify organizations that are considering or are implementing new technologies like e-business. The poor communications infrastructure and the high political instability of many countries make it difficult to obtain addresses that are valid and current. Somalia presents an extreme example. A country without a central government, it is

ruled by various regional warlords. There is no functional postal system, and I had to remove all Somali contacts from my lists when I was unable to verify postal or e-mail addresses for them after repeated attempts.

Another challenge comes from countries facing civil wars that cripple commerce and communications. Unfortunately, this is not a rare situation in SSA. In fact, I became painfully aware of the seriousness of this problem when I received the following e-mail response from a Liberian ICT expert, as rebels were surrounding his city, about to topple Charles Taylor's government in June 2003:

> I am sorry I can not reply you as soon as you expect me to do so. If you are listening to international news, by now you should have known that my country is in a major crisis, particularly in the city, Monrovia, where I live and work. As soon as I get peace in the city, I will get back to you.

In spite of these challenges in obtaining appropriate data, I was nonetheless able to identify two data sources that provide contact information for the relevant experts. First, I obtained names from a database of 1,253 organizations from the African Information Society Initiative (AISI) (AISI 2003b), a project sponsored since 1996 by the United Nations Economic Commission for Africa. Administered by the Association for Progressive Communications, the AISI database permits organizations to enter and update their information. The Organization of African Unity and a consortium of African ministers of telecommunications have endorsed AISI (AISI 2003a).

The AISI database included organizations involved in ICTs all over Africa, whether or not the involved organizations are themselves based in Africa. 60.1% of these organizations were actually in Sub-Saharan Africa and 84.7% of these organizations were located in the continent of Africa as a whole (i.e., North Africa, the Republic of South Africa, and Sub-Saharan Africa). These organizations represent all four categories for my target experts: commercial enterprises,

government offices, NGOs, and academic institutions. Most of these organizations listed their contact information. When the contact information was missing or insufficient, I obtained pertinent information from the Web as I describe below in the details of my pilot and main studies.

My second data source was the database of experts provided by the African Research for Information Society Emergence (ARISE) (ARISE 2003), a project sponsored since 2002 by the International Development Research Centre of Canada. The particular focus of this database is on "African professionals, researchers and activists concerned with the social issues involved in building the Information Society in Africa." From this list I obtained the names and e-mail addresses of 196 such experts. Most of these experts participated in electronic discussion forums on various issues related to African ICT policy in late 2002. Because of the recency of these addresses, I did not further validate their addresses before mailing them the original survey link, as I had done for the AISI database.

3.3 Data Collection Procedure

To actually administer the survey, I followed a rigorous approach to ensure that the study validly answers my questions concerning e-business in Sub-Saharan Africa. Based on studies that have shown that there are no significant differences in means scores between paper- and Web-based surveys (Kantor 1991; Rosenfeld, Doherty, Kantor and Greaves 1989), I administered the questionnaires using World Wide Web, paper, and electronic document versions and distributed the questionnaires to respondents via World Wide Web, regular postal mail and e-mail, respectively. The respondents could return their responses via automatic submission using a Web-based survey, an e-mail attachment, a fax message, or postal mail. All of these media are viable options considering that postal mail is a well-established medium for

administering surveys, and e-mail and fax are becoming increasingly popular and established (Matz 1999).

Although, using the Internet to administer questionnaires is already well-established, the fact that the connectivity infrastructure in SSA is generally so poor would give cause to cautious nonetheless. However, in my case, I am soliciting information from people who are experts on using the Internet to do business. Not only would this sample be expected to have adequate Internet access, but I would seriously question the expertise of someone who claims to be knowledgeable on the business use of the Internet in any part of the world, yet does not have access to the Internet. Indeed, the respondents used all of these media for completing and returning the questionnaire responses. I used this multiple-media approach for receiving responses for the following reasons:

1. **Gave flexibility to respondents.** By giving respondents multiple means of completing and returning my survey, I made it easier for them to participate and thus, hopefully, increased my overall response rate from what it would have been had I restricted them to any one medium. I cannot precisely calculate how much these media increased my response rate because the fact that respondents might have used a particular medium does not mean they would not have completed the questionnaire had that medium not been available. But I do know for a fact that this was the case for some respondents, who asked for an electronic attachment when they had trouble accessing the Web. Moreover, I had e-mail addresses for some experts but no postal addresses, and vice versa, meaning that I could have contacted these experts using only one medium or the other. Thus, although I cannot calculate specific numbers, I am convinced that this approach increased the number of respondents.

2. **Improved accuracy of data entry.** This advantage only applied to the Web version of the survey (described below); its results were automatically stored in a standard format that I could easily export to a statistical program. However, since 77.8% of my respondents chose to use the Web option, I greatly benefited from this data entry accuracy. With less human intervention, I greatly reduced the chances of human error in recording data. Of course, I assume here that the respondents entered the data accurately onto the website, recording what they meant to. At least, with this Web option, my handling of their responses added little, if any, data entry errors.
3. **Easier data entry.** It was more convenient to record and compile electronic data than to convert paper-based data to electronic format. Again, this advantage applied only to the Web version of my survey.
4. **Speed of responses.** All the distribution and return media other than postal mail were almost instantaneous. By cutting out the weeks of transit for international mail, I cut down on my average time to receive responses. However, since the data could not be processed until I had received all the responses, this was not a significant advantage in my case. Nonetheless, I was able to begin preliminary analyses well before I had received all the postal data.

3.3.1 Media-Specific Questionnaire Design

Considering my administration mechanism of simultaneously employing paper, electronic document, and Web versions of the survey, it was critical that I carefully design the questionnaires to make sure that these formats were equivalent. Dillman (2000) goes into extensive detail on giving guidelines for designing effective mail and Internet surveys; I carefully adhered to his suggestions. I designed three versions of the questionnaire, carefully following Dillman's (2000) principles:

1. **Electronic document:** I used a word processor to design a four-page survey in traditional format. Appendix A reproduces this document. I saved it in Rich Text Format (RTF), a universally standard document format that any word processor can reproduce accurately. In my e-mail reminders for my main study, I included this document as an attachment to give respondents an opportunity to return this format in lieu of the Web version of the survey. They could return it by e-mailing me back (the most popular option), or by printing it and faxing or snail-mailing it to me.
2. **Paper:** The traditional paper version of the survey was almost identical to a printout of the electronic document; the only exception was that I gave them the option to give me a postal address to mail results to. I sent this version to respondents by postal mail, recognizing that some did not have a functional e-mail address. I gave these respondents the option to return the survey by postal mail, by fax, or by e-mail (after scanning the completed survey, which at least one respondent did).
3. **World Wide Web:** Following Dillman (2000), I used the WebSurveyor 4 program to carefully design a version of my survey available on the Web. This version was visually rather different from the electronic document and paper versions, as it followed the formatting imposed by the design software (Appendix B lists this version). In contrast to the other two cases, in this case respondents had no submission option except to press "Submit" for the final electronic submission of their responses. However, when I e-mailed or mailed them the Web URL for this version of the survey, I also gave them information about obtaining alternate versions of the surveys in case they had technical trouble with the Web version, or preferred an alternate format. The Web version proved the most popular, but many respondents found the electronic attachment (or a printed version thereof) more convenient.

3.4 Operationalization of Constructs and Instrument Creation

Guided by the theoretical understanding I obtained from my literature review in Chapter 3, I combed the pertinent literature carefully to identify questionnaire items that are pertinent to my study of e-business in Sub-Saharan Africa. Borrowing from and adapting items used in these studies, I developed multiple-item measures for each item, as I describe in this section. Before detailing the operationalization of each theoretical construct, I explain here some of the important qualifications I used in the survey to ensure that the experts were responding to the same issues. In addition, Table 3.1 lists the definitions I gave the experts of the most important terms I used in the questionnaire: e-business, the Internet, ICT/IT, and SMEs (see Appendixes A and B).

Table 3.1. Important definitions for this survey

Term	Definition
Sub-Saharan Africa (SSA)	For this survey, all African countries excluding North Africa (Morocco, Algeria, Tunisia, Libya, and Egypt), and excluding the Republic of South Africa. Although North and South Africa are very important, they are unique cases that deserve their own specialized surveys.
Electronic business (e-business)	Business-to-business sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks.
Internet	E-mail, the World Wide Web (WWW), FTP, chat, instant messaging, Voice over IP, USENET newsgroups, and other services.
ICT or IT	Information and communication technologies (ICTs) or information technologies (IT) include all telephone, computer and network-based technologies: phones, computers, faxes, networks, wireless, satellites, the Internet, and so on.
SME businesses	In this survey, please answer regarding small and medium-sized enterprises (SMEs) in urban cities of Sub-Saharan Africa. However, please write comments about rural businesses, and SSA businesses of other sizes.

First, I realized that although my respondents were experts on e-business in SSA, it would be unlikely that most of them would have expertise beyond a single country. For this reason, I asked them to answer all questions for the specific country in Sub-Saharan Africa whose e-business condition they were most familiar with. I expect that this helped the experts focus on concrete conditions, policies, and cultural attitudes as they responded to the questions. I did permit those who preferred to answer generally about a sub-region of SSA, or for the entire

sub-continent, to do so. However, I made it clear that North Africa and the Republic of South Africa were not included in this study.

Second, I restricted the scope of this study to businesses in urban centers of Sub-Saharan Africa. In most SSA countries, there are only one to three cities with Internet access. In SSA, around 34% of the population lives in urban areas (World Bank 2001), and the rural majority have little if any Internet access, and hence few options for e-commerce. This economic divide is largely due to disparity in income and literacy between urban and rural Africans. Moreover, those who live in rural areas are generally not well connected by transportation systems. My goal here is certainly not to give secondary consideration to those who are disconnected from the economic centers of their countries. On the contrary, I realize that it is these very people who often stand to benefit the most from e-commerce. However, because of the very limited current activity in rural areas of SSA, it is simply not feasible at this time to conduct an empirical study that would include this important sector. Hopefully, by the end of this decade connectivity might have improved, perhaps through the telecenters I described above, to the point that e-business might meaningfully help the rural majority of Sub-Saharan Africans. In chapter 5, I discuss the implications of this restriction to urban businesses.

Third, beyond restricting my focus to B2B Internet transactions, I further restricted the scope of this study to small and medium enterprises (SMEs). My reason this time is not for lack of data for e-business activities of larger businesses in SSA; on the contrary, I would expect more abundant data on the current operation of larger businesses of national and international scope. However, I expect that many, if not most, large businesses in SSA that presently implement e-business are local branches of multinational companies. While such businesses are in the same condition as domestic ones related to national infrastructure, I would expect significant differences in culture and in organizational resources that might mask the condition of the indigenous practice of e-business. Moreover, there might be such large disparities between

the e-business use of SMEs and large businesses that it might be difficult to accurately interpret my results. Thus, I asked the experts to respond only about urban SMEs in their country. Again, I further discuss this restriction to SMEs in chapter 5.

With these qualifications made explicit, I developed questions from relevant literature. I explain the items I chose from this relevant literature in the following sub-sections. Table 3.2 lists the items in the pilot and survey instruments, indicating the sources from literature for the items I chose.

3.4.1 E-Business Outcomes

There are some studies that have provided conceptual guidance as to what categories of e-business practice are relevant in measuring e-business, such that will provide economic benefits to organizations and regions. Travica (2002) and Wolcott et al (2001) conceptualized e-business at the national level, while Zwass (1996) conceptualized it at the organizational level. Also at the national level, I have Bridges.org's (2001) collection of e-readiness assessment tools, which highlight many pertinent aspects of e-business practice and outcomes. The various studies in the *Information Systems Research* 2002 double special issue (Devaraj, Fan and Kohli 2002; Lee 2002; McKinney, Yoon and Zahedi 2002; McKnight 2002; Straub et al 2002a; Straub 2002; Wheeler 2002; Zahra 2002; Zhu and Kraemer 2002) provide metrics for organizational-level measurement of e-business.

I also identified various studies that have developed instrumental measures of e-business that can immediately be borrowed for my study. These studies provided items for both the Capabilities (CID 2000; Kardaras and Karakostas 2001; Vadapalli and Ramamurthy 1998; Zhu and Kraemer 2002) and Value (CID 2000; Kardaras and Karakostas 2001; Zhu and Kraemer 2002) dimensions. Drawing from these different sources, I developed a parsimonious yet comprehensive set of items that reflected the measurements in which I am interested for e-business outcomes in Sub-Saharan Africa.

Table 3.2. Items in study instrument, with sources from theory

Construct	Code	Wording in final instrument	Δ	Sources of theory and items
E-business Outcomes	**EB**			(Dekleva 2000; Travica 2002; Zwass 1996)
E-Business Capabilities	**EBC**	**Capabilities:** Please indicate how much you agree or disagree that urban SME businesses in your country will have the following e-business capabilities **by the end of 2004**.		(Devaraj, Fan and Kohli 2002; Lee 2002; McKinney, Yoon and Zahedi 2002; McKnight 2002; Straub et al 2002a; Straub 2002; Wheeler 2002; Zahra 2002; Zhu and Kraemer 2002)
	EBCI	**Information:** Product information will be available online for business customers, including product search capabilities.		(CID 2000; Vadapalli and Ramamurthy 1998; Zhu and Kraemer 2002)
	EBCT	**Transaction:** Business customers will be able to use websites to place, track, and review orders.		(CID 2000; Vadapalli and Ramamurthy 1998; Zhu and Kraemer 2002)
	EBCX	**Interaction:** Business customers will be able to manage online accounts, customize their view of the website, and conduct real-time chat with customer service representatives.		(Zhu and Kraemer 2002)
	EBCS	**Supplier connection:** Businesses will place online orders from suppliers, use electronic data interchange (EDI), and electronically share inventory information with suppliers and business partners.		(CID 2000; Kardaras and Karakostas 2001; Zhu and Kraemer 2002)
	EBCN	**Intranet:** Within a business, employees will be able to use the Internet to share information internally, communicate with each other, and run applications.		(CID 2000; Kardaras and Karakostas 2001; Vadapalli and Ramamurthy 1998)
E-Business Value	**EBV**	**Value impacts:** Please indicate how much you agree or disagree with these statements about the impacts of e-business in the context of urban SME businesses in your country.		(Boon, Britz and Harmse 1994; Bridges.org 2001; Dekleva 2000)
	EBVR	E-business activity will increase **revenues**.		(CID 2000; Zhu and Kraemer 2002)
	EBVC	E-business activity will **save costs**.		(CID 2000; Kardaras and Karakostas 2001; Zhu and Kraemer 2002)
	EBVT	E-business activity will save employees' **time and effort**.		(Kardaras and Karakostas 2001)
	EBVJN	E-business activity will result in **new jobs** in your country.	+	Pilot respondents
	EBVJL	E-business activity will result in people **losing their jobs** in your country.	+	Pilot respondents

Table 3.2 Continued

Construct	Code	Wording in final instrument	Δ	Sources of theory and items
ICT Policies	**IP**	How much do you agree or disagree with the following statements about **current** policies concerning ICTs in your country?		(Checchi et al 2002; Dekleva 2000; Dutta 2001; Easterly and Levine 2002; Gurbaxani et al 1990b; Hakken 1991; IDRC 1998; King et al 1994; Kraemer, Gurbaxani and King 1992; Raman and Yap 1996; Tractinsky and Jarvenpaa 1995; Wild and Mncube 1996)
General ICT Policies	**IPIR**	Some policies **influence** information and communication technologies (ICTs) by encouraging or setting a trend, whereas others **regulate** ICTs by implementing and enforcing definite laws. Some policies target the **supply** of ICTs by focusing on organizations that create and provide ICTs, whereas others target the **demand** for ICTs by focusing on people and organizations that use them.		(Bridges.org 2001; Checchi et al 2002; Dutta 2001; King et al 1994; Montealegre 1999)
	IPIS	The government **influences the supply** of ICTs (for example: by funding ICT research and innovation; providing educational and training services; and subsidizing ICT development).		(King et al 1994)
	IPID	The government **influences the demand** for ICTs (for example: by providing skill training; subsidizing the costs of purchasing ICTs; and providing programs for ICT awareness and promotion).		(King et al 1994)
	IPRS	The government **regulates the supply** of ICTs (for example: by requiring computer education; removing economic barriers to ICT trade and innovation; and establishing standards and requirements for research and development in ICTs).		(King et al 1994)
	IPRD	The government **regulates the demand** for ICTs (for example: by requiring specific ICT-related standards, products or processes be used by government agencies or businesses with government contracts).		(King et al 1994)
	IPP	**Privatization and liberalization:** The government gives ownership and control of telecommunications provision to private enterprises, and private enterprises can freely compete in the mobile phone, ICT and ISP markets.	+	(APEC 1999; Checchi et al 2002; CID 2000; Dutta 1997; Mbarika and Byrd 2003; Wallsten 2001; WTO 1996)
E-business Policies	**IPE**			(Bridges.org 2001; Jarvenpaa and Tiller 1999; Kardaras and Karakostas 2001)
	IPEP	**E-business promotion:** The government generally supports and actively promotes the practice of e-business.	Δ	(APEC 1999; Checchi et al 2002)

Table 3.2 Continued

Construct	Code	Wording in final instrument	Δ	Sources of theory and items
	IPEI	**Intellectual property rights:** The government actively enforces the protection of patents, copyrights, trademarks, and other intellectual property rights.	Δ	(APEC 1999; Checchi et al 2002)
	IPEU	**E-business user rights:** E-business users have well-defined and actively-enforced legal rights when engaging in e-business regarding purchase protection and privacy.		(APEC 1999; Jarvenpaa and Tiller 1999; King et al 1994; Montealegre 1999)
	IPEA	**Awareness of e-business:** People are generally aware of the concept and benefits of electronic business.	+	(King et al 1994)
ICT Infrastructure	**II**	How much do you agree or disagree with the following statements about **the current state** of infrastructure for information and communication technologies in **urban cities** in your country?		(Adam 1996; Checchi et al 2002; Cunningham and Srayrah 1994; Grover and Goslar 1993; Heeks 2002; Hill et al 1998; Ives and Jarvenpaa 1991; Jain 1997; Kwon and Zmud 1987; Loch, Nelson and Straub 2000; Mahmood, Gemoets and Gosler 1995; Mbarika and Byrd 2003; Montealegre 1998; Mursu et al 1999; Nidumolu et al 1996; Rogers 1995; Straub, Loch and Hill 2001)
	IITB	There is an adequate number of national and international **trunk/backbone (long distance)** phone and data circuits.	Δ	(Dutta 1997; Wolcott et al 2001)
	IIE	There is a steady supply of **electrical power**, whether by national grids or backup electrical generators.		(Bingi et al 2000; Eze 2002)
	IIW	There is an adequate number of **ICT workers** skilled in developing and maintaining ICTs, training others how to use ICTs, and managing ICT infrastructures.		(Bingi et al 2000; CID 2000)
	IIWN	There is an adequate number of **wireless networks**, such as VSAT, satellite and microwave links.	Δ	(Bingi et al 2000)
	IIP	Urban citizens have adequate access to **phone services**, whether land telephone lines, mobile/cellular phones, or payphones.		(APEC 1999; CID 2000; Dutta 1997; Eze 2002; Mbarika and Byrd 2003; Mbarika et al 2001; Wallsten 2001)
	III	Urban citizens have adequate **access to the Internet**, whether from home, work, Internet cafes, telecenters, or other locations.	+	(APEC 1999; CID 2000; Wolcott et al 2001)
	IIISP	There is an adequate number of **Internet service providers (ISPs)** for the number of citizens.	X	(APEC 1999; CID 2000; Wolcott et al 2001)
	IIA	Computers, networks, Internet access, and other ICTs are **affordable** for most urban SME businesses.	+	(APEC 1999; CID 2000; Wolcott et al 2001)

Table 3.2 Continued

Construct	Code	Wording in final instrument	Δ	Sources of theory and items
	IIQ	The ICT equipment and services available to urban SME businesses are generally of **high quality**.	+	Pilot respondents
Institutions and Commerce	**IC**			
Institutions	**ICI**	How much do you agree or disagree with the following statements about governance institutions in your country?		(Dekleva 2000; Gurbaxani et al 1990a; Gurbaxani et al 1990b; Jarvenpaa and Leidner 1998; Licker and Motts 2000; Montealegre 1996; Montealegre 1999; Splettstoesser and Towry-Coker 1999)
	ICIV	**Voice and accountability:** Citizens can freely choose their government. They can exercise political rights and civil liberties, and the press is independent from government control.	+	(Easterly and Levine 2002)
	ICIB	**Government regulation and bureaucracy:** The government **does not** control goods markets, interfere with the banking system, nor excessively regulate or control private business and international trade.		(Easterly and Levine 2002; Eze 2002; Sachs and Warner 1997)
	ICIR	**Risk of repudiation:** There is a **low** risk that the government will modify its contracts by scaling them down, postponing them, or outright repudiating them.		(Sachs and Warner 1997)
	ICIL	**Rule of law:** The government justly enforces contracts, and protects individuals and businesses against violence, theft and fraud.		(Easterly and Levine 2002; Sachs and Warner 1997)
Commercial Infrastructure	**ICC**	How much do you agree or disagree with the following statements about the general commercial environment in your country?		(Bridges.org 2001; Easterly and Levine 2002; Jarvenpaa and Tiller 1999; King et al 1994; Sachs and Warner 1997)
	ICCF	How much do you agree or disagree that SME businesses in your country can easily obtain the funds needed to engage in new and ongoing ventures?	X	(Eze 2002)
	ICCLC*	*To what extent is commerce in general **most profitable** in your country when an enterprise is labor-intensive (involves hiring many low-wage laborers) versus when it is capital intensive (involves investing in technological infrastructure)? *"Technological infrastructure" here does not necessarily mean ICT—it can include mechanized farming, as opposed to manual labor.*	X	(Bingi et al 2000)

Table 3.2 Continued

Construct	Code	Wording in final instrument	Δ	Sources of theory and items
	ICCC	**Corruption:** Bribery and corruption are **rare** when dealing with the government or businesses in relation to contracts, loans, licenses, tax assessments, fines, and other necessary services.	+	(Easterly and Levine 2002; Eze 2002; Sachs and Warner 1997)
	ICCP	**Electronic payment systems:** Banks support electronic merchant payment systems such as credit and debit cards.	+	Pilot respondents
	ICCD*	*Which of the following descriptions most adequately reflects the distribution environment for physical products in your country?		(APEC 1999; Travica 2002)
ICT Transfer Implementation	**TI**	How much do you agree or disagree with the following statements about implementation factors for **a typical ICT project** (especially e-business) in urban SME businesses in your country?		(Adam 1996; Checchi et al 2002; Cunningham and Srayrah 1994; Grover and Goslar 1993; Heeks 2002; Hill et al 1998; Ives and Jarvenpaa 1991; Jain 1997; Kwon and Zmud 1987; Loch, Nelson and Straub 2000; Mahmood, Gemoets and Gosler 1995; Montealegre 1998; Mursu et al 1999; Nidumolu et al 1996; Straub, Loch and Hill 2001)
	TITM	Top managers support the project by word and action.		(Bingi et al 2000; de Vreede, Jones and Mgaya 1999; Jain 1997; Loch, Nelson and Straub 2000)
	TIUI	Users are closely involved in the design and development of the system.		(Bingi et al 2000)
	TIUT	Users are computer literate and they are adequately trained in using the system.		(Bingi et al 2000; Loch, Nelson and Straub 2000)
	TIPC	There is at least one person (not necessarily a top manager) who purposefully champions the project by encouraging and advocating it.		(Loch, Nelson and Straub 2000)
	TISD	The systems development team is skilled in the pertinent technologies.		(Bingi et al 2000; Jain 1997; Kardaras and Karakostas 2001; Vadapalli and Ramamurthy 1998)
Culture-Specific Beliefs and Values	**C**	Please indicate how much you agree or disagree with these statements about the work environment in urban SME businesses that implement or consider implementing ICTs (such as e-business) in your country.		(Baba 1995; Checchi et al 2002; de Vreede, Jones and Mgaya 1999; Hakken 1991; Hasan and Ditsa 1999; Hill et al 1998; Hofstede 1980; Ingold 1996; Korpela 1996; Okunoye and Karsten 2002; Powell 2001; Straub 1994; Straub et al 2002b; Straub, Loch and Hill 2001)
Uncertainty Avoidance	**CUA**			(Dorfman and Howell 1988; Hasan and Ditsa 1999; Hofstede 1980; Hofstede 1991; Hofstede et al 1990; Singh 1990)
	CUAY	Employees typically work for many years at the same company.	X	(Hofstede 1980; Singh 1990)

Table 3.2 Continued

Construct	Code	Wording in final instrument	Δ	Sources of theory and items
	CUAR	Employees generally feel that it is important to have job requirements and instructions spelled out in detail so they always know what they are expected to do.	X	(Dorfman and Howell 1988)
	CUAT	Business employees generally do not trust ICTs or e-business.	+	(McCoy 2002)
	CUAS	Business employees are generally concerned about data security when considering using ICTs.	+	(Bingi et al 2000; Eze 2002)
	CUAP	Managers typically prefer to adopt ICTs or e-business only if it has been proven to be effective.	Δ	(McCoy 2002)
	CUAN	Managers are usually hesitant to attempt new ICT or e-business applications.	Δ	(Hasan and Ditsa 1999)
Power Distance	**CPD**			(Dorfman and Howell 1988; Hasan and Ditsa 1999; Hofstede 1980; Hofstede 1991; Hofstede et al 1990; Singh 1990)
	CPDP	Managers frequently use their authority and power when dealing with subordinates.		(Dorfman and Howell 1988)
	CPDD	Managers do not usually delegate important tasks to employees.		(Dorfman and Howell 1988)
	CPDA	Subordinates are usually afraid to express disagreement with their superiors.		(Hofstede 1980; Singh 1990)
	CPDS	Managers generally avoid off-the-job social contacts with employees.	X	(Dorfman and Howell 1988)
Technology Culturation	**CTC**	Please indicate how much you agree or disagree with the following statements about the amount and nature of travel for **managers of ICTs or e-business** in urban SME businesses in your country. *(For these questions, include the Republic of South Africa as a "technologically-advanced" country.)*		(Checchi et al 2002; Straub et al 2002b; Straub, Loch and Hill 2001)
	CTCB	Most have traveled to a technologically-advanced country for **business purposes**.		(Straub, Loch and Hill 2001)
	CPCP	Most have traveled to a technologically-advanced country for **personal (non-business) purposes**.		(Straub, Loch and Hill 2001)
	CPCS	Most have attended a computer-related conference **either within Sub-Saharan Africa or in another developing country**.		(Straub, Loch and Hill 2001)
	CPCT	Most have attended a computer-related conference **in a technologically-advanced country**.		(Straub, Loch and Hill 2001)

Table 3.2 Continued

Δ: Changes from the pilot instrument		
	A blank means there were no changes between pilot instrument and final instrument	
+	Item not in pilot added to final instrument	
X	Item in pilot deleted from final instrument	
Δ	Item in pilot modified in final instrument. The description above is how it appeared in the final instrument. The original pilot versions are listed here:	
	IPEP	**E-business promotion:** The government actively promotes the practice of e-business.
	IPEI	**Intellectual property rights:** The government officially recognizes and actively enforces the protection of patents, copyrights, trademarks, and other intellectual property rights.
	IITB	There is an adequate number of national and international **trunk/backbone** phone and data circuits.
	IIWN	There is an adequate number of **long-distance wireless networks**, such as VSAT, satellite and microwave links.
	CUAP	Managers typically prefer to adopt e-business only if it has been proven to be effective.
	CUAN	Managers are usually willing to attempt new, potentially beneficial e-business applications.
***Almost all questions were a 7-point Likert scale, scored 1 to 7. However, ICCLC and ICCD were five-point ordinal scales, scored 1 to 5.**		
	Regular items: ○ Strongly disagree ○ Disagree ○ Somewhat disagree ○ Neutral ○ Somewhat agree ○ Agree ○ Strongly agree	
ICCLC*	*To what extent is commerce in general **most profitable** in your country when an enterprise is labor-intensive (involves hiring many low-wage laborers) versus when it is capital intensive (involves investing in technological infrastructure)? *"Technological infrastructure" here does not necessarily mean ICT—it can include mechanized farming, as opposed to manual labor.* ○ Highly labor-intensive ○ More labor- than capital-intensive ○ Balanced between labor and capital ○ More capital- than labor-intensive ○ Highly capital-intensive	
ICCD*	*Which of the following descriptions most adequately reflects the distribution environment for physical products in your country? ○ **Poor:** Basic postal services sparse and expensive. Road infrastructure seriously deficient even in larger cities. Airfreight services unavailable or prohibitively expensive. ○ **Substandard:** Basic postal services available but not reliable. Road infrastructure passable in larger cities, but does not reach remote areas. Airfreight services very expensive and infrequent. ○ **Fair:** Postal services well developed. Main cities linked by reliable road infrastructure. Airfreight services regular though still infrequent. ○ **Good:** Private delivery services available as alternative to traditional postal service. Roads to most locations in good condition. Regular and continuous airfreight services. ○ **Excellent:** Delivery services widely available. Airfreight well developed. Cities and towns well connected by highways and/or secondary roads. Sophisticated, specialized, distribution services.	

An important consideration in my survey is that I was trying to learn what where the effects of present infrastructural and cultural conditions in SSA on e-business outcomes. Because of the length of time to create e-business applications, and to obtain a return-on-investment, I realized that a completely cross-sectional model was inappropriate to validly identify the effects that I was testing. Thus, I asked the experts what they expected would be the e-business capabilities and value derived from e-business in SSA urban SMEs by the end of the year 2004. For all the other constructs in the model, I asked the experts what the current (as of April to July 2003, when the survey was conducted) conditions were in SSA.

3.4.2 ICT Policies

The literature on e-business policy is new and relatively sparse, so most of the studies I drew from focused on ICTs in general. Various studies have examined the effects of ICT policy on the development of ICT infrastructure (Checchi et al 2002; Dutta 2001; Easterly and Levine 2002; Gurbaxani et al 1990b; Hakken 1991; IDRC 1998; Jarvenpaa and Tiller 1999; King et al 1994; Kraemer, Gurbaxani and King 1992; Raman and Yap 1996; Tractinsky and Jarvenpaa 1995; Wild and Mncube 1996). These studies generally indicated that policies that favor the development of ICTs help the growth of national ICT infrastructures. However, there have been a number of studies that specifically examined or argued the specific effects of ICT policy on e-business (Bridges.org 2001; Dekleva 2000; Kardaras and Karakostas 2001). Such policies often targeted ICTs in general, but there is need to target certain policy issues peculiar to e-business, such as those concerning digital signatures and intellectual property rights for digital products.

For this study, the primary source of my ICT Policy instrument was King et al's (1994) comprehensive treatise on dimensions of ICT-related policy. For policy issues specifically related to e-business, I looked to a particular subset of these policy-focused studies that have discussed specific issues or even developed empirical measures and instruments for gauging the

effects of ICT policies on e-business outcomes (APEC 1999; Checchi et al 2002; Jarvenpaa and Tiller 1999; King et al 1994; Montealegre 1999).

3.4.3 ICT Infrastructure

For measuring ICT infrastructure, I looked at studies that have measured teledensity (Mbarika and Byrd 2003; Mbarika et al 2001), telecommunications infrastructure (Dutta 1997; Dutta 2001), and e-readiness assessments of ICT infrastructure (Bridges.org 2001; Wolcott et al 2001). There has been a considerable amount of research arguing that ICT infrastructure is a necessary prerequisite for effective e-business outcomes (Bridges.org 2001; Dekleva 2000; Kardaras and Karakostas 2001; Mbarika and Byrd 2003; Mueller 1999; UNECA 1999b; Zwass 1996). Other research has argued more generally about the effects of ICT infrastructure on economic development (Dutta 1997; Dutta 2001; Gilbert 1996; Mbarika et al 2001; Meso and Duncan 2000; Odedra-Straub 1993; Raman and Yap 1996; Salem 1986; Splettstoesser and Towry-Coker 1999), but I could argue, in the context of this present study, that this relationship is mediated by e-business outcomes.

For this study I selected items that come from a rich body of literature that has developed instruments to measure different aspects of ICT infrastructure at the national level (APEC 1999; Bingi et al 2000; CID 2000; Dutta 1997; Eze 2002; Mbarika and Byrd 2003; Mbarika et al 2001; Wallsten 2001; Wolcott et al 2001).

3.4.4 Institutional and Commercial Environment

The institutional and commercial environment includes the examination of socio-political institutions (Gurbaxani et al 1990a; Gurbaxani et al 1990b; Montealegre 1999; Splettstoesser and Towry-Coker 1999) and commercial institutions (Dekleva 2000; Jarvenpaa and Leidner 1998; Jarvenpaa and Tiller 1999; Licker and Motts 2000; Montealegre 1996; Travica 2002). For conceptualizing institutional factors for my study, I drew primarily from the economic

development literature (Easterly and Levine 2002; Sachs and Warner 1997) that provided factors such as governmental effectiveness, corruption, and regulatory burden to businesses, with some reference to ICT strategy and planning (Eze 2002). For commercial infrastructure, I drew from an eclectic set of sources comprising economic development (Easterly and Levine 2002; Sachs and Warner 1997), IS research (Bingi et al 2000; Eze 2002; Travica 2002), and e-readiness assessments (APEC 1999). Regarding this dimension, I borrowed from the studies which are specifically focused on commercial infrastructure issues in the developing country context.

3.4.5 ICT Transfer Implementation

Implementation factors feature a set of items with a long history of operationalizations; thus, I had much to choose from. However, I focused particularly on those items that had been identified as particularly pertinent to developing countries. The support of top executives is probably the most universally recognized factor of success in ICT projects (Bingi et al 2000; de Vreede, Jones and Mgaya 1999; Jain 1997; Loch, Nelson and Straub 2000). The close involvement of users in the design process is also important (Bingi et al 2000). User training in the system is also an important factor (Loch, Nelson and Straub 2000), and in developing countries this might be even more important in light of the low literacy levels (Bingi et al 2000)—the ability to read and write, that is, not just "computer literacy." Another important factor is that there be a project champion, an influential person—not necessarily a top executive—who takes a personal interest in the project and edges things on (Loch, Nelson and Straub 2000). Finally, it is widely recognized that the systems development team must be competent in the technologies they are handling (Bingi et al 2000; Jain 1997; Kardaras and Karakostas 2001; Vadapalli and Ramamurthy 1998).

3.4.6 Culture

For my study, I tested both Culture-specific beliefs and Technology acculturation as two sub-constructs of Culture. Most empirical literature on culture focus on beliefs and values

(Checchi et al 2002; de Vreede, Jones and Mgaya 1999; Hasan and Ditsa 1999; Hofstede 1980; Korpela 1996; Straub 1994; Straub, Loch and Hill 2001), and I drew from a variety of these to develop my items. Specifically, I borrowed from instruments that have conceptualized Power Distance (Dorfman and Howell 1988; Hofstede 1980; Singh 1990) and Uncertainty Avoidance (Bingi et al 2000; Dorfman and Howell 1988; Eze 2002; Hasan and Ditsa 1999; Hofstede 1980; McCoy 2002; Singh 1990). However, Technology Culturation has been uniquely developed by Straub et al in the information systems literature (Checchi et al 2002; Straub, Loch and Hill 2001), so I consulted that body of research for these items.

3.4.7 Demographic Questions

In addition to the theoretically-based items for testing my model, I asked a number of demographic questions to better understand my respondents. About their organizations, I asked the experts the nature (commercial, governmental, academic, or nongovernmental) and location. I asked the respondents how long they had been doing work related to e-business in Sub-Saharan Africa, and asked them to qualitatively describe the nature of their expertise. I asked how long they had lived in SSA, other parts of Africa, and in technologically-advanced countries. I also asked the experts about their gender, age, and educational qualifications.

3.5 Pilot Study

I conducted a pilot study with two primary goals. First, I wanted to validate the instrument that I would use for my main study. Second, I wanted to test the administration procedure of my study to ensure that it was appropriate for gathering adequate data. For the sake of efficiency in data collection, I only used a Web-based survey for the pilot study. As I have already discussed, while in other studies this mechanism might bias the results by restricting respondents to those with Internet access and who are comfortable using it, I believe it is appropriate in my study of e-business experts since their using the Internet is intrinsic to their area of expertise.

After designing a first draft of the Web-based survey and receiving internal peer feedback, I sent out the survey for content and face validation to external researchers with domain expertise. One of these researchers is an expert on cultural issues concerning ICTs, two of them have extensive expertise on ICTs in developing countries, and three have specific expertise on ICTs in SSA. Of the last group, one has been an ICT practitioner in SSA for many years, and another has served with the United Nations Economic Commission for Africa for four years. Thus, I have confidence that these validaters were competent enough to give me high-quality feedback.

Based on this input, I came up with a 44-item survey instrument that covers all my constructs. With 5 demographic questions, I had a total of 49 questions in the pilot instrument, not including solicitations for qualitative comments at the end of each section of the survey. I referred to Dillman's (2000) guidelines in my instrument design and survey administration. In addition, although I did not tell the experts that this was a pilot study, I did ask them to give me feedback to help improve the questionnaire.

From my list of 1,253 organizations, I randomly selected 399 organizations for which I tried to obtain e-mail addresses. I used the e-mail addresses when present in the database, and when contact e-mail addresses were missing, I searched for them on the Web. In order to validate the addresses I had, I sent a pre-contact e-mail (Dillman 2000) to all addresses in my pilot list. After validating these e-mail addresses, I finally obtained 402 apparently valid addresses to which I sent the survey in April and May 2003. I used Dillman's (2000) method of sending a pre-contact e-mail (as I described), another e-mail with the link to the actual Web-based survey after two days, and two reminders. However, for the pilot study, I did not send a final third reminder. I sent the first reminder six days after sending the survey link, and the second reminder two weeks after the first. 84 e-mails were undeliverable after multiple attempts. 17 respondents

asked to be excluded from the survey, but I received 48 completed responses, plus one more that arrived too late for pilot analysis. This gives an effective response rate of 20.8% ([48+17+1]/[402-84]).

One of the 48 responses had 27% of data missing (12 of 44 variables), and nine had 2% (1/44). One variable had 8.3% (4/48) missing data, another had 4.1% (2/48), and each of 15 variables had 2.1% (1/48) missing. Because of the relatively low incidence of missing data, I did not delete any variables or responses from the pilot study, but rather imputed the missing values in order to carry out my confirmatory factor analysis. I imputed each individual data point by imputing the mean for that variable among respondents who reported for that same country. When there was only one respondent for that country, I imputed the mean of the sub-region of Sub-Saharan Africa in which the country is located. (The five sub-regions are Central/Great Lakes, East, Horn, Southern, and West—see Table 1.1.)

Hair et al (1998) recommend an absolute minimum sample size of 50 for factor analysis, with no less than 5 observations for each variable. For exploratory factor analysis (EFA), my sample size of 48 was only just sufficient. For confirmatory factor analysis (CFA), my largest construct (E-business Outcomes) has eight items, thus requiring at least 40 observations. While I just barely made the minimum requirements, I believe this is sufficient for my pilot study, as I did not want to sacrifice any more of my sample for the pilot study. However, I was aware that the results of the pilot study needed to be interpreted cautiously, with only a marginally sufficient sample size. All the same, I hoped that such statistical analyses could indicate which items were problematic and might suggest changes and modifications for the main study.

Table 3.3 summarizes the results of my exploratory analyses. Using SPSS 11.5, I conducted reliability analysis to produce Cronbach's α for each construct and dimension, and

EFA with varimax rotation to determine which items to eliminate or revise. I conducted analysis for discriminant validity using AMOS 4.0. In summary, I found the following:

Table 3.3. Pilot study results

	# items in pilot instrument	Reliability and EFA		Confirmatory Factor Analysis		
		Cronbach α	# retained from EFA	# CFA items	AVE	Discriminant Validity
E-biz Outcomes		0.815			0.677	Distinct
E-biz Capabilities	5	0.902	5	5	0.644	
E-biz Values	3	0.880	3	3	0.732	
Culture-specific		0.569			N/A	Distinct
Power Distance	4	0.816	3	3	0.668	
Uncertainty Avoidance	4	0.149	2	N/A	N/A	
Technology Culturation	4	0.834	4	4	0.564	Single
ICT Transfer Implementation	5	0.821	5	5	0.462	Single
ICT Policies		0.864			0.578	Distinct
General	4	0.859	4	4	0.573	
E-biz	3	0.803	3	3	0.584	
Inst. and Com. Environment		0.543			N/A	Single
Institutional	3	0.714	3	3	0.489	
Commercial	3	0.081	1	N/A	N/A	
ICT Infrastructure	6	0.775	5	6	0.366	Single

- The E-business Outcomes items were very stable. Cronbach's α was >0.7 for both dimensions, which is the minimum recommendation (Hair et al 1998). I retained all the initial items. For the CFA, the average variance extracted (AVE) was well above the 0.5 minimum (Fornell and Larcker 1981). Discriminant analysis indicated that there were two distinct first-order constructs: E-Business Capabilities and E-Business Values.
- For Culture-specific Beliefs and Values, the Power Distance dimension was fairly stable (α = 0.816) with only one poor item, but Uncertainty Avoidance needed to be completely revised (α = 0.149). I conducted CFA only for Power Distance, and the three retained items performed well with 0.668 AVE.
- Technology Culturation was very stable (α = 0.834). I retained all items. CFA was also satisfactory (AVE = 0.564).

- The ICT Transfer Implementation items were very stable ($\alpha = 0.821$). I retained all items, even though the CFA was poor with AVE at 0.462.
- ICT Policies had two distinct dimensions: General ICT Policies and E-Business Policies. Both dimensions proved equally stable in both EFA ($\alpha > 0.8$) and CFA (AVE ≥ 0.57).
- The Commercial items of Institutional and Commercial Environment were very poorly formulated ($\alpha = 0.081$). I retained only one item and thoroughly revised the others. However, the Institutional items were marginally stable ($\alpha = 0.714$, AVE = 0.489).
- The ICT Infrastructure items were satisfactory in EFA ($\alpha = 0.775$), but poor in CFA (AVE = 0.366). I thus, revised these items considerably.

After conducting these analyses, I took the following measures to thoroughly revise the instrument for my main survey:

1. I dropped or modified items that loaded poorly on their respective factors based on my reliability analysis, EFA and CFA, as I report above.
2. Many respondents gave detailed qualitative comments in their responses, and I carefully examined these comments to guide my revisions.
3. I re-consulted two of the domain researchers who had initially assisted me in developing the pilot instrument. They advised me on what to revise, drop, and add to the final instrument.

After these revisions, I developed an instrument with 50 questions addressing my theoretical constructs. With 8 demographic questions (one of which is qualitative), there are 58 total questions, not including the qualitative requests for comments. Table 3.2 records this final instrument, comparing it with the initial pilot instrument. Appendices A and B list the actual RTF and the Web versions of the survey, respectively. In the next chapter, I describe the administration of the main study, and report the results.

CHAPTER 4. ADMINISTRATION AND RESULTS OF THE STUDY

In Chapter 3 I described how I designed a survey instrument and then refined it with a pilot study. In this chapter, I will describe how I conducted the actual study. First, I report my procedure for administering the survey and analyzing the data I collected from it. Then, I report some descriptive analyses and tests for response bias and statistical assumptions. Next, I report how I refined the measurement model based on the data I collected, and then I report my tests of the structural models and hypotheses that I described in Chapter 2. I conclude this chapter by reviewing the steps I took to ensure the validity of this study.

4.1 Survey Administration

For my main study, I used the expert contacts from the AISI database that were left after conducting the pilot study. For each missing e-mail address or postal address, three separate research assistants searched the Web to locate the missing information. After I supplemented the database with this information, I still could not obtain any address information, whether e-mail or postal, for 52 contacts. As with the pilot study, I validated the e-mail addresses I had using a pre-contact mailing (Dillman 2000). This resulted in 840 valid e-mail addresses. For 56 other contacts, I had postal addresses, but no valid e-mail address. Thus, from the AISI database I obtained 896 contact addresses. However, it should be noted that for 56 of these, I only sent the paper version of the instrument on one occasion with no reminder.

In addition to the 896 contacts from the AISI database, I obtained 196 names and e-mail addresses from the ARISE database. All ARISE contacts had e-mail addresses, but no postal addresses. Thus, as I describe below, I made four contacts with the ARISE experts, but did not send them the final reminder by postal mail. In all, in May to July 2003 I sent my survey instrument to 1,092 expert contacts.

Following Dillman's (2000) administration methodology, six days after sending a pre-contact e-mail, I sent another e-mail with the link to the actual Web-based survey. Two weeks later, I e-mailed a reminder to the experts. With this reminder I attached an electronic RTF version of the survey. Two weeks after that, I sent a second reminder, also with an attached survey. Finally, five days later, I sent all those who had not responded (for whom I had a postal address) a final reminder by postal mail. I expect that they received these mailed surveys anywhere from three days to one month from the date I posted them.

In spite of my attempt to pre-validate the addresses, 175 e-mails were undeliverable after multiple attempts. 20 physical letters were returned undeliverable—these all came from the United States and Canada, except for one from Norway. 39 respondents asked to be excluded from the survey, but I received 158 completed responses, giving an effective response rate of 22.0% ([158+39]/[1,092-195]). It also should be noted that I did not receive a single postal mail letter undeliverable from Africa. The postal systems in these countries apparently are not set up to return international undeliverable mail. Thus, the true response rate was an undeterminable higher number.

I deleted responses with unacceptable levels of missing data according to the following principles: First, I deleted 6 cases with <25% of non-demographic questions answered (the highest case answered only 22% of the questions). Next, I deleted 5 with <90% of the E-business Outcomes questions answered (highest case was 50%). I felt that I should apply such a strict standard for the primary construct of interest. I deleted one case where the respondent stopped midway. I deleted three cases, two from the Republic of South Africa and one from Egypt, where the respondents failed to indicate a country for which they were answering—I was afraid the responses might have been for these African countries outside the scope of this study. This data cleaning left 147 usable responses. Of this data, only 0.8% was missing. No item (variable) had

more than 5 of 147 (3.4%) of values missing. Other than four out of 147 cases with 8 to 22% missing values, no case that I retained had more than 2% missing data. Unlike the pilot study where my low sample size impelled me to impute missing values, I performed no such imputations for my main analysis because the analytical techniques I used (exploratory factor analysis and PLS) were able to handle missing data from the robust sample size of the actual study.

4.2 Data Analysis Procedure

Before testing the actual model, I first conducted some descriptive analyses to understand the data I had collected, and I tested for response bias and for some common statistical assumptions. I describe these tests in this section.

4.2.1 Descriptive Analysis

In Table 4.1, I report the minimums, maximums, means, and standard deviations of responses to each question of my survey instrument. All scales range from 1 (Strongly Disagree) to 7 (Strongly Agree), except ICCD, which is 1 to 5. For the specific questions, refer to Table 3.1. In Tables 4.2 and 4.3 I report responses to numeric and categorical demographic questions, respectively. (The totals were less than 147 when some respondents left these answers blank.) Half of the experts (50.3%) were from commercial organizations, with the rest evenly divided (15.9 to 17.2%) among nongovernmental, academic, and governmental organizations. These organizations were located all over the world. 104 experts (71.2%) were actually in Sub-Saharan Africa. 24 (16.4%) were based in the Republic of South Africa, and 4 (2.7%) were in North Africa. Regardless of where they were from, I asked the experts to respond for a specific country in SSA, or a sub-region there. 36 experts responded for East Africa, 45 for West Africa, and 51 for Southern Africa. 4 experts responded for Central Africa, 3 for the Horn of Africa, and 8 generalized for all of Sub-Saharan Africa (refer to Table 1.1 in the introduction for the countries in these regions).

Table 4.1. Descriptive statistics of questionnaire item responses

		N	Min	Max	Mean	σ
E-Business Capabilities						
	EBCI	146	1	7	4.39	1.724
	EBCT	147	1	7	3.87	1.895
	EBCX	147	1	7	3.6	1.797
	EBCS	147	1	7	3.54	1.725
	EBCN	143	1	7	5.21	1.448
E-Business Value						
	EBVR	147	1	7	5.24	1.321
	EBVC	147	2	7	5.54	1.218
	EBVT	147	2	7	5.67	1.160
	EBVJN	146	1	7	5.33	1.308
	EBVJL	147	1	7	3.83	1.644
ICT Policy						
	IPIS	146	1	7	4.15	1.998
	IPID	146	1	7	3.97	1.840
	IPRS	146	1	7	4.18	1.833
	IPRD	146	1	7	3.95	1.790
	IPP	146	1	7	4.52	1.938
E-business Policy						
	IPEP	144	1	7	4.1	1.735
	IPEI	145	1	7	3.81	1.867
	IPEU	145	1	7	3.19	1.760
	IPEA	145	1	7	3.72	1.627
ICT Infrastructure						
	IITB	147	1	7	3.34	1.978
	IIE	146	1	7	3.64	1.919
	IIIW	147	1	7	3.58	1.724
	IIWN	147	1	7	3.25	1.621
	IIP	146	1	7	4.16	1.814
	III	142	1	7	3.78	1.743
	IIA	145	1	7	3.11	1.625
	IIQ	146	1	7	3.85	1.625

		N	Min	Max	Mean	σ
Institutions						
	ICIV	147	1	7	4.71	1.756
	ICIB	146	1	7	4.08	1.704
	ICIR	147	1	7	4.16	1.658
	ICIL	146	1	7	4.31	1.837
Commercial Infrastructure						
	ICCC	147	1	7	3.03	1.761
	ICCP	147	1	7	4.17	1.956
	ICCD*	145	1	5	2.85	1.082
Transfer Implementation						
	TITM	145	1	7	4.47	1.344
	TIUI	145	1	7	3.83	1.450
	TIUT	144	1	7	3.88	1.465
	TIPC	145	1	7	5.01	1.236
	TISD	145	1	7	4.54	1.434
Uncertainty Avoidance						
	CUAT	147	1	7	3.75	1.364
	CUAS	147	1	7	4.76	1.560
	CUAP	147	1	7	5.14	1.327
	CUAN	147	1	7	4.83	1.326
Power Distance						
	CPDP	146	1	7	5.38	1.210
	CPDD	145	1	7	4.7	1.385
	CPDA	145	1	7	5.06	1.461
Technology Culturation						
	CTCB	146	1	7	4.92	1.392
	CTCP	145	1	7	4.61	1.420
	CTCS	146	1	7	4.64	1.404
	CTCT	144	1	7	4.36	1.461

*All scales range from 1 (Strongly Disagree) to 7 (Strongly Agree), except ICCD, which is 1 to 5

Table 4.2. Responses to numeric demographic questions

	N	Min	Max	Mean	σ
Number of years of experience with e-business in SSA	142	0	28	6.71	5.38
Number of years lived in Sub-Saharan Africa	131	0	54	21.09	15.99
Number of years lived in Republic of South Africa	126	0	50	5.01	11.59
Number of years lived in North Africa	120	0	40	1.23	5.64
Number of years lived in technologically-advanced countries	130	0	47	7.12	10.30

Table 4.3. Responses to categorical demographic questions

Region for which responded		
	N	**%**
Central	4	2.7
East	36	24.5
Horn	3	2.0
Southern	51	34.7
West	45	30.6
All of SSA	8	5.4
Total	147	

Type of experts' organization		
	N	**%**
Commercial	73	50.3
Governmental	25	17.2
Nongovernmental	23	15.9
Academic	24	16.6
Total	145	

Region of expert's organization		
	N	**%**
Asia	1	0.7
Europe	8	5.5
North Africa	4	2.7
North America	5	3.4
South Africa	24	16.4
SSA	104	71.2
Total	146	

Age		
	N	**%**
24<	4	2.8
25-34	47	32.4
35-44	53	36.6
45-54	32	22.1
55-64	8	5.5
65>	1	0.7
Total	145	

Gender		
	N	**%**
Female	16	11.0
Male	129	89.0
Total	145	

Highest level of education		
	N	**%**
Secondary	5	3.5
Post-secondary	8	5.6
Bachelor's	46	32.4
Master's	64	45.1
Doctorate	19	13.4
Total	142	

The experts had an average of 6.7 years of experience in e-business regarding Sub-Saharan Africa. They had lived an average of 21.1 years in SSA, and 7.1 years in technologically-advanced countries outside the continent of Africa. The median and mode age group for respondents was from 35-44 years. The median and mode of highest education level attained was a master's degree. 89.0% of respondents were male.

4.2.2 Tests for Response Bias

Before I actually tested my hypotheses towards answering my research questions, I conducted some exploratory analyses to test my responses for any possible biases. First, I checked for biases associated with the medium that the experts used to respond to the survey. Of my 158 total responses (including the unusable ones), 123 (77.8%) responded online using the Web-based survey I created using WebSurveyor. 10 (6.3%) responded by e-mailing me an RTF attachment, 6 (3.8%) responded by fax, 18 (11.4%) responded by postal mail, and 1 (0.6%) scanned the survey and e-mailed me a TIF file. Because of the small number of respondents who used means other than Web-survey, I could not conduct any statistically valid test (such as ANOVA or a χ^2 test of contingency tables) that would indicate any possible bias. Thus, I assumed that there was no bias due to response medium that significantly skewed my results.

I also conducted preliminary analysis of the experts' responses to the primary dependent variables (E-Business Capabilities and E-Business Value) based on their demographic characteristics to see if the demographic distribution of respondents affected their answers to these questions. I conducted multiple analyses of variance (MANOVA) on the data, using each demographic variable separately for the independent variables, and for the dependent variables, the five E-Business Capabilities items and the three valid (as I describe below) E-Business Value items separately as multidimensional constructs. I found no relationship that was substantially important.

4.2.3 Tests for Normality and Outliers

I conducted preliminary assessment of the normality of all metric variables by plotting histograms and normal probability plots. I also preliminarily examined the skewness and kurtosis of these variables, and I tested for normality using the Kolmogorov-Smirnov statistic. These tests revealed that none of my variables, whether for the theoretical instrument or for the demographic questions, was normally distributed. To try to obtain normal data, I transformed each variable by computing the square, square root, reciprocal (1/X), and natural logarithm. In spite of these attempts, none of the transformations was normal. However, because I employed PLS (which I describe below), this lack of normality is not a problem, as PLS is a non-parametric method. Covariance-based SEM procedures, such as LISREL, would have been inappropriate because of their requirement of normal data. With my mode of analysis, I avoided this problem. For my 50 theoretical items, outliers were not a concern, as responses were constrained to 1 to 7 for all items (except ICCD, which was 1 to 5).

4.2.4 Choice of Statistical Technique: PLS

My literature review identified the following factors as pertinent for e-business in SSA, and specified their interrelationship: ICT Policies, ICT Infrastructure; Institutional and Commercial Environment; ICT Transfer Implementation; and Culture. I could test the model using structural equation modeling (SEM). This technique is valuable for its ability to test complex models that feature interactions and multiple-cause effects, where constructs are measured with multiple indicators (Chin 2000). Such models let the indicators empirically measure theoretical latent constructs, particularly where sets of indicators are correlated with each other. The measurement of the constructs with multiple indicators permits calculation of and consideration for measurement error. An alternative technique that I could have used is multiple regression analysis, but it only tests unidimensional constructs, making the unrealistic

assumption of no measurement error. Moreover, regression analysis cannot simultaneously test multiple endogenous variables, as can SEM. Thus, structured equation modeling was most appropriate for testing my model.

There are two general approaches to structural equation modeling: covariance-based SEM and the partial least squares (PLS) approach of variance-based SEM. The standard terminology used is rather confusing because, although both approaches are technically different ways to model structural equations, the covariance-based approach is usually simply called "structural equation modeling" (SEM), whereas the variance approach is called PLS (Chin 2000). I will follow this conventional terminology in distinguishing between SEM (the covariance-based variation) and PLS (the variance-based approach).

Chin and Newsted (1999) compared and contrasted SEM and PLS, outlining which situation is appropriate for which technique. There are a number of reasons why PLS was clearly the better approach for analyzing the model in this current research. First, PLS is more appropriate in exploratory research such as mine. SEM works best for well-defined theoretical constructs that are being conclusively confirmed. When the underlying theory is relatively new and untested, PLS is more appropriate. Second, SEM requires that the data be normally distributed to calculate appropriate relationships. PLS takes a non-parametric distribution-free approach that makes no such requirement on the data. As I mentioned earlier, none of my variables was normally distributed, so PLS was clearly more appropriate for analyzing the data in this study. Third, SEM requires large sample sizes. The standard suggestion is the lesser of 200 cases or 10 times the number of estimated parameters (in my case, 10 x 50 = 500) (Hair et al 1998). In contrast, PLS merely requires 10 times the number of items in the construct with the most incoming structural paths (Chin 2000). In my case, this construct was E-Business Capabilities with 5 items (see Table 4.5 and Figures 2.3 and 2.4), for a minimum requirement of

50. My sample of 147 amply met the PLS requirement, but failed that of SEM. For these three reasons, I chose to test the model using the PLS approach.

An additional distinctive of PLS is that it permits the use of formative indicators that measure a construct by regression-like weights in contrast to the more common reflective indicators that use factor loadings to measure the construct. In my case, I did not have any formative indicators. All the variables in each construct were highly correlated with each other, which would cause multicollinearity problems as in multiple regression analysis. Thus, a fully reflective model was appropriate in my case, and this potential benefit of PLS is not applicable.

For these and other reasons, PLS has proven popular as a data analysis technique in information systems research, being used for studies as diverse as investigating the factors that induce small firms to accept personal computing (Igbaria, Zinatelli, Cragg and Cavaye 1997), factors that contribute towards success in data warehousing (Wixom and Watson 2001), and institutional factors that enable organizations to assimilate Web technologies (Chatterjee, Grewal and Sambamurthy 2002). I used PLS Graph 3.00 to calculate the paths for the structural model, also called the inner model. Unlike regular SEM, PLS does not provide any meaningful measure of overall model fit. Whereas SEM measures of fit indicate how well the model covariances fit those in the sample data, PLS tries to maximize explained variance, rather than covariance. As a result, Chin (1998) recommends that a PLS model is best evaluated based on high R^2 values and high path correlations, as I discuss below. In the following sections, I report the analysis of the measurement (outer) model and of the structural (inner) model using PLS.

4.2.5 Testing and Refining the Measurement (Outer) Model

Reliability is a variable measurement criterion. A reliable measure is one that reports the same value when measured over and over again. There should be very little error in measurement between repeated measures of the same thing. If there was a significant error between two or

more measures of the same construct, then the hypothesized relationships could not be accurately measured. The researcher wouldn't know if a relationship was detected (or not detected) because of a fluke in measurement. Thus, it was imperative that I examined the reliability of the instruments I used as a first step before I actually tested my hypotheses.

Before beginning statistical analysis to test and refine the measurement model, I must first ensure that I have developed high-quality measurement instruments. I have already described how I used Dillman's (2000) rigorous guidelines, which are based on carefully tested measurement theory, to develop my instruments. Also, my pilot study helped me verify the clarity and appropriateness of the instrument by obtaining feedback from sample respondents. Table 3.1 in Chapter 3 lists all the items in the final instrument with their codes. With these critical preliminary steps, I could now measure the reliability of the final instrument.

There are four steps involved in testing and refining the measurement model (Chin 1998): confirmatory factor analysis, checking for cross-loadings, reliability measures of the constructs, and discriminant validity.

4.2.5.1 Confirmatory Factor Analysis

The first step in testing and refining the measurement model was to conduct confirmatory factor analysis (CFA). This ensured that, in a factor analysis of all the items in the instrument, each item loaded on the construct to which it is theoretically assigned. I used PLS Graph 3.00 to run the overall model I theoretically specified in Figure 2.2, using all 50 items in Table 3.2. This run generates weights and loadings for each item on their respective constructs. The weights are regression beta coefficients for the items on their respective latent constructs, and are used to directly generate latent variable scores for each construct. (For formative constructs, the weights are also used to represent the contribution of each item to its latent construct, but in my model there are no formative constructs.) The loadings are the factor-analytic loadings for each item on its respective latent construct. Table 4.4 displays the weights and loadings for this initial run.

Table 4.4. Confirmatory factor analysis

Construct	Item	Initial Instrument		Refined Instrument		
		Weight	Loading	Weight	Loading	Composite reliability
E-Business Capabilities	EBCI	0.232	0.833	0.251	0.841	0.935
	EBCT	0.279	0.912	0.305	0.916	
	EBCX	0.243	0.898	0.263	0.903	
	EBCS	0.278	0.869	0.310	0.878	
	EBCN	0.146	0.664			
E-Business Value	EBVR	0.297	0.863	0.294	0.859	0.909
	EBVC	0.307	0.884	0.312	0.885	
	EBVT	0.318	0.887	0.323	0.889	
	EBVJN	0.251	0.735	0.250	0.739	
	EBVJL	0.036	0.177			
ICT Policy	IPIS	0.232	0.855	0.274	0.885	0.939
	IPID	0.225	0.892	0.275	0.915	
	IPRS	0.210	0.877	0.250	0.914	
	IPRD	0.272	0.810	0.327	0.847	
	IPP	0.297	0.662			
E-business Policy	IPEP	0.294	0.756	0.365	0.827	0.910
	IPEI	0.305	0.870	0.371	0.898	
	IPEU	0.326	0.895	0.407	0.909	
	IPEA	0.318	0.705			
ICT Infrastructure	IIIW	0.168	0.696			
	IIWN	0.162	0.694			
	IIP	0.172	0.767	0.241	0.800	0.892
	III	0.173	0.819	0.236	0.824	
	IIA	0.181	0.734	0.250	0.780	
	IIQ	0.192	0.764	0.274	0.797	
	IITB	0.198	0.736	0.276	0.747	
	IIE	0.134	0.599			
Institutions	ICIV	0.305	0.825	0.308	0.826	0.917
	ICIB	0.283	0.866	0.282	0.866	
	ICIR	0.290	0.851	0.292	0.851	
	ICIL	0.296	0.883	0.294	0.882	
Commerce	ICCC	0.446	0.795	0.432	0.786	0.814
	ICCP	0.351	0.722	0.351	0.720	
	ICCD	0.497	0.793	0.510	0.801	
Transfer Implementation	TITM	0.233	0.824	0.233	0.824	0.907
	TIUI	0.231	0.791	0.232	0.791	
	TIUT	0.254	0.848	0.254	0.848	
	TIPC	0.200	0.755	0.200	0.755	
	TISD	0.307	0.845	0.305	0.844	
Power Distance	CPDP	0.481	0.858	0.510	0.870	0.872
	CPDD	0.251	0.782	0.223	0.768	
	CPDA	0.453	0.865	0.449	0.860	
Uncertainty Avoidance	CUAS	0.527	0.799	0.541	0.818	0.834
	CUAP	0.666	0.886	0.639	0.873	
	CUAT	0.053	0.154			
	CUAN	0.011	0.310			
Technology Culturation	CTCB	0.350	0.867	0.415	0.864	0.908
	CTCS	0.268	0.816	0.305	0.844	
	CTCT	0.368	0.877	0.422	0.919	
	CTCP	0.250	0.636			

Chin (1998) indicates that to be retained in the analysis, each item should have a standardized loading of at least 0.707 on its respective factor. In Table 4.4, I highlight the 10 loadings that do not meet this criterion. I dropped these 10 from subsequent analysis. Based on a bootstrap with 200 resamples with 0 cases per sample, the factor loadings for the remaining 40 items were statistically significant with $p \leq 0.01$, with the sole exception of CPDD in the Power Distance dimension, with $p = 0.139$. For 1 out of 40 variables (0.025), I disregarded this as an empirical fluke, considering its high loading of 0.768 in the CFA (Table 4.5).

4.2.5.2 Checking for Cross-Loadings

The next step in testing the measurement model was to assess if any item cross-loaded on a construct other than the one for which it is theoretically specified Chin (1998). After removing the 10 items that did not pass the CFA, I used PLS Graph to generate latent variable scores for all 11 constructs with the 40 items that were left. I standardized the raw scores of all the items, and used SPSS 11.5 to generate Pearson's correlation coefficients for the items against the latent variable scores, and obtained the results I list in Table 4.5 (Table 3.2 explains the codes). Although I included the 10 dropped items for comparison, note that the latent variable scores only used the 40 items I retained. As expected, none of the 10 dropped items loaded on their original constructs, or on any other construct for that matter. The cross-loading table shows that no item loaded at more than 0.707 on any construct other than that for which I theoretically specified it. This indicated that each of the 40 retained items loaded uniquely on their respective theoretical constructs.

Table 4.5. Cross-Loadings of All Items against Refined (40-Item) Latent Variable Scores

	EBC	EBV	IPIR	IPE	II	ICI	ICC	TI	CPD	CUA	CTC
EBCI	0.8431	0.3477	0.1843	0.2767	0.2734	0.1439	-0.2117	0.2254	-0.1466	-0.1930	0.0667
EBCN	0.5636	0.3342	0.1063	0.1591	0.2479	0.1957	-0.1849	0.2228	-0.0297	-0.1644	0.0639
EBCS	0.8780	0.3311	0.2603	0.3918	0.3732	0.1921	-0.2543	0.3865	-0.1910	-0.2471	0.2209
EBCT	0.9155	0.3841	0.1681	0.3587	0.3525	0.1761	-0.2371	0.3327	-0.1744	-0.1947	0.1855
EBCX	0.9030	0.4149	0.1639	0.2601	0.3052	0.1600	-0.2081	0.3259	-0.1963	-0.1493	0.1941
EBVC	0.3636	0.8847	0.1357	0.2272	0.2138	0.3233	-0.1187	0.3363	-0.0835	-0.1110	0.1178
EBVJL	0.1963	0.1426	0.1075	0.0954	0.0622	0.0038	-0.0054	0.0924	-0.0070	0.0147	0.1046
EBVJN	0.2870	0.7411	0.2427	0.2652	0.2328	0.3401	-0.2621	0.2527	-0.0156	-0.1554	0.1875
EBVR	0.3977	0.8585	0.2383	0.3435	0.2346	0.3373	-0.2399	0.2825	-0.1432	-0.1928	0.1052
EBVT	0.3531	0.8889	0.1102	0.2465	0.2473	0.3806	-0.1462	0.3297	-0.0136	-0.2649	0.1927
IPID	0.2185	0.2199	0.9154	0.5737	0.2147	0.3080	-0.2751	0.3177	-0.0740	-0.1706	0.2933
IPIS	0.2061	0.2243	0.8850	0.5577	0.2226	0.2717	-0.2704	0.3041	-0.0334	-0.1108	0.3095
IPRD	0.3262	0.2445	0.8474	0.5621	0.1902	0.2018	-0.2078	0.3067	-0.1230	-0.1576	0.2941
IPRS	0.2199	0.2368	0.9139	0.5448	0.1237	0.2428	-0.2490	0.3179	-0.0289	-0.1945	0.2586
IPP	0.2898	0.3216	0.4378	0.4401	0.2318	0.3290	-0.1436	0.2988	-0.0192	-0.0095	0.2994
IPEI	0.3652	0.3750	0.5147	0.9009	0.3360	0.4023	-0.3326	0.3184	-0.1326	-0.2462	0.1842
IPEP	0.4329	0.3237	0.5877	0.8316	0.2868	0.4328	-0.4121	0.3108	-0.0691	-0.2932	0.2696
IPEU	0.4402	0.3643	0.5673	0.9072	0.3588	0.3043	-0.3562	0.3924	-0.2106	-0.2465	0.2837
IPEA	0.4259	0.2861	0.1227	0.4814	0.3768	0.2256	-0.2403	0.3216	-0.1902	-0.1503	0.2315
IIA	0.3145	0.2593	0.1352	0.1874	0.7852	0.3435	-0.3354	0.2366	-0.1392	-0.1158	0.0788
IIE	0.1919	0.0434	0.1621	0.2984	0.4880	0.3410	-0.5354	0.1565	-0.1001	-0.0525	0.0450
III	0.3199	0.2234	0.1323	0.1982	0.8260	0.3071	-0.3580	0.2928	-0.1188	-0.1115	0.2405
IIIW	0.2915	0.2543	0.1371	0.1778	0.5470	0.3835	-0.3692	0.3921	-0.1113	-0.1797	0.2758
IIP	0.2314	0.2633	0.1414	0.2770	0.8025	0.3531	-0.3681	0.2731	-0.0594	-0.0940	0.1587
IIQ	0.2949	0.2094	0.1644	0.2697	0.7998	0.4389	-0.4343	0.3528	-0.1777	-0.1524	0.2376
IITB	0.3159	0.1417	0.1617	0.2816	0.7467	0.3034	-0.4594	0.2113	-0.0809	-0.0880	0.0910
IIWN	0.2621	0.1956	0.1182	0.2037	0.5586	0.1558	-0.2251	0.2035	-0.0447	0.0032	0.1369
ICIB	0.1929	0.3168	0.2230	0.2727	0.4008	0.8656	-0.5394	0.3651	-0.0988	-0.2697	0.1881
ICIL	0.1910	0.3344	0.2767	0.4208	0.3914	0.8790	-0.5951	0.3166	-0.0951	-0.3424	0.1902
ICIR	0.1591	0.3451	0.1625	0.2693	0.3818	0.8510	-0.5240	0.2953	-0.0195	-0.3374	0.1538
ICIV	0.1136	0.3899	0.2462	0.3162	0.3356	0.8257	-0.4702	0.2844	0.0372	-0.2289	0.0946
ICCC	0.2098	0.1512	0.2797	0.3125	0.3343	0.5818	-0.7865	0.2122	-0.1200	-0.2435	0.1327
ICCD	0.2457	0.1852	0.1900	0.3131	0.4739	0.4543	-0.8055	0.3299	-0.1406	-0.2235	0.1262
ICCP	0.1261	0.1745	0.1090	0.1879	0.3190	0.4006	-0.7203	0.2859	-0.1687	-0.2364	0.1759
TIPC	0.2720	0.2817	0.1603	0.2512	0.3465	0.3807	-0.3643	0.7549	-0.1029	-0.2841	0.2512
TISD	0.4191	0.4254	0.1518	0.2934	0.3683	0.4033	-0.3736	0.8443	-0.1585	-0.3274	0.3783
TITM	0.3010	0.3436	0.2069	0.2909	0.4088	0.4363	-0.3596	0.8240	-0.2338	-0.2202	0.3642
TIUI	0.3435	0.2998	0.2194	0.2654	0.3112	0.4221	-0.4439	0.7913	-0.2275	-0.2024	0.3343
TIUT	0.3469	0.3573	0.2128	0.2172	0.4512	0.4128	-0.4617	0.8509	-0.2344	-0.2627	0.2865
CPDA	-0.1594	-0.1159	-0.1225	-0.1539	-0.1931	-0.1595	0.2274	-0.2439	0.8655	-0.0820	-0.0925
CPDD	-0.0756	-0.0659	-0.0521	-0.1129	-0.0951	-0.0210	0.1290	-0.2016	0.7727	-0.1458	-0.1014
CPDP	-0.2228	-0.0202	-0.0668	-0.1356	-0.0782	0.0506	0.1038	-0.1831	0.8724	-0.1714	-0.0841
CUAN	-0.0077	-0.0133	0.0940	0.0707	-0.0176	0.0706	0.0041	0.0558	0.4716	-0.3255	0.1231
CUAP	0.1833	0.2177	0.0892	0.2000	0.1415	0.3409	-0.2986	0.1597	0.1363	-0.8730	0.1608
CUAS	0.1968	0.1414	0.1457	0.1850	0.0955	0.2329	-0.2037	0.0267	0.1265	-0.8177	0.0251
CUAT	0.0714	-0.1101	0.0573	-0.0157	0.0805	-0.1253	0.0706	-0.1735	0.3494	-0.2116	-0.0161
CTCB	0.2339	0.1649	0.2584	0.2129	0.2684	0.3258	-0.3270	0.3929	-0.0502	-0.1938	0.8637
CTCP	0.1551	0.1139	0.1647	0.0948	0.2475	0.1819	-0.1114	0.2075	0.1104	-0.1191	0.4525
CTCS	0.1366	0.1625	0.1362	0.1688	0.2161	0.1930	-0.1283	0.3391	-0.0719	-0.2273	0.8441
CTCT	0.2196	0.1928	0.2685	0.2748	0.2379	0.2905	-0.2434	0.3577	-0.1853	-0.1435	0.9203

4.2.5.3 Reliability Measures of the Constructs

The appropriate measure for reliability for items loading on factors representing latent constructs is the composite reliability (r_c) score (Chin et al 1996). This is in contrast to the Cronbach α, which weights each item equally, regardless of its factor loading. The minimum r_c should be 0.8. In Table 4.4, I give the composite reliabilities for each refined construct. All my constructs exceeded the 0.8 minimum, indicating that all the constructs were adequately and reliably measured.

In addition to the composite reliability (r_c), another measure of reliability that is particularly pertinent when testing measures of latent constructs is the average variance extracted (AVE), calculated as the average of the squared loading of each item in a construct measure. AVE is a CFA measure of how well a theoretical latent construct explains the variation in the set of items that is used to measure it. Fornell and Larcker (1981) explain that AVE must be at least 0.5 for an acceptable measure of a latent construct. All AVEs for the latent constructs in my study were very good, as Table 4.6 displays, with Commercial Infrastructure (ICC) being the lowest at 0.618. Hence, with very good composite reliabilities and AVEs, I was confident that my operationalizations were reliable measures of the theoretical constructs.

4.2.5.4 Discriminant Validity

The next step in ensuring the reliability of the measurement model involved testing for discriminant validity between the constructs to demonstrate that the data supported my theoretical contention that the items used to measure each construct in my model distinguished that construct from the others and were not confounded between the distinct constructs. The test for discriminant validity examined the correlations between the latent factor scores of each construct in the model; this set of correlations is called the φ (phi) matrix. The test compared

these correlations with the square root of the AVE for each construct pair. The weaker form of the test required that the correlation be smaller than the average of the two root-AVEs; the stricter form required that it be smaller than the smaller of the two root-AVEs (William C. Black, 2003, personal communication). Table 4.6 displays the resultant φ matrix of latent construct correlations with the square root of AVEs in the leading diagonal (Table 3.2 explains the codes). In no case was any correlation equal to or larger than a root-AVE above it or to its right; this indicated that all constructs in the model were indeed distinct from each other according to the strict form of the test.

With a satisfactorily reliable instrument and a valid measurement model, I proceeded to test the structural model. This was the stage at which I could test the hypotheses.

Table 4.6. Correlations between latent constructs (φ matrix)
Square root of AVE is in leading diagonal

	AVE	EBC	EBV	IPIR	IPE	II	ICI	ICC	TI	CUA	CPD	CTC
EBC	0.707	**0.841**										
EBV	0.737	0.416	**0.859**									
IPIR	0.783	0.278	0.261	**0.885**								
IPE	0.683	0.469	0.403	0.631	**0.827**							
II	0.640	0.372	0.273	0.213	0.372	**0.800**						
ICI	0.682	0.191	0.407	0.286	0.426	0.441	**0.826**					
ICC	0.618	-0.259	-0.220	-0.280	-0.415	-0.495	-0.621	**0.786**				
TI	0.679	0.420	0.426	0.331	0.451	0.463	0.502	-0.491	**0.824**			
CUA	0.669	-0.224	-0.216	-0.177	-0.297	-0.142	-0.344	0.301	-0.322	**0.818**		
CPD	0.756	-0.201	-0.076	-0.077	-0.159	-0.146	-0.050	0.182	-0.235	-0.156	**0.870**	
CTC	0.746	0.230	0.199	0.339	0.330	0.276	0.316	-0.277	0.399	-0.209	-0.120	**0.864**

4.2.6 Testing the Structural (Inner) Model and Hypotheses

In my literature review (Chapter 2), I developed the hypotheses that I summarize in Tables 2.2 and 4.10. I used PLS Graph 3.0 to test all these hypotheses, and in this section, I report the PLS results that I obtained while testing the overall model, the national infrastructure model, and the cultural model.

4.2.6.1 Overall Model of E-Business Factors

PLS yielded two main kinds of information that would indicate how well the structural model predicted the hypothesized relationships. First, it provided the squared multiple correlation (R^2) for each endogenous construct in the model, which is a measure of the percentage of a construct's variation that the model explains. This value was interpreted similarly to the R^2 in a regression model (Wixom and Watson 2001). Table 4.7 displays R^2 for each endogenous construct. All the exogenous factors in the model explained 32.9% of the variation in E-Business Capabilities and 28.8% of E-Business Value, an average of 30.9%. General ICT and specific E-business Policies explained 13.9% of ICT Infrastructure. All R^2 values were significant ($p \leq 0.001$) using the F test that Falk and Miller (1992 p. 72) provide:

$$F = \frac{R^2 / m}{\left(1 - R^2\right) / \left(N - m - 1\right)}$$

In this formula, N is the number of cases, m is the number of items in the construct, and F is distributed as an F distribution with m and (N – m – 1) degrees of freedom.

The second measure of the structural model provided by PLS was the path coefficients that indicated the strength of relationship between two constructs (Wixom and Watson 2001). To calculate the significance of these coefficients, I ran a bootstrap procedure with 200 resamples. Table 4.7 displays the coefficients for all hypothesized paths in the model with their significances. Even when paths are significant (which a sufficiently large sample size could guarantee), Chin (1998) suggests, "Standardized paths should be around 0.20 and ideally above 0.30 in order to be considered meaningful." Figure 4.1 displays the structural path diagram with the coefficients of paths that were statistically significant at the 0.05 level. All significant paths had coefficients of at least 0.20.

Table 4.7. Path coefficients and R^2 for overall model

Predictor Constructs		Predicted Constructs	Path	*t*	p(*t*)
ICT Policies	→	E-biz Capabilities	-0.030	-0.383	0.702
	→	E-biz Value	-0.001	-0.009	0.993
	→	ICT Infrastructure	-0.035	-0.346	0.730
E-biz Policies	→	E-biz Capabilities	0.350***	3.690	0.000
	→	E-biz Value	0.235*	2.017	0.046
	→	ICT Infrastructure	0.394***	4.199	0.000
ICT Infrastructure	→	E-biz Capabilities	0.208*	2.237	0.027
	→	E-biz Value	0.046	0.438	0.662
Institutions	→	E-biz Capabilities	-0.176	-1.635	0.104
	→	E-biz Value	0.284**	3.029	0.003
Commerce	→	E-biz Capabilities	0.032	0.282	0.778
	→	E-biz Value	0.204*	1.957	0.052
Transfer Implementation	→	E-biz Capabilities	0.218*	2.171	0.032
	→	E-biz Value	0.262**	2.651	0.009
Power Distance	→	E-biz Capabilities	-0.096	-1.144	0.255
	→	E-biz Value	-0.002	-0.023	0.982
Uncertainty Avoidance	→	E-biz Capabilities	-0.108	-1.380	0.170
	→	E-biz Value	-0.027	-0.286	0.776
Technology Culturation	→	E-biz Capabilities	0.010	0.116	0.908
	→	E-biz Value	-0.035	-0.345	0.731

	R^2	*F*	p(*F*)
E-biz Capabilities	0.329***	17.398	0.000
E-biz Value	0.288***	14.388	0.000
ICT Infrastructure	0.139**	4.549	0.001

While experts perceived e-business policies to be significantly influential on ICT infrastructure (H1b) with a path coefficient of 0.394—the highest in the entire model—there was no apparent effect of general ICT policies (H1a). In fact, the model's 13.9% explanation of ICT infrastructure was virtually entirely from e-business policies. Similarly, experts perceived no effect of general ICT policies on either e-business capabilities or value (H2a), whereas they perceived e-business policies to be significantly influential (H2b) with path coefficients of 0.350 and 0.235, respectively. All these coefficients were meaningful by Chin's (1998) criteria of ≥ 0.2. These results support my hypothesis that experts would consider e-business policy to be more important for e-business outcomes than general ICT policies (H2c).

The experts perceived that ICT infrastructure would increase the specific capabilities of e-business in SSA (path = 0.208), but did not think it would help businesses yield valuable results from e-business (H3). On the other hand, they believed that strong governance institutions would enable e-business produce valuable results (path = 0.284), but did not think it would increase specific capabilities (H4a). Experts did not believe that more functional commercial infrastructure would increase the value that e-business could offer in SSA (H4b). The test for their effect on specific e-business capabilities was only marginally insignificant (p = 0.052, path = 0.204); however, in light of its clear insignificance in the infrastructural model below, I considered this relationship insignificant.

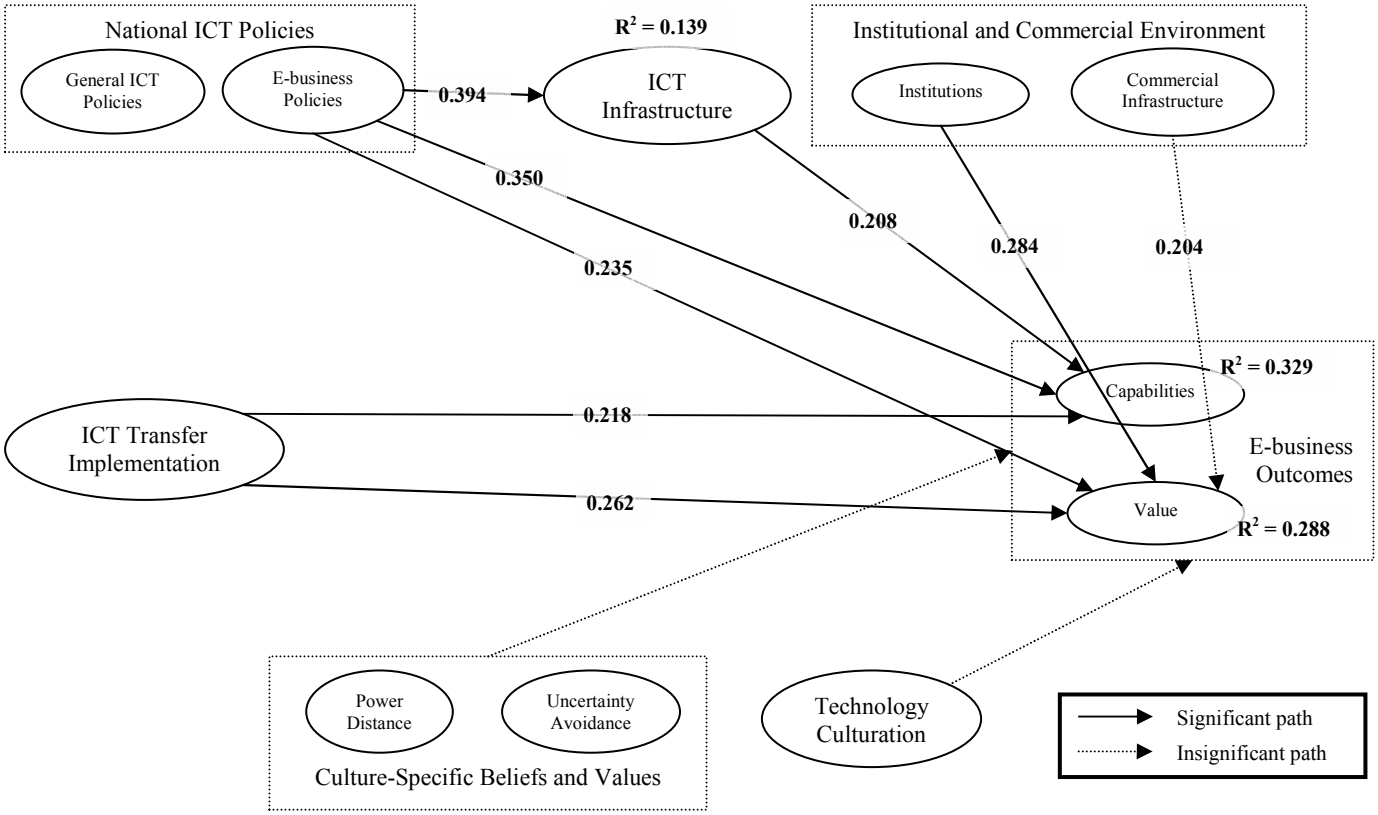

Figure 4.1. Overall model of e-business factors with coefficients of significant paths

Based on this overall model, experts perceived that well-managed ICT projects (H5) would result both in increased e-business capabilities (path = 0.218) and in more valuable yields from e-business (path = 0.262). However, my study did not find support for any of the cultural hypotheses. Whether regarding e-business capabilities or the value of e-business, experts did not believe that power distance (H6a), uncertainty avoidance (H6b), or technology culturation (H7) affected e-business outcomes in any significant way. At this stage, I did not test the interaction hypotheses (H8a, H8b, and H9); I tested these when I looked specifically at the cultural model.

4.2.6.2 National Infrastructure Model of E-Business Factors

I conducted PLS analysis on the national infrastructure model to compare the results with that of the overall model. Table 4.8 displays R^2 for each endogenous construct. The exogenous factors explained 27.4% of the variation in E-Business Capabilities and 24.7% of E-Business Value, an average of 26.0%, compared to an average of 20.9% for the overall model. This slight drop could be expected because of the absence of the cultural factors. General ICT and specific E-business Policies explained 13.9% of ICT Infrastructure, virtually identical to the overall model. This is expected because the predictors of ICT Infrastructure were identical in both models. All R^2 values were statistically significant ($p \leq 0.001$).

Table 4.8 displays the coefficients for all hypothesized paths in the model with their significances, and Figure 4.2 displays the structural path diagram with the coefficients of paths that were statistically significant at the 0.05 level.

While experts perceived e-business policies to be significantly influential on ICT infrastructure (H1b) with a path coefficient of 0.394, there was no apparent effect of general ICT policies (H1a). Similarly, experts perceived no effect of general ICT policies on either e-business capabilities or value (H2a), whereas they perceived e-business policies to be significantly influential (H2b) with path coefficients of 0.422 and 0.280, respectively. All these coefficients

were meaningful by Chin's (1998) criteria, being above 0.2. Again, these results support my hypothesis that experts would consider e-business policy to be more important for e-business outcomes than general ICT policies (H2c).

Table 4.8. Path coefficients and R^2 for national infrastructure model

Predictor Constructs		Predicted Constructs	Path	*t*	p(*t*)
ICT Policies	→	E-biz Capabilities	-0.018	-0.198	0.843
	→	E-biz Value	0.014	0.118	0.906
	→	ICT Infrastructure	-0.035	-0.307	0.759
E-biz Policies	→	E-biz Capabilities	0.422***	4.515	0.000
	→	E-biz Value	0.280*	2.344	0.020
	→	ICT Infrastructure	0.394**	3.276	0.001
ICT Infrastructure	→	E-biz Capabilities	0.253**	2.644	0.009
	→	E-biz Value	0.094	0.929	0.354
Institutions	→	E-biz Capabilities	-0.118	-1.141	0.256
	→	E-biz Value	0.340***	3.794	0.000
Commerce	→	E-biz Capabilities	-0.037	-0.350	0.727
	→	E-biz Value	0.153	1.416	0.159
			R^2	*F*	p(*F*)
		E-biz Capabilities	0.274***	13.385	0.000
		E-biz Value	0.247***	11.638	0.000
		ICT Infrastructure	0.139**	4.549	0.001

As before, the experts perceived that ICT infrastructure would increase the specific capabilities of e-business in SSA (path = 0.253), but did not think it would help businesses yield valuable results from e-business (H3). On the other hand, they believed that strong governance institutions (H4a) would enable e-business to produce valuable results (path = 0.340), but not specific capabilities; this was the same as in the overall model. The results for experts' perceptions of the effect of commercial infrastructure (H4b) were also similar to those in the overall model. The effect on specific capabilities was not significant, nor was the effect on the value of e-business, which had a path of 0.153 and p-value of 0.159 in the infrastructural model. Thus, I disregard the apparent near-significance of this latter path in the overall model.

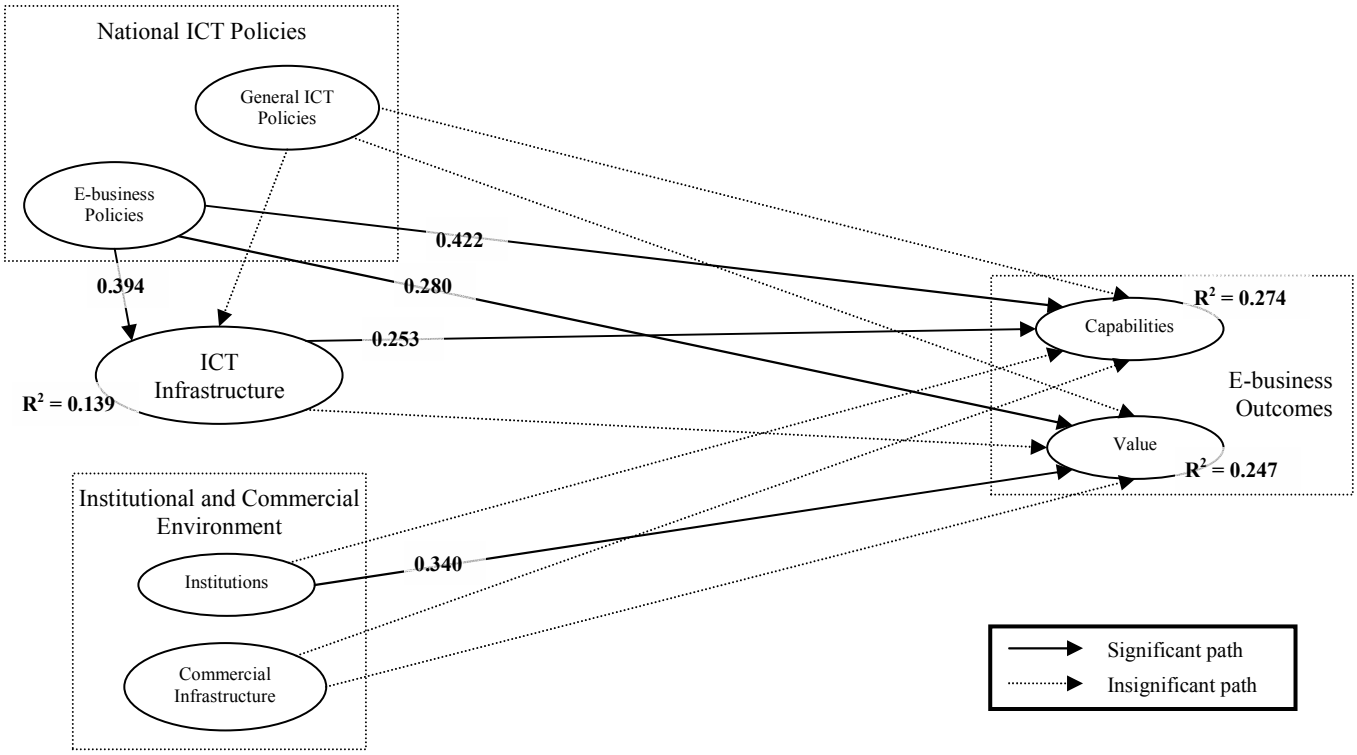

Figure 4.2. National infrastructure model of e-business factors with coefficients of significant paths

In summary, the results for the infrastructural model were virtually the same as for the overall model. The only difference was that the apparent relationship between commerce and e-business value was clearly statistically significant in the infrastructural model, whereas there was some question in the overall model.

4.2.6.3 Cultural Model of E-Business Factors

Next, I conducted similar comparative analyses on the cultural model. Most of my hypotheses involved the direct path between two constructs, but I also hypothesized interactions between ICT transfer implementation and the cultural factors of power distance, uncertainty avoidance, and technology culturation. For testing these hypotheses, I used the methodology that Chin (1996) presented for testing interactions using PLS. I normalized each variable in the cultural model (E-Business Capabilities, E-Business Value, Transfer Implementation, Power

Distance, Uncertainty Avoidance, and Technology Culturation) by subtracting the mean from each data point and dividing by the standard deviation. Next, I created three new interaction constructs by multiplying the value of each variable in the constructs proposed to interact with each other. Thus, I had three new constructs: TIxCPD with 5 x 3 = 15 variables, TIxCUA with 10 variables, and TIxCTC with 15 variables (TI is Transfer Implementation, CPD is Power Distance, CUA is Uncertainty Avoidance, and CTC is Technology Culturation). I incorporated these interaction constructs into the cultural model and conducted my PLS analysis, interpreting my results as usual. Figure 4.3 displays the cultural model I tested with interaction terms.

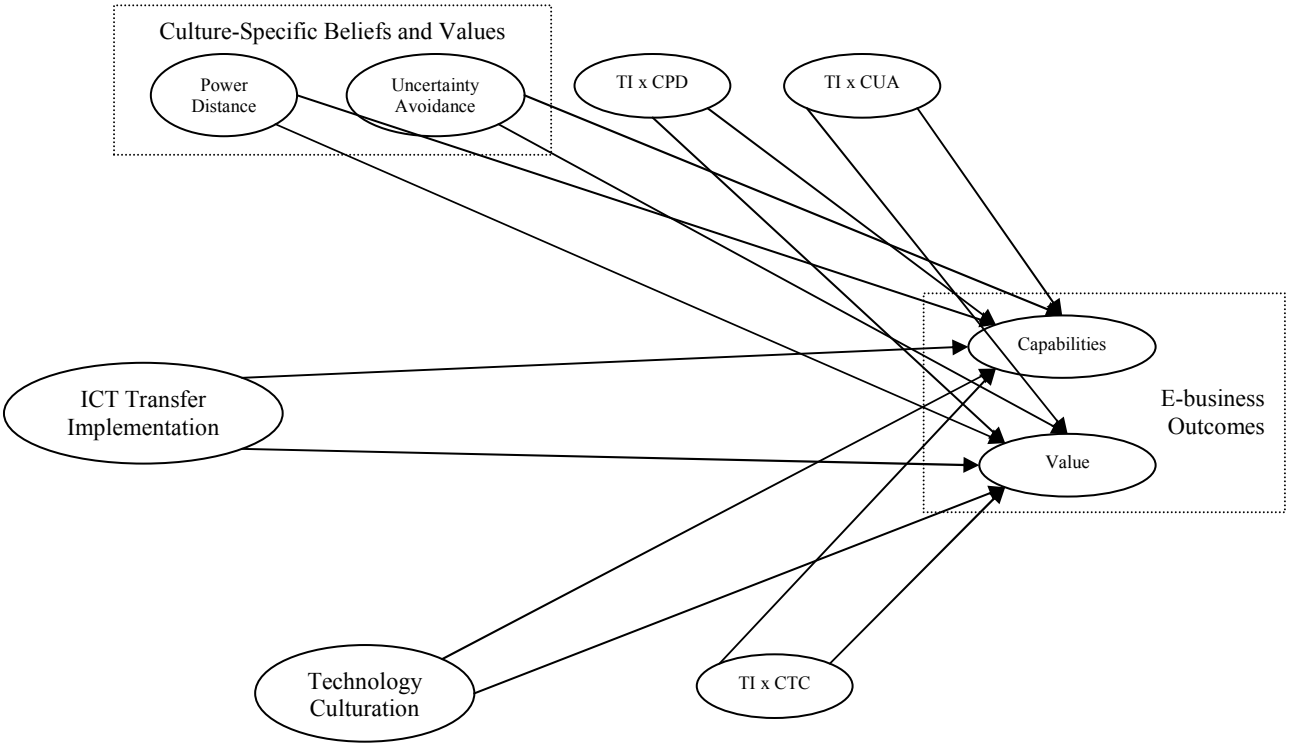

Figure 4.3. PLS cultural interaction model

Table 4.9 displays R^2 for the two endogenous e-business constructs. The exogenous factors explain 22.3% of the variation in E-Business Capabilities and 24.6% of E-Business Value. This is an average explanation of 23.4%, compared to an average of 29.5% for the overall

model. This drop can be expected because of the absence of the national infrastructure factors. Both R^2 values are statistically significant ($p < 0.001$). Table 4.9 displays the coefficients for all hypothesized paths in the model with their significances.

Table 4.9. Path coefficients and R^2 for cultural model

Predictor Constructs		Predicted Constructs	Path	*t*	p(*t*)
Transfer Implementation	→	E-biz Capabilities	0.328**	3.079	0.002
	→	E-biz Value	0.354***	3.736	0.000
Power Distance	→	E-biz Capabilities	-0.138	-1.477	0.142
	→	E-biz Value	-0.028	-0.276	0.783
Uncertainty Avoidance	→	E-biz Capabilities	-0.090	-0.866	0.388
	→	E-biz Value	-0.117	-1.254	0.212
Technology Culturation	→	E-biz Capabilities	0.036	0.410	0.683
	→	E-biz Value	0.021	0.228	0.820
TIxCPD	→	E-biz Capabilities	-0.077	-0.615	0.540
	→	E-biz Value	-0.184	-1.215	0.226
TIxCUA	→	E-biz Capabilities	-0.034	-0.311	0.756
	→	E-biz Value	0.200	1.537	0.127
TIxCTC	→	E-biz Capabilities	-0.089	-0.621	0.536
	→	E-biz Value	-0.086	-0.602	0.548

	R^2	*F*	p(*F*)
E-biz Capabilities	0.223***	10.171	0.000
E-biz Value	0.246***	11.551	0.000

In addition to testing all the constructs and interactions in the cultural model together, I tested each interaction individually to ensure that the related cultural constructs in one model were not masking the effects of any interactions. That is, I tested three further PLS models: The first had Transfer Implementation (TI), Power Distance (CPD), the TI-PD interaction (TIxCPD), E-Business Capabilities (EBC) and E-Business Value (EBV); the second had TI, Uncertainty Avoidance (CUA), TIxCUA, EBC, and EBV; and the third had TI, Technology Culturation (CTC), TIxCTC, EBC, and EBV. However, as Table 4.10 shows, none of these interactions was statistically significant. Figure 4.4 displays the structural path diagram of the cultural model with the coefficients of paths that were statistically significant at the 0.05 level.

Table 4.10. Path Coefficients in Three Cultural Interaction Models

Predictor Constructs		Predicted Constructs	Path	*t*	p(*t*)
TIxCPD	→	E-biz Capabilities	-0.015	0.933	0.352
	→	E-biz Value	-0.104	1.013	0.313
TIxCUA	→	E-biz Capabilities	-0.093	0.909	0.365
	→	E-biz Value	0.104	1.019	0.310
TIxCTC	→	E-biz Capabilities	0.116	0.980	0.329
	→	E-biz Value	0.145	0.339	0.735

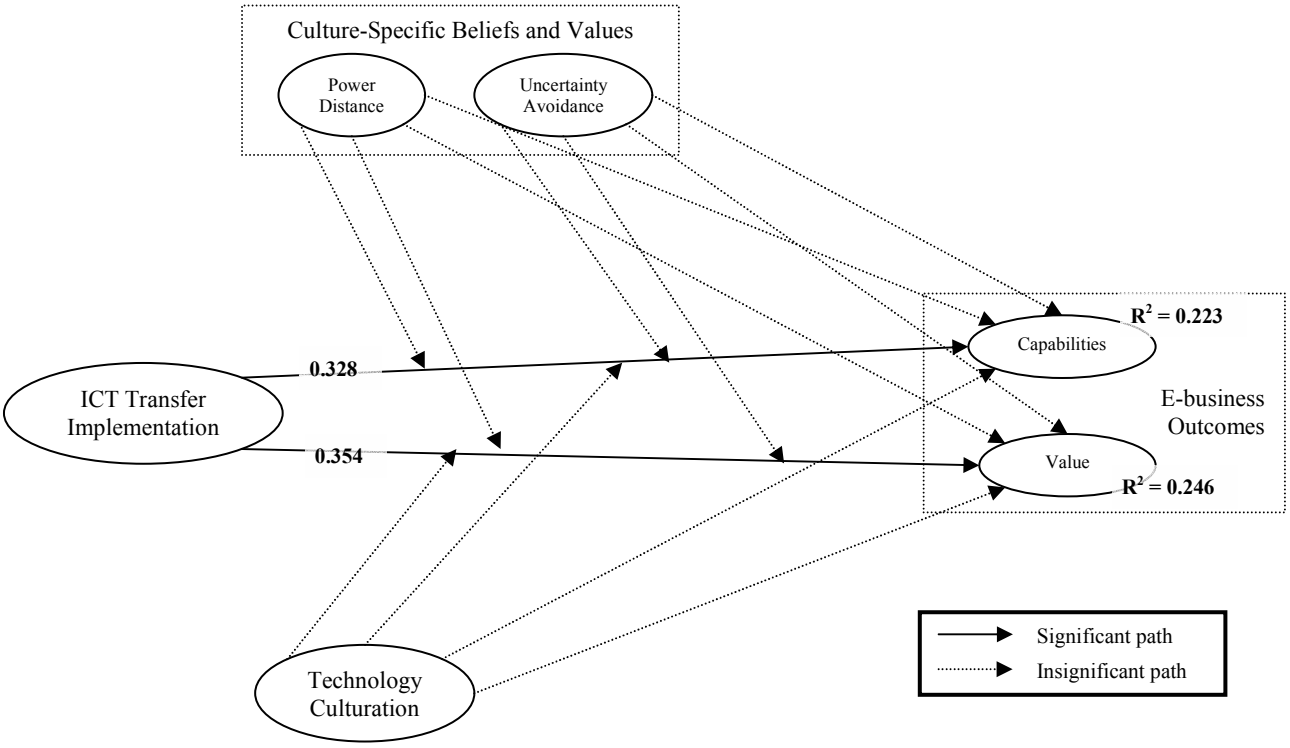

Figure 4.4. Cultural model of e-business factors with coefficients of significant path

As in the overall model, experts perceived that well-managed ICT projects (H5) would help improve specific capabilities (path = 0.328) and result in more valuable yields from e-business (path = 0.354). As before, this test did not find support for any of the cultural hypotheses. Whether regarding e-business capabilities or the value of e-business, experts did not believe that power distance (H6a), uncertainty avoidance (H6b), or technology culturation (H7)

affected e-business outcomes in any significant way. When I tested the interaction between each cultural factor and transfer implementation (H8a, H8b, and H9), I did not find any statistically significant effects, indicating that the experts saw no relationship whatsoever between the cultural factors I tested and e-business outcomes.

In summary, the results for the cultural model were the same as for the overall model. E-business experts believed that ICT transfer implementation factors strongly affected both e-business capabilities and values. Most notably, none of the cultural hypotheses, including the interactions, was supported in my test of either model.

Based on my tests of the overall, the infrastructural, and the national models, Table 4.11 repeats all the hypotheses I tested and summarizes the results of the tests.

4.3 Study Validation

I close this chapter with a summary of the steps I took to ensure that this study was valid and psychometrically sound. Such assurance was critical before I proceeded to interpret the results, for I needed to be confident that the results reliably and validly reflected the perceptions of experts on e-business in Sub-Saharan Africa. The steps I summarize here involved the pilot study, and the various statistical tests to ensure validity, reliability, and statistical power.

1. **Pilot study.** Based on my theory and on the items I identified from the literature, I constructed a survey instrument that represented the constructs and tested the theory, carefully following Dillman's (2000) guidelines (Section 3.5). I randomly selected 399 respondents from among my contacts and piloted my survey on them. I solicited comments from them on how to improve the survey. Based on the results of the pilot and the respondents' feedback, I modified my questions and the format of my survey to ensure a reliable instrument for the main study.

Table 4.11. Results of hypothesis testing for model of e-business factors

H	Hypothesis	Result
1a	National policies that favor the development of ICTs in general will increase the level of ICT infrastructure.	Not supported
1b	National policies specifically tailored to promote e-business will increase the level of ICT infrastructure.	**Supported**
2a	National policies that favor the development of ICTs in general will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	Neither (i) nor (ii) supported
2b	National policies specifically tailored to promote e-business will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	**Both (i) and (ii) supported**
2c	National policies specifically tailored to promote e-business will (i) increase capabilities more and (ii) yield more valuable e-business outcomes than will general ICT policies.	**Both (i) and (ii) supported**
3	Higher quality ICT infrastructure will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	**(i) supported, but not (ii)**
4a	More functional and stable national governance institutions will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	**(ii) supported, but not (i)**
4b	Higher quality commercial infrastructure will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	Neither (i) nor (ii) supported
5	Effective implementation of ICT transfer projects will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	**Both (i) and (ii) supported**
6a	Less power distance between managers and subordinates will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	Neither (i) nor (ii) supported
6b	Less avoidance of uncertainty in business decisions will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	Neither (i) nor (ii) supported
7	Greater exposure to business ICTs from advanced nations will (i) increase the capabilities of e-business and (ii) yield valuable e-business outcomes.	Neither (i) nor (ii) supported
8a	Power distance between managers and subordinates will dampen the effect of better ICT transfer implementation, thus (i) reducing the capabilities of e-business and (ii) reducing the value of e-business outcomes.	Neither (i) nor (ii) supported
8b	Uncertainty avoidance in business decisions will dampen the effect of better ICT transfer implementation, thus (i) reducing the capabilities of e-business and (ii) reducing the value of e-business outcomes.	Neither (i) nor (ii) supported
9	Exposure to business ICTs from advanced nations will enhance the effect of better ICT transfer implementation, thus (i) further increasing the capabilities of e-business and (ii) further increasing the value of e-business outcomes.	Neither (i) nor (ii) supported

2. **Statistical power.** Because PLS is a very complex statistical procedure, the precise computations for power are uncertain (Hair et al 1998). However, I followed the standard guidelines (Chin 2000) of ten subjects per item for the endogenous construct with the most predictors (E-Business Capabilities, in my case, requiring a minimum sample of 50). With 147 cases, I exceeded the minimum recommendation by a factor of 3 (Section 4.2.4). Thus, I can be reasonably confident that my test was able to detect whatever relationships that might actually exist.

3. **Reliability of instruments.** The first step I took in ensuring reliability was to develop high-quality measurement instruments. I did this by following Dillman's (2000) rigorous guidelines of questionnaire design, both for the pilot study and for the main study (Section 3.5). Furthermore, my pilot study helped verify the clarity and appropriateness of the instrument by obtaining feedback from sample respondents. For the actual study, I computed various reliability measures (composite reliability and AVE) to confirm that my instrument was indeed satisfactorily reliable (Section 4.2.5.3).
4. **Validity.** I evaluated the validity of my study from many different perspectives.
    a. **Construct validity** involves face, convergent, and discriminant validity. I assured face validity by having outside experts review my questionnaire who had worked both in academia and practice contexts, and who had lived many years in Sub-Saharan Africa (Section 3.5). Furthermore, my pilot study with the feedback from respondents verified the face validity of the final questionnaire. Convergent validity indicates that the items used to measure a construct all represent the same construct. My exploratory and confirmatory factor analysis helped me refine and confirm unified constructs, and my reliability analysis confirmed their convergent validity (Section 4.2.5.3). Discriminant validity indicates that the items used to measure a construct distinguish it from other constructs, and are not confounded between distinct constructs. I tested and confirmed this aspect by verifying that the square roots of the AVEs for each construct was greater than their respective correlations with other constructs in the model (Section 4.2.5.4).
    b. **Statistical test validity** assures that the chosen statistical test is appropriate for testing the specified hypothetical relationship. In my explanation of why I chose the PLS approach to structural equation modeling, I justified why I can consider its statistical

conclusions valid for this study (Section 4.2.4). There are four aspects of the study that ensured the validity of the statistical test (Ye-Sho Chen, 2002, personal communication):

i. **Definition of the population:** The population in my case was all the business persons, government officials, NGO officials, and academics working anywhere in the world who have expertise on e-business in Sub-Saharan Africa. Currently, I cannot estimate how many such experts there are, but they must number over 10,000.

ii. **Representativeness of sample:** Out of this population, approximately 1,600 experts were selected in the AISI and ARISE databases. These databases were collected by projects sponsored by leading international NGOs in the domain of ICTs in Africa, the United Nations Economic Commission for Africa and the International Development Research Centre respectively.

iii. **Statistical model and its assumptions:** I have described the details of PLS and the assumptions it makes (Section 4.2.4). In particular, PLS is a non-parametric technique that makes no assumptions of normality of the data. Standard errors were computed through a bootstrap resampling technique.

iv. **Sample size:** Related to the issue of statistical power, the sample size in my models far exceeded the PLS required minimum requirement of 50 (for a model with the structure mine had).

c. **Internal validity** assures that the hypothesized relationship between two constructs is indeed causal in the direction specified. PLS is an exploratory data analysis technique that makes no claims for causality. Rather, like regression analysis, PLS attempts prediction (Falk and Miller 1992). That is, it predicts the existence of significant relationships, without making an argument for temporal precedence. Therefore, all

relationships that the experts have established here must be understood correlationally. This is the extent to which I can claim internal validity for this study.

d. External validity is the assurance that the results of my study can be confidently generalized to the appropriate population. I do not claim that this study is applicable to any region outside Sub-Saharan Africa, which has been the focus of my literature review and my theorizing. However, because I surveyed qualified experts on e-business in SSA, I believe that my sample is representative of my target population.

CHAPTER 5. DISCUSSION OF RESULTS AND CONCLUSIONS

This study has presented a research proposal for investigating the factors affecting the diffusion of e-business in Sub-Saharan Africa. I began by justifying the need for such a study by describing the digital divide, the particular situation of SSA, and the unique potential of e-business in helping SSA with its development problems.

In Chapter 2 I reviewed the literature concerning e-business in Sub-Saharan Africa, and developed a conceptual model for explaining e-business outcomes based on national and cultural factors. In Chapter 3 I described the design of a survey-based study that empirically solicited information from relevant experts to test my models in helping me answer my research questions. In Chapter 4 I reported the findings of my study. In this final chapter, I discuss the findings and their implications. I begin here by interpreting the results in light of the literature that I reviewed. Next, I acknowledge the limitations of the study, and note a number of implications for research, for practice, and for teaching. Then, I highlight the contributions of this study. I conclude this chapter by discussing some directions for future research.

5.1 Interpretation of Results

In this section I discuss the meaning of the results from the previous chapter, translating the statistical conclusions into theoretical understanding. In the overall model, all the exogenous factors in the model explained 32.9% of the variation in E-Business Capabilities and 28.8% of E-Business Value, an average of 30.9%. The average in the national model was 26.0%, and in the cultural model it was 23.4%. General ICT and specific E-business Policies explained 13.9% of ICT Infrastructure, with the same value in both the overall and national models, which had exactly the same predictors.

The results of specific hypotheses were the same for the overall, infrastructural, and cultural models, though specific path coefficients and statistical significances varied. While

experts perceived e-business policies to be significantly influential on ICT infrastructure (H1b), there was no apparent effect of general ICT policies (H1a). Similarly, experts perceived no effect of general ICT policies on either e-business capabilities or value (H2a), whereas they perceived e-business policies to be significantly influential on both (H2b). These results supported my hypothesis that experts would consider e-business policy to be more important for e-business outcomes than general ICT policies (H2c). The experts also perceived that ICT infrastructure would increase the specific capabilities of e-business in SSA, but did not think it would help businesses yield valuable results from e-business (H3).

For the institutional and commercial environment, experts believed that strong governance institutions (H4a) would enable e-business to produce valuable results, but they did not feel that strong institutions would help increase specific e-business capabilities. Experts also did not believe that better commercial infrastructure (H4b) would increase either the specific capabilities of or the value derived from e-business in SSA.

Regarding cultural constructs, experts perceived that well-managed ICT projects (H5) would help improve specific e-business capabilities and also result in more valuable yields from e-business. However, I found no support for any of the cultural hypotheses. Whether regarding e-business capabilities or the value of e-business, experts did not believe that power distance (H6a), uncertainty avoidance (H6b), or technology culturation (H7) affected e-business outcomes in any significant way; nor was there any statistically significant interaction effect between any cultural factor and transfer implementation (H8a, H8b, and H9).

In the rest of this section, I interpret and then compare the findings in my present survey with those of past studies. To aid my interpretation, I examined the numerous qualitative comments that the respondents included with their quantitative responses. In addition, I sent out a supplementary e-mail to all respondents who gave me addresses for further contact asking them

how the various factors I identified in this study related to e-business outcomes in SSA. In discussing the specific findings below, I draw from the respondents' comments (edited for grammar and spelling), and cite them when relevant.

5.1.1 ICT Policies

I was surprised to find that most experts did not seem to feel that general ICT policies had any influence on e-business outcomes, and not even on ICT infrastructure. Some experts believed there was an influence, and were optimistic about governments' role; for example: "The government is doing a lot, but in isolated pockets. An approach should rather be to identify high impact industries and focus on enabling the re-engineering of the whole value chain of that specific industry with regards to e-business." However, most experts felt that SSA governments are doing little by way of policy to further ICTs and e-business in their countries.

There were also quite a number of cynical comments that expressed little confidence in governments' ability to significantly influence e-business through general ICT policies:

> In my view the take up has been very slow—certainly there is a perception that the government does not understand the future of e-business.
>
> I find that hard to tell right now. But I do know that a lot of good policies have been initiated but never carried out to the letter, eroding hopes of success.
>
> Little effect. I would guess 90% hot air, 10% minimal effect.
>
> Negligible; e-business is done independently of policies.
>
> Not much of a policy has been developed so far. There is tangential relationship if any [between general ICT policies and e-business].
>
> Governments I find a lot of the time pay little more than lip service to e-business development in Africa. They consider several other issues of far greater importance. … They formulate laudable ICT policies, but never commit the necessary financial and political backing needed to see fruition.
>
> Policies are most of the time not implemented nor followed up.

These comments suggest that many experts believed that even when governments might establish general ICT policies, they often do not carry out these policies. The reasons for this lack of follow-through include the government's poor understanding of the important issues involving ICT policy, and the low priority they sometimes give ICTs in comparison to other needs they consider more pressing. Because of this disconnection between policy enactment and follow-through, the establishment or non-establishment of ICT policies has little influence on the actual incidence of ICT infrastructure and e-business outcomes.

Moreover, countries with such attitudes towards ICT policies most likely would act the same way towards policies specific to e-business; yet, the survey results indicated that experts believed that e-business policies have significant influence on the state of ICTs and e-business outcomes. Two sets of comments by the same respondent shed light on why I might have found this result in my survey:

> ICT Policies in SSA should be taken in an integrated manner. ICT policies should converge with information policies, education policies, financial policies, cultural policies in order to generate overall benefits in the global information society where the local has interpenetrated the global and the global, the local. The issue of intellectual property rights (IPR), the use of top level domain names and individual domains names is still a very new conception in SSA and people are still grappling with the issue and have not been able to form adequate policies or trace the course of action in order to participate in a win-win situation in the E-Business activity in SSA.
>
> The effect of general policies on information and communication technology (ICT/IT) on e-business in Sub-Sahara Africa is a mixed effect. Mixed in terms of the impact of general policies on e-business. The policies on e-business for Sub-Sahara Africa should be integrated specific policies and not general policies. By "general" I would guess passive policies and not specific policies. If they are "general", they are not promotional of e-business and can only passively negatively or positively affect e-business.

I also might have found this result in my survey due to the way I operationalized ICT policies and e-business policies, respectively. I operationalized ICT policies very generally, along the lines of King et al's (1994) four categories of policies that influence demand, influence

supply, regulate demand, and regulate supply (see Table 3.1). Although I gave brief examples of the kinds of policy I was referring to, my operationalizations were still rather generic. This might have something to do with why experts did not see them as having much influence.

In contrast, my operationalization of e-business policies was far more specific, and experts believed that these were strongly influential on e-business outcomes and ICT infrastructure. Hence, possibly the indication here is that experts believe that for ICT policies to be effective, they need to be very precise and focused on specific goals, rather than be broad-sweeping with little concrete substance.

Past studies seem to indicate this view. King et al (1994) and the studies based on their framework (Gurbaxani et al 1990b; Montealegre 1999; Raman and Yap 1996) all delineated very precise ICT policies that were followed up by purposeful implementation. Moreover, most of the Egyptian ICT policies that Checchi et al (2002) listed were narrow and focused on specific, measurable goals.

This ineffectiveness of general policies might be similar to that of the telecommunication privatization regimes of many current African governments. Although an increasing number of SSA governments are advocating privatization and have laid down long-term plans, it is often government telecommunication ministries and national security forces that frustrate the implementation of these plans (Chowdary 1992; Pisciotta 1994).

In contrast, the experts' strong affirmation of the effects of e-business policy confirms the sentiment of various studies that have called for ICT policies that focuses on issues peculiar to e-business, such as those concerning digital signatures and intellectual property rights for digital products (Bridges.org 2001; Jarvenpaa and Tiller 1999; Kardaras and Karakostas 2001). While I have not found any longitudinal studies that have documented the effects of such policies on e-business, the evidence from my study weighs strongly in their favor.

5.1.2 ICT Infrastructure

The experts believed that ICT infrastructure would significantly affect e-business capabilities, but not necessarily e-business value. This finding indicated that experts distinguished between the infrastructure's ability to enable specific capabilities and the likelihood that it would give value to those SSA businesses that employed it. The literature I have found on the effects of ICT does not generally distinguish between the capabilities it enables and its value; these two dimensions are generally lumped together. However, it seems that more literature tends to consider the benefits of ICT in terms of the capabilities it would enable for its users. Such capabilities include using the Internet (Adam 1996; Mbarika 2001), wireless connectivity (Kibati and Krairit 1999; Peha 1999), and localized software development (Darley 2001). Thus, my findings regarding e-business capabilities were consistent with the literature.

In contrast, the experts believed that ICT infrastructure in itself does not necessarily contribute towards e-business value. This makes sense, considering that even if SSA businesses were able to set-up advanced websites with many interactive features, they might nonetheless be unable to get much value out of it for many possible reasons. For example, poor payment systems might prohibit online transactions, and low levels of trust might discourage electronic transactions.

One recurrent factor I saw in the respondents' comments was that because of the high cost of accessing the ICT infrastructure that is currently in SSA, the actual use and value of the infrastructure is severely limited:

> The few cyber-cafés that exist due to high cost that they pay to the national telecommunications operator—Cote d'Ivoire Telecom—about US$5 an hour are bound to charge US$2 an hour to internauts or surfers like me in order to cover

> the overhead costs: rents, workers' salaries, electricity, water, value-added tax, stamp duties, council tax and other management costs like repairs of computers due to irregular power failure, etc.
>
> A reasonable number of highly educated people work in the ICT industry, but the major problem is whilst academic education is a good grounding, there is a shortage of projects and systems upon which people can develop necessary experience. Rather like passing a driving test, you educate yourself to a standard to pass the test, but thereafter, you really get to learn through time and experience.
>
> ICT infrastructure in SSA is amongst the poorest in the world. However, the improved liberalisation of the sector and a desire for value for money is helping to address this problem. Urban centres are reasonably well supported. However, the quality of service could make this support go a lot further.
>
> Cost can be as much of a limitation as complete absence of facilities for many SMEs, and even if they have access, their clients probably don't.
>
> There is sufficient ICT infrastructure in Mauritius for conducting e-business. However, the price still remains prohibitive despite the removal of the monopoly situation.

I can understand this paradox between the presence of ICTs and the high cost of using them in light of the large income gap in many SSA countries. Whether I see this in terms of urban versus rural or rich versus poor, there is a small percentage of SSA citizens who are able to organize resources to acquire ICT infrastructure to access the Internet. However, e-business is a network-based technology; that is, it needs a large base of users to be effective. Thus, the value of ICT infrastructure is limited when only a minority of citizens has access to it. In the following section, I present the institutional and commercial environment with regards to its effect on perceived e-business value and then discuss how this effect might affect an ICT infrastructure.

5.1.3 Institutional and Commercial Environment

The initial results of testing my institutional and commercial hypotheses were as I expected: Experts believed that strong, effective governance institutions would enable e-business to yield valuable results, but that the converse was most often the actual situation—that inefficient, ineffective government institutions hindered the progress of e-business in SSA. This

supports my conjecture that regarding e-business value, adequate ICT infrastructure is not enough; countries need strong institutional environments. Thus, it makes sense that ICT infrastructure would primarily affect the specific capabilities and applications of e-business whereas institutional environment would have more effect on e-business value. As in this study E-Business Value is more similar to economic outcomes than is E-Business Capabilities, my findings regarding the effect of institutions on e-business value are consistent with economic development studies that examined the effect of institutional strength (using similar measures as mine) on GDP in SSA, and found a significant positive effect (Easterly and Levine 2002; Sachs and Warner 1997).

However, related to e-business capabilities my result is at odds with the literature I have studied. I found that experts did not generally believe that governmental institutions had a statistically significant effect on e-business capabilities, whereas King et al (1994) argued that supportive institutions were critical to increasing technology innovation, a dimension that corresponds to e-business capabilities. Moreover, case studies in Latin America (Montealegre 1999), Singapore (Gurbaxani et al 1990b), and Malaysia (Raman and Yap 1996) found that institutional support played an indispensable role in the progress of ICTs in these regions. S Hence, for the dimension of capabilities, there is a disparity between my findings and those of previous studies. Yet, this disparity may also be due to the fact that, strictly speaking, these studies measured the *support* that the governments in these countries provided for ICT and Internet development, rather than the *strength* of these governments as effective governance institutions, whereas my study focused more on the issue of the strength of the SSA governments.

Overall, it seemed that respondents took two kinds of attitudes towards the effects of strong government in their countries. First, many were hopeful that better governments would improve e-business, and that poor governments were largely responsible for low incidences of and prospects of e-business:

> It will reap untold rewards for productivity. But are the institutions operating effectively and efficiently yet?
>
> Government should demonstrate a leading role, and effective operation of these institutions are important.

These kinds of responses might have largely accounted for the strong link between the quality of governance and the value that e-business could yield. The second general kind of response was a cynical attitude towards what impact governments could have on e-business. Many experts believed that their governments were generally insincere and ineffective:

> How many governments of SSA are committed in allocating funds and other resources for Intellectual property and ICT development in their countries? What are the levels of transparency and responsibility of these countries with regards to Corruption and Graft?
>
> Voice and accountability status has no commensurate impact on the government policies and attitudes.
>
> The attitude of Government has indicated to the populace and to the investing community that the government is paying [little] more than lip service to the socio-economic development of the country and the sub-region in general.
>
> [There is] little [effect of governance institutions on e-business] in my experience … lots of hot air. Example in Ghana: at the highest level there is continuous emphasis on "zero tolerance for corruption"; yet in every day life it is rampant: "What have you for me today," "it's the weekend," etc.

The results seem to indicate that the experts believed that an institutional environment that allows businesses to increase their e-business capabilities does not necessarily permit them to derive value from their e-business applications.

Regarding commercial infrastructure, the result surprisingly was contrary to my hypothesis, and even contradicted Travica's (2002) findings. In his case study of B2C e-

commerce in Costa Rica, Travica (2002) indicated that the inefficient transportation and delivery systems impeded the delivery of goods, particularly when ordered over the Web. He also attributed the limited e-payment systems as a hindrance. However, although SSA has similar or worse conditions, the experts did not consider that this had much effect on the capabilities of e-business in this region. In other words, the experts did not feel that commercial infrastructure had much effect on specific e-business capabilities and applications nor on the value derived from e-business, as the following comments suggest:

> Private parcel delivery services like DHL, Chronopost, American Express exist but are very expensive and prohibitive. Shipping transport systems are available but insecure, as seaports are not too secured in the clearance of goods. It needs to be improved upon. Shipping and Railway transport systems exist and serve the land-locked countries in SSA but the poor management of these systems due to labour-feathering [sic] and government agencies' management and financial inefficiencies do not make them reliable and hence the distribution environment is hampered.

> Downside to the infrastructure is that fuel is not available except on the black market, so in recent months it has been very difficult to make use of the infrastructure.

The comments above indicate that the experts' beliefs on the effectiveness of commercial infrastructure on e-business capabilities in SSA could be due to the fact that poor management by commercial infrastructures such as railways and petroleum distribution—often government-controlled in SSA countries— impedes the effectiveness of such infrastructures even when they are present

Another surprising effect came out as I examined respondents' comments: Not only did experts believe that effective commercial infrastructure did not necessarily increase the capabilities or value of e-business in SSA, but it even seemed that many believed that a solid commercial infrastructure might actually *impede* the development of e-business. Numerous comments bring this possibility to light:

> Mauritius being a small country, the public still relies on the traditional commercial systems. The latter are present in all cities and for the public it is seen as a means to go out and enjoy. This has some degree of negative impact on e-business.
>
> For now, [traditional commercial systems] serve as largely a hindrance. African people, especially the less educated and exposed ones do not want to abandon traditional methods of trade and exchange yet.
>
> The traditional commercial systems would normally look at e-business as a competitive system and try to combat it in all forms when it would have been developed. The middle-men in the traditional commercial system shall form syndicates to combat the e-business system as it threatens their profit maximisation or call it profiteering. e-Business Policies to be developed in Sub-Sahara Africa have to take account of this.
>
> E-business is not yet fully trusted, because most economies are cash based.
>
> At a time when banks are unable to clear cheques in less than 7 days with some taking as much as 21 days to credit an account for deposits made by cheque ... At a time when there is literally no cash money available for even simple purchases I believe that a very active drive should be (should have long been) happening to develop e-business. On-line transactions that can update real-time against back end systems and reduce cash requirements would have / could still make a very positive impact on the prevailing problems. I think that perhaps the banks have too much to gain by being able to sit on deposits without crediting the beneficiary. ... Old ways, or should that be "Old Habits" die hard.
>
> Organisations operating traditional processes only will try to maintain their markets. However, market forces will force them to e-business or out of business.
>
> Barter, purchasing from traditional tribal structures and the like make people uncomfortable with doing e-business, where they can't see or touch the product or the seller's face.
>
> In general the people believe in seeing the person they are conducting business with rather that the very formal avenue provided by the electronic media which they consider very rude cold and unfriendly

From these comments, it is apparent that many experts felt that comfort with traditional commercial institutions would inhibit the adoption of e-business, both by businesses providing Internet services and by consumers using them. This is particularly ironic, considering that one of my items operationalizing "traditional" commerce was the extent of electronic payment systems in SSA (item code ICCP)—yet experts did not consider that the use (or non-use) of such

systems had any significant correlation with the adoption of e-business capabilities, or with the value it could render SSA businesses. It seems that when business people in SSA are generally content with the commercial systems—or rather, are not sufficiently aware or do not sufficiently appreciate the potential of e-business—such complacency would limit the potential value of e-business.

5.1.4 ICT Transfer Implementation

The study provided strong evidence that experts perceived that well-managed ICT projects would increase the capabilities of e-business in SSA, and that this e-business activity would be profitable. This finding is consistent with those from the ICT implementation literature, one of the oldest streams of research in information systems (Eze 2002; Grover and Goslar 1993; Kwon and Zmud 1987; Lucas 1978; Schultz and Slevin 1983). This indicates that the experts believed that the traditional factors that contribute towards success in ICT projects—top management support, user involvement, project championship, and so on—were also applicable to e-business projects in SSA. This is particularly important in this study, since researchers developed these theories under Western models of ICT development and this study was conducted in an African context, which a number of studies have shown can be rather different from the Western context (de Vreede, Jones and Mgaya 1999; Hasan and Ditsa 1999).

As the comments below indicate, the experts, with few exceptions, generally believed that well-managed ICT implementation practices facilitated successful e-business:

> They are inherently linked. The success in one means the success in the other.
>
> The effectiveness of ICT projects would provide improved, faster and cheaper e-business solutions.
>
> Every development in ICT carries some sort of benefit for e-business. The projects have mostly included enhancements for data services. While there is still an abundance of room for development of the ICT infrastructure, the developments we did have towards the end of the last millenium have served us

> well. Development is now almost at a standstill but this is hardly surprising to anyone familiar with our economic woes.
>
> Well-implemented ICT projects increase the availability and use of ICTs, which increases the likelihood that e-business practices will be pursued.

With this common ground of the importance of ICT transfer implementation, I had a base upon which to test and compare the strictly cultural constructs to see if these indeed had an effect on e-business in SSA.

5.1.5 Culture

In light of the strong effects of ICT transfer implementation, it is striking that none of the cultural factors—or interactions—I tested proved to have any statistically significant effect on either e-business capabilities or value. Specifically, I tested what experts believed were the effects of power distance, uncertainty avoidance, and technology culturation on e-business outcomes. I tested each of these directly, and in interaction with ICT transfer implementation, but none of my cultural hypotheses proved to have any significant effect, according to the experts I surveyed.

This finding is contrary to that of Hasan and Ditsa (1999), who found that high power distance among West African business managers made them reluctant to solicit technical advice from their qualified subordinates and consequently resulted in project failures. However, their finding that West African managers' propensity to take on risks (that is, low uncertainty avoidance) led to their taking on more ICT projects, but these projects often failed for other reasons. I would not expect that taking on risky projects—especially based on poor judgment—would have a consistent effect on either e-business capabilities or value; so, an insignificant effect is not surprising for this dimension. Perhaps a similar finding is de Vreede et al's (1999) finding that although the high power distance of East African managers did not reduce their use of groupware, it did reduce their faithful use of the democratic decision-making features of the

system. Such an effect would not necessarily increase or reduce either e-business capabilities or value.

On examining the experts' comments, I obtained some insights that helped to better interpret the results. Regarding uncertainty avoidance, some experts reported high avoidance while others reported low, each condition hindering or encouraging e-business, respectively. However, some comments helped explain why low uncertainty avoidance might have little impact on e-business:

> There is a great yearning to be part of the digital world. Emerging skills are lost to developed countries.
>
> The concept of technological innovation is highly desirable, although it is arguable that without the attention that must be given to development of capacity, it will fail to deliver the required results. … Countries generally can confuse education with experience. Why pay for skills from a developed country when it is much cheaper locally? Then, options for skills transfer are ignored or the incoming firm is reluctant to divulge the skills that they are selling. Very silly and impractical, and considerable lost opportunity.
>
> The attitude is generally positive but what hampers ICT development in SSA is poor ICT infrastructure and govt. monopolistic tendencies in telecommunications.
>
> Many African countries are quite interested and excited in e-business but the cost of electronic facilities is quite high and sometimes prohibitive. Generally, e-business infrastructure provided to or imported by Uganda is low quality.

These comments indicate that other factors, such as brain drain, ICT infrastructure, and government attitudes, overshadow the effects of willingness to attempt e-business; that is, low uncertainty avoidance. The experts' comments regarding power distance were generally mixed; some indicated a positive relationship, whereas others indicated that they would not expect any relationship between authority structure and e-business outcomes; for example, "I don't think this is terribly significant yet since the business people are yet to show genuine will on any meaningful scale."

Regarding technology culturation, Straub et al (2001) found that Arabs' culturation to the technology of advanced nations, particularly by traveling to these countries, affected their

perception of the success of Western-based information systems. However, although e-business is a Western innovation, the experts I surveyed did not believe that technology culturation had any effect on e-business capabilities or value in SSA. This conclusion must be qualified by my operationalization of technology culturation. This operationalization emphasized the extent to which ICT and e-business managers in SSA had traveled to technologically-advanced countries, or for ICT conferences. Many experts responded to this perspective, sometimes indicating that these opportunities have limited effect on e-business:

> Government remains the dominant player in ICT and her agents, civil servants are always at one international travel or another. Largely because they earn estacodes [travel "inconvenience" allowances] from such travels rather than for any tech transfer back to Nigeria.

> Most managers have attended a computer-related conference in a technologically-advanced country as observers without contributing effectively in the discussions because of lack of well-informed knowledge in the sector. Most managers have not been able to attend a computer-related conference due to immigration requirements. Remember that frontiers have been crumbled by ICT infrastructure which are "inherently globalizing" and yet, artificial frontiers exist because of government policies on immigration.

While these are the items that proved most relevant in Straub et al's (2001) study, there are other ways to measure technology culturation that might yield different results (Checchi et al 2002). As one respondent indicated, "Most knowledge can be acquired by ICTs," perhaps referring to online education.

Although different from Hasan and Ditsa's, my findings are consistent with one significant study from the literature. In an in-depth case study of the impediments to ICT diffusion among the Yoruba ethnic group of Nigeria, Korpela (1996) rejected the hypothesis that culture had any significant effect. His alternative explanation, citing the effects of historical political economy, had more in common with ICT implementation factors than with culture. He recommended that "systems analysis should be extended from the information flow within the end-user organisation to the services provided by the organisation to the civil society" (p. 39),

and that African systems development projects should mobilize adequate resources, including management consultancy. Thus, the experts I surveyed concurred that the proper implementation of the e-business project itself is more important than the culture of those implementing it. Although what makes for "proper" implementation might be culturally relative, the items that I used in operationalizing transfer implementation seem to be common across both in SSA and in Western nations.

The reason for the disparity between Korpela's and Hasan and Ditsa's findings could very well be due to the fact that Hasan and Ditsa compared West African ICT personnel with those outside of Africa (Australia and the Middle East), whereas Korpela's study was a qualitative analysis that examined only the Yoruba culture within Nigeria. Although my study is not a case study, it is similar to Korpela's in that it only studied respondents within Africa. It could be that, even though my study represents hundreds of Sub-Saharan cultures, there is not sufficient cultural variation to detect significant differences in cultural effects. However, perhaps a study that compared SSA with some other region of the world, like Latin America or Europe, might detect significant cultural effects. This is an important qualification to note in interpreting the results of this study.

5.2 Limitations of the Study

Although I conducted a rigorous and comprehensive study, I recognize that there are some limitations of my design and administration that require me to qualify the scope of applicability of these results. The first is that my study tests my model of e-business outcomes in SSA using the subjective perception methodology of a survey. I have already explained why I believe that the evaluations of experts are valuable and meaningful for insight, especially at the early stages of the development of e-business in SSA. Nonetheless, I realize that at best, expert

opinions are only an approximation of the actual factors that affect e-business. I also recognize that expert assessments are imperfect measures of the constructs in which I am interested.

Moreover, I realize that the poor communications infrastructure and high political instability of many countries made it difficult to obtain comprehensive contact information about organizations in Sub-Saharan Africa, especially about those organizations that are implementing new technologies like e-business. Nonetheless, I believe that my data sources, sponsored by institutions such as the United Nations Economic Commission for Africa, gave me access to experts that are representative of those knowledgeable about e-business in SSA.

A related limitation of this present study is that I did not survey the actual users of e-business in SSA. of course, many of my experts—particularly the practitioners—*are* actual users, but this is only around half of my respondents. Moreover, most of the practitioners in my study are managers, corporate executives, and systems administrators—I have very few of other classes of experts. I recognize that those who actually use the e-business systems that others have ordered and implemented might have different perspectives on the capabilities and value of these systems. However, at the present stage of e-business in SSA, it is not feasible to identify and contact a statistically meaningful sample of organizations that use e-business to get a representative user perspective. I believe that the assessments of managers are an acceptable substitute at this time.

Finally, my operationalizations restricted my results to experts' assessments regarding urban SMEs in SSA. Thus, my results cannot be generalized to rural businesses in SSA, to large businesses (including those of national and international scope), or to businesses in other developing countries outside of SSA. While this limits the generalizability of my study, I believe it made the study more focused so that the experts could give more consistent responses. This

might not have been the case had I let them respond regarding any business in SSA, as the following expert comments indicate:

> Most urban SMEs are involved in intra-urban and internationally oriented e-business. No rural sector.
>
> [There is a steady supply of **electrical power**]: in [Senegalese] cities [Strongly Agree], in rural area [Disagree]
>
> [The survey has an] interesting format, not boring. User-friendly. But it automatically excludes my constituency in rural Nigeria where it will cost an arm and a leg to fill in this questionnaire from the nearest cybercafé that is 2 hours journey from my station

In particular, the last comment justifies my decision to ask my experts, virtually all of whom worked in urban areas, to answer only for the situation in urban parts of SSA. I believe they were more qualified to answer accurately regarding this particular matter.

5.3 Contributions and Implications of the Study

I conducted this study to help answer two research questions:

1. What kinds of national infrastructure contribute toward effective e-business outcomes in Sub-Saharan Africa?
2. What cultural factors contribute toward effective e-business outcomes in Sub-Saharan Africa?

The first step towards answering these questions was to survey the relevant literature and derive conceptual models that addressed each question. The second step was to empirically test the model. With these two steps, I have learned much about what contributes towards effective e-business in SSA, and this study makes a few significant contributions that have implications for information systems research, managers of businesses that use the Internet in SSA, and for teaching global information management. Table 5.1 summarizes these contributions.

Table 5.1. Contributions of this study

• Clearly distinguishes between two different dimensions of e-business outcomes: specific capabilities and value derived from e-business.
• Models and tests the effects of national governance institutions and commercial infrastructure on e-business outcomes.
• Provides empirical support for studies that have argued conceptually for the need for ICT policies specific to the needs of e-business.
• First study that conducts a quantitative, broad-based survey on factors that contribute toward e-business in the Sub-Saharan Africa region.
• Gives cause to question the common argument that native culture significantly affects the adoption of ICTs.

5.3.1 Contributions

The first contribution of this study was to clearly distinguish between two different dimensions of e-business outcomes: specific capabilities and value derived from e-business. Our empirical discriminant analysis justified this distinction of dimensions. This distinction is important because certain factors might affect one kind of e-business outcome in one way, and another kind in a completely different way. This came out most clearly when contrasting the effects of ICT infrastructure, which experts believed affected e-business capabilities but not value, with the effects of governance institutions, which they believed affected the value derived from e-business but had little effect on the specific capabilities that would be applied. Failing to decompose these distinct dimensions of e-business outcomes could lead to misleading results and recommendations.

A second contribution was my modeling and testing the effects of national governance institutions and commercial infrastructure on e-business outcomes. Although much theoretical literature has proposed and discussed the effects of different aspects of the institutional and commercial environment on e-business (Bridges.org 2001; Dekleva 2000; Easterly and Levine 2002; Gurbaxani et al 1990a; Gurbaxani et al 1990b; Jarvenpaa and Leidner 1998; Jarvenpaa and Tiller 1999; King et al 1994; Licker and Motts 2000; Montealegre 1996; Montealegre 1999; Sachs and Warner 1997; Splettstoesser and Towry-Coker 1999), this is the first empirical study I

am aware of that operationalized these constructs and empirically tested for their effects on e-business.

Third, this study provides empirical support for studies that have argued conceptually for the need of ICT policies specific to the needs of e-business (Bridges.org 2001; Jarvenpaa and Tiller 1999; Kardaras and Karakostas 2001). By showing that experts believe that e-business policies have strong effects both on general ICT and on specific e-business outcomes, my study adds weight to this call for focused policies.

Fourth, this is the first study that conducts a quantitative, broad-based survey on factors that contribute toward e-business in the Sub-Saharan Africa region. There have been studies that examined different aspects of e-business, but these have mostly been either conceptual or qualitative (Darley 2001; Licker and Motts 2000; Okoli and Mbarika 2003; Okunoye and Karsten 2002; UNECA 1999a). While valuable and insightful, such studies have limited generalizability, considering the wide disparities in e-business in SSA. The expert assessments from this study lay an empirical foundation upon which future studies can proceed to better understand e-business in this region of the world.

Finally, the results from this study give cause to question the common argument that native culture significantly affects the adoption of ICTs (de Vreede, Jones and Mgaya 1999; Hasan and Ditsa 1999; Straub, Loch and Hill 2001). Most of the literature on ICTs and culture make this argument, and there have been empirical findings to this effect, but there has also been the argument that while culture might color the way ICTs are used, it is not the prime determinant of specific outcomes (Korpela 1996). It is important to note that I cannot and do not make any conjectures about the possible effects of other cultural dimensions that I did not test in this study, such as long term orientation, social collectivity, or valuation of "the good life" (Hofstede's Masculinity/Femininity). However, the dimensions that I tested here—power

distance, uncertainty avoidance, and technology culturation—have been clearly shown elsewhere to be relevant dimensions in similar contexts (Shore and Venkatachalam 1996; Straub, Loch and Hill 2001). By presenting evidence that experts do not believe that these cultural dimensions have a significant effect on e-business outcomes in SSA, I provided quantitative evidence that reproduced Korpela's contrarian conclusion. However, my test was such that I can legitimately question whether cultural effects appear insignificant only when examining the variation within SSA. I discuss this issue further in the next section on specific implications of my findings and contributions to management, research, and teaching.

5.3.2 Implications for Practice

My study has a number of implications for practitioners, including government and NGO officials, of e-business in Sub-Saharan Africa. First, there are the implications related to the national model that I presented in this paper. This national model identifies environmental factors over which managers have little control. However, being aware of this model may aid these managers with their e-business capabilities and e-business value. For example, being aware that the experts believed that e-business capabilities flourish best in an environment with good ICT infrastructure and supportive policies focused on e-business may help SSA managers who are considering implementing e-business, or trying to expand their capabilities and profit from their efforts. Also, by taking note that the experts' believed that supportive e-business policies as well as strong national governance institutions make for valuable outcomes, SSA managers may be benefited in their strategic planning. In addition, government policy makers and NGO officials who might have more control over environmental factors, being conscious of the experts' beliefs regarding policies and e-business value, may be assisted to design, enact and implement supportive e-business policies that actually create an environment conducive to e-business. In this way, businesses can receive value from the policy makers' efforts.

Moreover, noting that the experts' believed that implementing supportive e-business policies rather than general ICT policies can help grow a good ICT infrastructure may help government policy makers and NGO officials offset SSA's poor ICT infrastructure dilemma, and consequent slow economic growth. .ICT infrastructure is highly correlated with the level of economic development; thus, SSA countries, with their deficiencies in economic development, are at a great disadvantage. Moreover, the subcontinent is also generally poor at developing strong, effective governments, which is critical for a vibrant commercial sector. This, of course, retards economic growth, keeping many countries in a vicious cycle of sub-optimal progress. Ironically, the respondents were fairly optimistic about the potential of e-business. Yet, because of the economic and social problems, there is often little practical way to realize these aspirations. As I mentioned previously, my finding regarding experts' assessments of the effects of policy on ICT infrastructure provides a possible solution. In other words, by taking note of this finding, policy makers can implement specific e-business policies that could help grow ICT infrastructure rather than implementing more general ICT policies that apparently do not have much effect on the infrastructure. In this way these policy makers can offset the economic constraints that often limit ICT infrastructure.

My second set of implications for practitioners relate to the cultural model of my study. The cultural model features factors over which e-business managers have a little more control. For example, the experts strongly believed that paying attention to sound ICT project implementation (Keil, Cule, Lyytinen and Schmidt 1998) lead to greater e-business capabilities and enable e-business systems to give value to SSA businesses. Some other studies have identified other critical, controllable, success factors for e-business practice in SSA (Darley 2001; Poku and Vlosky 2001). The most important factors seem to be: a clear business case for e-business; technical skills to deploy Internet based applications; a sound understanding of

customer needs and behavior; and understanding the differences between online and offline customers.

Moreover, Travica (2002) and others believe that in developing countries in general, consumer culture is a very important consideration for successful e-business practice, since this culture is often quite different from the culture in developed countries, the context in which many of these models have been developed. However, the experts in this study did not consider that cultural factors—over which managers have less control—are significant. Because the cultural effects I tested here are very particular, I would not say that they have no effect, especially in light of research that indicates the contrary (de Vreede, Jones and Mgaya 1999; Hasan and Ditsa 1999; Straub, Loch and Hill 2001). Nevertheless, the experts seemed to believe that SSA managers are able to create good e-business systems and that the quality of their system implementation projects could determine their e-business outcomes.

5.3.3 Implications for Research and Directions for Future Research

Based on the first contribution I have noted, it is important that research on the e-business outcomes in any region of the world be careful to distinguish between specific capabilities and value. My study has shown that these dimensions, while related, have a different set of antecedents. Perhaps I could use very different structural models to explain the effects of each of these dimensions. For example, in this study, experts believed that better ICT infrastructure increased the capabilities of e-business. Future research could examine both constructs more closely, and analyze which specific ICTs and infrastructural elements contribute to which specific e-business capabilities. It is likely that there would be differences found. However, if such a study were to lump e-business capabilities together with value, it might be more difficult to identify the effects of specific elements of ICT.

Another implication for research is that the operationalization of ICT policies needs to be very specific. One of my most interesting findings was that while experts believed that e-

business policies had strong effects on ICT infrastructure and on both e-business capabilities and value, they did not see much relation between general ICT policies and these factors. It makes sense that policies specific to e-business have the most influence on e-business outcomes, but I would have expected general ICT policies to at least have some influence on ICT infrastructure. One possible reason for this finding could be that my operationalization for general ICT policies, though theoretically based (King et al 1994) with specific examples, was rather generic (see Table 3.1), whereas my operationalization for e-business policies was more specific. This might suggest that studies on the effects of ICT policies should be as specific as possible in operationalizing these policies. However, because the scope of this particular study covered factors that affect e-business in SSA as a whole, creating specific operationalizations of ICT policies was difficult. With so many different countries and innumerable specific policies, it was more practical and comprehensive to operationalize ICT policies based on classes derived from theory. Hence, future research may need to be narrower in scope in order to include more specific operationalization of ICT policies.

Moreover, another future research direction involves deeper investigation of the national commercial infrastructure. The operationalization of the national commercial infrastructure in this study might not encompass all pertinent components. The final, refined instrument only covered corruption, delivery and transportation infrastructure, and e-payment systems (though the pilot version included access to financing and the mix of labor and capital in enterprise resources, which did not factor adequately together). The reason for the limited number of factors is that, with the broad scope of this study, it was impractical to develop a more detailed operationalization of commercial infrastructure. However, the experts' comments, which elucidated why they generally felt that traditional commerce had little effect on e-business in SSA, give numerous ideas for potentially fruitful lines of deeper investigation.

Two other implications for research are testing the cultural model within specific countries or sub-regions of SSA and replicating this study in regions outside of SSA, respectively. Sub-Saharan Africa is an incredibly diverse geographical region, as can be seen from the over 2,000 languages spoken on the entire continent of Africa (Ethnologue 2000). However, my study was deliberately broad, attempting to understand what factors are general to this region of Africa as a whole. Hence, the models I proposed in this study explained only around 30% of the variation in e-business capabilities and value, indicating that, from the experts' perspective, there are other factors that affect e-business outcomes in SSA. These probably mostly have to do with factors, such as the unique historical and socioeconomic situations in each individual Sub-Saharan country, which were deliberately not included in this study of SSA as a whole region. Thus, in the future, it might be helpful to test the cultural model within specific countries or sub-regions of SSA to see if there might be differences when not examining culture at such a high level. In addition, although SSA cultures differ from each other, taken as a whole they are relatively homogenous compared to the cultures in the rest of the world. This homogeneity may be the reason for my findings of insignificant cultural effects. Thus, a replication of this study that examines regions outside of SSA might yield different results.

In addition to implying that future research might need to change the context of the cultural model and the overall study, respectively to possibly yield different results related to cultural issues, my study has two other implications regarding these issues. First, in this study, I based my findings on my specific measures of culture-specific beliefs and values—power distance and uncertainty avoidance. While there is empirical evidence that these are usually the most pertinent factors in a work context, research needs to be conducted on other cultural dimensions (Hasan and Ditsa 1999) and on specific culture-influenced decisions and actions

(Straub, Loch and Hill 2001) before anything can be conclusively said on the effects of culture on SSA e-business. Findings from such a study might be quite different from those in this one, and might lead to more insight on the precise effects of culture and the conditions under which these effects are most acute. Second, in the introduction, I mentioned the possible effects of the consumer credit card culture, the open-air marketplace culture, female entrepreneurship, and community telecenters on e-commerce in SSA. As these aspects pertain primarily to consumers, I did not examine them in this study. (However, I did include the effects of corruption in the operationalization of commercial infrastructure.) Hence, it might be fruitful and enlightening to investigate what effect these consumer-related cultural aspects have on e-commerce in SSA. Of course, this kind of study would be more in the area of B2C e-commerce, rather than the B2B focus of this study.

Other implications for future research include replicating the national model using more objective factors, and conducting a study on users of e-business in SSA instead of on experts of e-business, respectively. However, while these are promising and will need to be conducted some time in the future, these kinds of studies are not yet feasible given the present situation of e-business in SSA. With the cultural model, it would not make sense to try to replicate this study using objective factors, as cultural beliefs and values are inherently subjective, but this might be a helpful approach for further exploring the national model. However, as I detailed in the introduction of this study, the current state of e-business in SSA does not provide sufficient data on e-business outcomes in SSA businesses to permit a large quantitative survey. Data for the other factors are available and collectible, but without the primary dependent variable of e-business outcomes, such an "objective" study is not yet feasible. A related opportunity would be to conduct a study of the users of e-business rather than, or in addition to, managers, officials, and academics. However, with the present state of e-business in SSA, such users would be harder

to access in a statistically representative way than the experts I surveyed here, and it would be difficult to explain or justify the generalizability of such a study now.

Taking the opposite approach, in-depth country case studies would shed much light on the specific effects of the factors I have studied in this model. I could study existing SSA businesses that successfully use the Internet, particularly those that use innovative business models, such as Africa Online's e-touch franchises (Africa Online 2001). Such studies would not be highly generalizable, but they would provide richer understanding than what is possible from a broad survey such as this present study, which mainly serves as a foundation for such detailed case studies by giving specific directions of inquiry and focusing attention on the most relevant questions to investigate in interviews. Related to these case studies, insights from the e-business development of other developing regions and comparisons with the limited progress in SSA would also be valuable. To maximize the potential understanding that such studies could give, I might employ qualitative techniques such as verbal protocol analysis to decompose and interpret the experts' responses (Ericsson and Simon 1993).

In addition to case studies, another avenue for future research implied by my study is a study among larger businesses in SSA. I restricted this study to small and medium enterprises because, for practical reasons, I had to restrict the nature of business I was inquiring about in order to let the experts respond consistently about the same kind of entity. I focused on SMEs as these best represent African-owned and operated businesses in SSA. However, larger businesses, particularly multinationals with branches in developed nations, are likely to have different patterns of employing e-business; thus, this study cannot be generalized to them. Hence, there is the need for further research to understand the factors that affect the capabilities and value of e-business among larger businesses in SSA.

Finally, my study implies that an option for future research is conducting carefully targeted case studies in rural areas in SSA. Although I explained my reason for limiting my study

to urban areas of SSA, a number of the experts highlighted the critical need for studying the potential of e-business for rural SSA:

> [The potential of e-business] to bring the informal business sector into mainstream is not mentioned here. This is where most of Nigeria's rural business operates.
>
> Rural area is where ICT can be of benefit to the country since the majority live and die there, roads, postal telephone services, and most importantly alt [sic] power generation systems e.g. solar and hydro. Education to create awareness and benefits of ICTs, pilots for select village areas where there is opportunity for SME to demonstrate the use of ICT in running profitable SMEs, including training of forming SMEs, banking, financials, HR. Social studies using ICT will go a long way to demonstrate the benefits of ICTs.

Quantitative surveys like this would be impractical to study business use of the Internet in rural SSA. However, carefully targeted case studies of existing practices might provide valuable insight of what might work in this context, and the environmental situation needed for rural e-business to succeed in SSA.

5.3.4 Implications for Teaching

In light of the implications I have observed for practitioners and researchers, teachers of global information management can learn from this study. Global information management is becoming a component of most information systems curricula, most often as a component of different courses, and sometimes even as a course in its own right (El Sawy and Kumar 1998). Such studies typically focus on extending information systems created in developed countries into other developed countries, but technology transfer to developing countries is becoming a more important topic, mainly for two reasons. First, in the intense competitive environment that many businesses face, they are beginning to realize that expanding to new markets might be the only way to continue growing. As globalization rapidly saturates developed markets, emerging markets in developing nations are becoming more attractive. Second, because developing countries typically have much lower costs of labor (consisting of lower salaries, insurance,

benefits, and other overheads), yet often have highly educated workforces, an increasing number of businesses in developed nations are establishing plants or in outsourcing labor-intensive components of their enterprise to developing countries.

Regardless of the reason for setting up shop in developing countries, such establishments need information systems to operate. Studies like this that shed light on the issues surrounding specific classes of systems (in this case, e-business) in developing countries can provide insights to teachers when developing their global information management course material and help them stay up-to-date with developments in global information management. Because many businesses in developed countries do not have much experience in Sub-Saharan Africa, this study provides information to teach students based on expert assessments regarding concerns that businesses must consider that would like to branch out into this part of the world.

5.4 Conclusion

Over the past three decades, many have viewed much of the continent of Africa as the "forgotten" continent of information and telecommunication technologies. In spite of numerous socioeconomic problems, there has been an increasing growth in Internet connectivity, and much business activity has taken advantage of this. This study investigated experts' assessments of the pertinent factors affecting e-business in Sub-Saharan Africa. First, I justified the need for such a study and presented my two driving research questions: (1) What kinds of national infrastructure contribute toward effective e-business outcomes in Sub-Saharan Africa? (2) What cultural factors contribute toward effective e-business outcomes in Sub-Saharan Africa?

To answer these questions, I first reviewed the literature related to e-business in SSA and then developed three conceptual models that identified various pertinent factors and hypothesized their interrelationships in determining e-business outcomes. The first model included all the factors I identified; the second model examined those factors that operate at the

national level; and the third included those that operate at the cultural level. For empirical insight into my research questions, I designed and conducted a survey that empirically solicited information from business practitioners, government officials, NGO officials, and academics that had expertise related to e-business among urban SMEs in SSA. I used the survey responses to test the research models and to help answer my research questions.

Then, I discussed the survey results. The overall model explained approximately 30 percent of the variation in each of e-business capabilities and e-business value. I found that from a national infrastructure perspective, experts believed that non-specific general ICT policies were not very influential, while policies targeted specifically towards e-business were important in effecting e-business capabilities and in obtaining value from e-business, as well as effecting ICT infrastructure. I also found that ICT infrastructure only affected e-business capabilities. Moreover, experts believed that national governance institutions positively affected e-business value, but not capabilities. They also did not believe that commercial infrastructure had a significant effect on either e-business capabilities or value. From the cultural perspective, experts believed that ICT transfer implementation strongly affected both e-business capabilities and value, but that among SSA countries, there were no significant cultural effects of power distance, uncertainty avoidance, or technology culturation. Furthermore, they did not believe that there was any significant interaction between culture and transfer implementation within SSA. I concluded by discussing the findings in light of the existing literature related to e-business in SSA, and by observing implications for management, research and teaching.

Many of the major industrial revolutions of the past two centuries have bypassed SSA, and this region of the world has continued to lag behind economically. Today the information age, with the Internet as its leading technology, provides another major turn in the economic landscape of this world. In contrast to their past experience, Sub-Saharan businesses need to take

advantage of this new opportunity to firmly establish their place in the global economy. As we go further into the twenty-first century, it is important for SSA businesses to understand the relative importance of various environmental factors in competing in a global digital economy in order to achieve this goal. I hope this study helps extend this understanding.

REFERENCES

Adam, Lishan (1996). Electronic communications technology and development on Internet in Africa. *Information Technology for Development* (7:3), p. 133.

Adam, Lishan (1997). Brief communication: Content and the Web for African development. *Journal of Information Science* (23:1), p. 91.

Africa Online (2001). Africa e-touch. Africa Online. http://www.africaonline.com/site/africa/etouch.jsp (as of October 2003).

AISI (2003a). About AISI. United Nations Economic Commission for Africa. http://www.uneca.org/aisi/abtaisi.htm (as of October 2003).

AISI (2003b). African information society initiative (AISI) connect online database. United Nations Economic Commission for Africa. http://paradigm.wn.apc.org/africa/ (as of October 2003).

APEC (1999). APEC e-commerce readiness assessment guide. Asia-Pacific Economic Cooperation. http://www.ita.doc.gov/td/industry/otea/ecommerce/apec/docs/readiness_guide.html (as of October 2003).

ARISE (2003). African research for information society emergence. African Research for Information Society Emergence. http://www.ariseafrica.org (as of October 2003).

Avgerou, C. (1998). How can IT enable economic growth in developing countries? *Information Technology for Development* (8:1), pp. 15-29.

Baba, M. (1995). The cultural dimensions of technology-enabled corporate transformation. *Technological innovation and cultural processes: New theoretical perspectives*. M. J. Santos and R. D. Crus, eds. Mexico City: National University of Mexico.

Bertolotti, D. S. (1984). *Culture and technology*. Bowling Green, Ohio: Bowling Green State University Popular Press.

Bettis, Richard A and M. A. Hitt (1995). The new competitive landscape. *Strategic Management Journal* (16), pp. 7-19.

Bingi, Prasad, Laura G. Leff, Zoher E. Shipchandler and Suresh Rao (2000). Critical IT implementation issues in developed and developing countries. *Information Strategy* (16:2), pp. 25-34.

Boockholdt, J. L. (1989). Implementing security and integrity in micro-mainframe networks. *MIS Quarterly* (13:2), pp. 134-144.

Boon, J. A., Johannes J. Britz and C. Harmse (1994). The information economy of south Africa: Definition and measurement. *Journal of Information Science* (20:5), pp. 314-323.

Bray, Hiawatha (2001). Internet visionary hopes his plan has the e-touch. *Boston Globe*, Boston. July 23, 2001.

Bridges.org (2001). Comparison of e-readiness assessment models. Bridges.org. http://www.bridges.org/ereadiness/comparison.html (as of October 2003).

Brynjolfsson, Erik and Michael D. Smith (2000). The great equalizer? Consumer choice behavior at Internet shopbots. Journal article, July 2000. Massachusetts Institute of Technology, Cambridge, MA.

Chatterjee, Debabroto, Rajdeep Grewal and V. Sambamurthy (2002). Shaping up for e-commerce: Institutional enablers of the organizational assimilation of Web technologies. *MIS Quarterly* (26:2).

Checchi, Ricardo M., Galen R. Sevcik, Karen D. Loch and Detmar W. Straub (2002). An instrumentation process for measuring ICT policies and culture. *Proceedings of International Conference on Information Technology, Communications and Development*. Kathmandu, Nepal, December 1-3, 2002. Computer Association of Nepal.

Chifwepa, Vitalicy (1998). Connectivity in Africa: Use, benefits and constraints of electronic communication. http://www.uneca.org/aisi/studies.htm (as of October 2003).

Chin, Wynne W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly* (22:1), pp. vii-xvi.

Chin, Wynne W. (2000). Tutorial - partial least squares for researchers: An overview and presentation of recent advances using the PLS approach. *Proceedings of International Conference on Information Systems*. Brisbane, Australia, December 10-13, 2000.

Chin, Wynne W., Barbara L. Marcolin and Peter R. Newsted (1996). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a monte carlo simulation study and voice mail emotion/adoption study. *Proceedings of 17th International Conference on Information Systems*. Cleveland, Ohio, December, 1996.

Chin, Wynne W. and Peter R. Newsted (1999). Structural equation modeling analysis with small samples using partial least squares. *Statistical strategies for small sample research*. Rick Hoyle, ed.: Sage, pp. 307-341.

Chowdary, T. H. (1992). Telecommunications restructuring in developing countries. *Telecommunications Policy* (16), pp. 591-602.

CID (2000). Readiness for the networked world: A guide for developing countries. Center for International Development at Harvard University, Cambridge, Massachusetts.

Cunningham, R. B. and Y.K. Srayrah (1994). The human factor in technology transfer. *International Journal of Public Administration* (17:1), pp. 101-118.

Darley, William K. (2001). The Internet and emerging e-commerce: Challenges and implications for management in sub-saharan Africa. *Journal of Global Information Technology Management* (4:4), pp. 4-18.

de Vreede, Gert-Jan, Noel Jones and Rabson J. Mgaya (1999). Exploring the application and acceptance of group support systems in Africa. *Journal of Management Information Systems* (15:3), p. 197.

Dekleva, Sasa (2000). Electronic commerce: A half-empty glass? *Communications of the AIS* (3:18).

Devaraj, Sarv, Ming Fan and Rajiv Kohli (2002). Antecedents of B2C channel satisfaction and preference: Validating e-commerce metrics. *Information Systems Research* (13:3), pp. 316-333.

Dillman, Don A. (2000). *Mail and Internet surveys: The tailored design method*. New York: John Wiley & Sons.

Dorfman, P. W. and J. P. Howell (1988). Dimensions of national culture and effective leadership patterns: Hofstede revisited. *Advances in International Comparative Management* (3), pp. 127-150.

Dutta, Amitava (1997). The physical infrastructure for electronic commerce in developing nations: Historical trends and the impact of privatization. *International Journal of Electronic Commerce* (2:1), pp. 61-83.

Dutta, Amitava (2001). Telecommunications and economic activity: An analysis of Granger causality. *Journal of Management Information Systems* (17:4), pp. 71-95.

Easterly, William and Ross Levine (2002). Tropics, germs, and crops: How endowments influence economic development. Working paper, July 2002. National Bureau Of Economic Research, Cambridge, Massachusetts.

Ein-Dor, Phillip (2002). A global community of scholars and the digital divide. Association for Information Systems. http://aisnet.org/news/ein-dor060602.shtml (as of October 2003).

El Sawy, Omar A. and K. Ravi Kumar (1998). Making the world your oyster: Experiences from teaching information systems management for global operations. *Journal of Global Information Technology Management* (1:1).

El Sherif, Hisham and Omar A. El Sawy (1988). Issue-based decision support systems for the Egyptian cabinet. *MIS Quarterly* (12:4), pp. 551-569.

Ericsson, K. Anders and Herbert Alexander Simon (1993). *Protocol analysis: Verbal reports as data*. Cambridge, Massachusetts: MIT Press.

Ethnologue (2000). Geographic distribution of living languages, 2000. SIL International. http://www.ethnologue.com/ethno_docs/distribution.asp (as of October 2003).

Eze, Ezegozie (2002). A critical examination of strategic planning and implementation of information technology in developing countries. *International Journal of Services Technology and Management* (3:4), pp. 429-440.

Falk, R. Frank and Nancy B. Miller (1992). *A primer for soft modeling*. Akron, Ohio: University of Akron Press.

Fichman, Robert G. (2000). The diffusion and assimilation of information technology innovations. Chapter 7 in *Framing the domains of IT research: Glimpsing the future through the past*. Robert W. Zmud, ed. Cincinnati: Pinnaflex Educational Resources, p. 464.

Fornell, Claes and David F. Larcker (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* (18), pp. 39-50.

Gilbert, J. (1996). A framework for building national information infrastructure: The evolution of increased reach and range in Singapore. *Global information technology and systems management: Key issues and trends*. Prashant C. Palvia et al, eds. Westford, Massachusetts: Ivy League Publishing, pp. 55-76.

Grover, Varun and Martin D. Goslar (1993). The initiation, adoption, and implementation of telecommunications technologies in u.S. Organizations. *Journal of Management Information Systems* (10:1), pp. 141-163.

Gurbaxani, V., J. L. King, K. L. Kraemer, F. Warren McFarlan, K. S. Raman and C. S. Yap (1990a). Institutions in the international diffusion of information technology. *Proceedings of 11th International Conference on Information Systems*. Copenhagen, 1990a. Association for Information Systems.

Gurbaxani, Vijay, Kenneth L. Kraemer, John Leslie King, Sheryl Jarman, Jason Dedrick, K. S. Raman and C. S. Yap (1990b). Government as the driving force toward the information society: National computer policy in Singapore. *The Information Society* (7:2), pp. 155-185.

Hair, Joseph F., Jr., Rolph E. Anderson, Ronald L. Tatham and William C. Black (1998). *Multivariate data analysis*. Upper Saddle River, New Jersey: Prentice-Hall.

Hakken, D. (1991). Culture-centered computing: Social policy and development of new information technology in England and in the united states. *Human Organization* (50:4), pp. 406-423.

Hamilton, Paul (2001a). An inopportune time to privatise? Market analysis, World Markets Research Centre, London.

Hamilton, Paul (2001b). Leapfrogging the digital divide. Market analysis, World Markets Research Centre, London.

Hasan, Helen and George Ditsa (1999). The impact of culture on the adoption of IT: An interpretive study. *Journal of Global Information Management* (7:1), pp. 5-15.

Heeks, Richard (2002). I-development not e-development: Understanding and implementing ICTs and development. *Journal of International Development* (14:1).

Hill, Carole E., Detmar W. Straub, Karen D. Loch, William Cotterman and Kamal El-Sheshai (1994). The impact of Arab culture on the diffusion of information technology: A culture-centered model. *Proceedings of The Impact of Informatics on Society: Key Issues for Developing Countries, IFIP 9.4*. Havana, 1994.

Hill, Carole, Karen D. Loch, Detmar W. Straub and Kamal El-Sheshai (1998). A qualitative assessment of Arab culture and information technology transfer. *Journal of Global Information Management* (6:3), pp. 29-38.

Hoffman, Donna L. and Thomas P. Novak (1998). Bridging the racial divide on the Internet. *Science* (280), pp. 390-391.

Hofstede, Geert (1980). *Culture's consequences: International differences in work-related values*. Beverly Hills: Sage.

Hofstede, Geert (1991). *Cultures and organizations: Software of the mind*. London: McGraw-Hill.

Hofstede, Geert, Bram Neuijen, Denise-Daval Ohayv and G. Sanders (1990). Measuring organizational cultures: A qualitative and quantitative study across twenty cases. *Administrative Science Quarterly* (35), pp. 286-316.

IDRC (1998). National information and informatics policies in Africa. *Proceedings of IDRC Regional Seminar*. Addis Ababa, Ethiopia, November, 1998. International Development Research Centre.

Igbaria, Magid, Nancy Zinatelli, Paul Cragg and Angele L. M. Cavaye (1997). Personal computing acceptance factors in small firms: A structural equation model. *MIS Quarterly* (21:3), pp. 279-305.

Ingold, Tim (1996). Technology and culture. *Encyclopedia of cultural anthropology*. E. Levinson and M. Ember, eds. New York: Henry Holt and Company, (4) pp. 1297-1301.

ITU (1994). World telecommunications development report. International Telecommunications Union, Geneva.

ITU (2001). African telecommunication indicators. International Telecommunication Union, Geneva.

Ives, Blake and Sirkka L. Jarvenpaa (1991). Applications of global information technology - key issues for management. *MIS Quarterly* (15:1), pp. 33-49.

Jain, Rekha (1997). A diffusion model for public information systems in developing countries. *Journal of Global Information Management* (5:1), pp. 4-15.

Jarvenpaa, Sirkka L. and Dorothy E. Leidner (1998). An information company in Mexico: Extending the resource-based view of the firm to a developing country context. *Information Systems Research* (9:4), pp. 342-361.

Jarvenpaa, Sirkka L. and E. H. Tiller (1999). Integrating market, technology, and policy opportunities in e- business strategy. *Journal of Strategic Information Systems* (8:3), pp. 235-249.

Javalgi, R. and R. Ramsey (2001). Strategic issues of e-commerce as an alternative global distribution system. *International Marketing Review* (18:4), pp. 376-391.

Jensen, Mike (1995). Telematics in a global context. Discussion paper. *Proceedings of Africa Regional Symposium on Telematics for Development*. Addis Ababa, Ethiopia, 1995.

Kamel, Sherif (1995). IT diffusion and socio-economic change in Egypt. *Journal of Global Information Management* (3:2), pp. 4-16.

Kantor, J. (1991). Effects of computer administration and identification on the job descriptive index. *Journal of Business and Psychology* (5), pp. 309-323.

Kardaras, D. and B. Karakostas (2001). An empirical investigation of the management practices and the development of electronic commerce in mauritius. *International Journal of Information Management* (21:6), pp. 441-455.

Keil, Mark, Paul E. Cule, Kalle Lyytinen and Roy C. Schmidt (1998). A framework for identifying software project risks. *Communications of the ACM* (41:11), pp. 76-83.

Kibati, Mugo and Donyaprueth Krairit (1999). The wireless local loop in developing regions. *Communications of the ACM* (42:6), pp. 60-66.

Kimbrough, Steven O. and Ronald M. Lee (1997). Formal aspects of electronic commerce: Research issues and challenges. *International Journal of Electronic Commerce* (1:4), pp. 11-30.

King, John Leslie, Vijay Gurbaxani, Kenneth L. Kraemer, F. Warren McFarlan, K. S. Raman and C. S. Yap (1994). Institutional factors in information technology innovation. *Information Systems Research* (5:2), pp. 139-169.

Korpela, Mikko (1996). Traditional culture or political economy? On the root causes of organizational obstacles of IT in developing countries. *Information Technology for Development* (7:1), pp. 29-42.

Kraemer, Kenneth L., Vijay Gurbaxani and John Leslie King (1992). Economic development, government policy, and the diffusion of computing in Pacific area countries. *Public Administration Review* (52:2), pp. 146-156.

Kransberg, M. and W. Davenport (1972). *Technology and culture: An anthology*. New York: Schocken Books.

Kwon, T. H. and Robert W. Zmud (1987). Unifying the fragmented models of information systems implementation. *Critical issues in information systems research*. R. J. Boland and Rudy A. Hirscheim, eds. New York: John Wiley and Sons, pp. 227-251.

Laudon, Kenneth C., Jane P. Laudon and Mary Elizabeth Brabston (2002). *Management information* systems. Toronto: Pearson Education Canada.

Lee, Jinwoo Kim; Jungwon (2002). Business as buildings: Metrics for the architectural quality of Internet businesses. *Information Systems Research* (13:3), pp. 239-254.

Licker, Paul and Nigel Motts (2000). Extending the benefits of e-commerce in Africa: Exploratory phase. *Proceedings of First Annual Global Information Technology Management World Conference*. Memphis, Tennessee, 11-13 June, 2000. Global Information Technology Management Association.

Loch, Karen, Gayle Nelson and Detmar W. Straub (2000). NSF project summary: IT transfer to Egypt: A process model for developing countries. Grant proposal, September 2000. Georgia State University, Atlanta.

Loch, Karen, Detmar W. Straub and Sherif Kamel (2000). Use of the Internet: A study of individuals and organizations in the Arab world. *Proceedings of Global Information Technology Management Conference*, 2000. Global Information Technology Management Association.

Lu, Ming-te (2001). Digital divide in developing countries. *Journal of Global Information Technology Management* (4:3), pp. 1-4.

Lucas, H. C. (1978). Empirical evidence for a descriptive model of implementation. *MIS Quarterly* (2:2), pp. 27-41.

Mahmood, M.A., L.A. Gemoets and M.D. Gosler (1995). Information technology transfer and diffusion to Mexico: A preliminary analysis. *Journal of Global Information Management* (3:4), pp. 5-15.

Mansell, Robin (2001). Digital opportunities and the missing link for developing countries. *Oxford Review of Economic Policy* (17:2), p. 282.

Matz, M. (1999). Administration of Web versus paper surveys: Mode effects and response rates. *University of North Carolina*. Working paper, Paper # 2555, Chapel Hill, North Carolina.

Mbarika, Victor W. A. (1999). Factors that affect growth of teledensity in least developed countries. *Proceedings of 22nd Conference on Information Systems Research in the Scandinavia (IRIS 22)*. Jyväskyla, Finland, 1999.

Mbarika, Victor W. A. (2001). *Africa's least developed countries' teledensity problems and strategies*. Yaoundé, Cameroon: ME & AGWECAMS Publishers.

Mbarika, Victor W. A. and Terry A. Byrd (2003). Stakeholders' perceptions of strategies to improve the technological infrastructure for e-commerce in africa's least developed countries. *European Journal of Information Systems* (Forthcoming).

Mbarika, Victor W. A., Terry A. Byrd, P. McMullen and P. Musa (2002). Teledensity growth constraints and strategies for africa's LDCs: "Viagra" prescriptions or sustainable development strategy? *Journal of Global Information Technology Management* (5:1), p. 25.

Mbarika, Victor W. A., Terry A. Byrd and J. Raymond (2002). Growth of teledensity in least developed countries: Need for a mitigated euphoria. *Journal of Global Information Management* (10:2), pp. 14-27.

Mbarika, Victor W. A., Terry A. Byrd, J. Raymond and P. McMullen (2001). Investments in telecommunications infrastructure are not the panacea for least developed countries leapfrogging growth of teledensity. *International Journal on Media Management* (2:1), pp. 133-142.

Mbarika, Victor W. A., Mike Jensen and Peter Meso (2002). Cyberspace across sub-saharan Africa: From technological desert towards emergent sustainable growth? *Communications of the ACM* (45:12), pp. 17-21.

Mbogo, Steve (2000). Can Africa exploit the Internet? *Review of African Political Economy* (27:83), p. 127.

McCoy, Scott (2002). The effect of national culture dimensions on the acceptance of information technology: A trait based approach. University of Pittsburgh. Dissertation, Pittsburgh.

McKinney, V., K. Yoon and F. Zahedi (2002). The measurement of Web-customer satisfaction: An expectation and disconfirmation approach. *Information Systems Research* (13:3), pp. 296-315.

McKnight, D. H.; Choudhury, V.; Kacmar, C. (2002). Developing and validating trust measures for e-commerce: An integrative typology. *Information Systems Research* (13:3), pp. 334-359.

McLoughlin, G. J. (2000). The national information infrastructure: The federal role. Document IB95051, U.S. Department of State: Resources, Science, and Industry Division, Washington, DC.

Mensah, Kent (2001). Ghana: Telecenter project takes off. *Accra Mail*, Accra. 2/8/2001.

Meso, Peter, Ricardo M. Checchi, Galen R. Sevcik, Karen D. Loch and Detmar W. Straub (2003). Bounded rationality and sectoral differences in diffusion of national IT policies. *Proceedings of IFIP WG 9.4*. Athens, 2003.

Meso, Peter N. and Nancy Duncan (2000). Can national information infrastructures enhance social development in the least developed countries? An empirical investigation. *Journal of Global Information Management* (8:4), pp. 30-42.

Montealegre, Ramiro (1996). Implications of electronic commerce for managers in less-developed countries. *Information Technology for Development* (7:3), pp. 145-152.

Montealegre, Ramiro (1998). Managing information technology in modernizing "against the odds": Lessons from an organization in a less-developed country. *Information & Management* (34), pp. 103-116.

Montealegre, Ramiro (1999). A temporal model of institutional interventions for information technology adoption in less-developed countries. *Journal of Management Information Systems* (16:1), pp. 207-232.

Montealegre, Ramiro (2001). Four visions of e-commerce in latin America in the year 2010. *Thunderbird International Business Review* (43:6), pp. 717-735.

Moore, Gary C. and Izak Benbasat (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research* (2:3), pp. 192-222.

Mueller, Milton (1999). Emerging Internet infrastructures worldwide. *Communications of the ACM* (42:6), pp. 29-30.

Mursu, Anja, Abimbola H. Soriyan, Karen C. Olufokunbi and Mikko Korpela (1999). From software risks to sustainable information systems: Setting the stage for a Delphi study in Nigeria. *Journal of Global Information Technology Management* (2:3).

Nambisan, Satish, Ritu Agarwal and Mohan Tanniru (1999). Organizational mechanisms for enhancing user innovation in information technology. *MIS Quarterly* (23:3), pp. 365-395.

Ngai, Eric W. T. and Francis K. T. Wat (2002). A literature review and classification of electronic commerce research. *Information & Management* (39:5), pp. 415-429.

Nidumolu, Sarma R., Seymour E. Goodman, Douglas R. Vogel and Ann K. Danowitz (1996). Information technology for local administration support: The governorates project in Egypt. *MIS Quarterly* (20:2), pp. 197-224.

Nidumolu, Sarma R. and Gary W. Knotts (1998). The effects of customizability and reusability on perceived process and competitive performance. *MIS Quarterly* (22:2), pp. 105-137.

Odedra, Mayuri, Mike Lawrie, Mark Bennet and Seymour E. Goodman (1993). Sub-saharan Africa: A technological desert. *Communications of the ACM* (36:2), pp. 25-29.

Odedra-Straub, Mayuri (1993). Critical factors affecting success of CBIS: Cases from Africa. *Journal of Global Information Management* (1:3), p. 16.

Okoli, Chitu and Victor W. A. Mbarika (2003). A framework for assessing e-commerce in sub-saharan Africa. *Journal of Global Information Technology Management* (6:3).

Okunoye, Adekunle and Helena Karsten (2002). Where the global needs the local: Variation in enablers in the knowledge management process. *Journal of Global Information Technology Management* (5:3).

Oyelaran-Oyeyinka, Banji and Catherine Nyaki Adeya (2002). Internet access in Africa: An empirical exploration. *United Nations University, Institute for New Technologies: Discussion Paper Series*. Discussion paper, 2002-5, May. United Nations University, Tokyo.

Paltridge, S. (1994). A survey of tariff structures in Africa: Comparison to the rest of the world. *Proceedings of Africa Telecom '94*. Cairo, 1994.

Peha, Jon M. (1999). Lessons from Haiti's Internet development. *Communications of the ACM* (42:6), pp. 67-72.

Petrazzini, Ben and Mugo Kibati (1999). The Internet in developing countries. *Communications of the ACM* (42:6), pp. 31-36.

Pisciotta, A. A. (1994). Telecommunications reforms: Options, models, and global challenges. *IEEE Communications Magazine* (32:11), pp. 28-31.

Poku, Kofi and Richard Vlosky (2001). The digital divide: Implications for African business development. *Proceedings of* IAABD *2nd Annual International Conference*. Washington DC, April 4-7, 2001. International Academy of African Business and Development.

Porter, Michael E (2001). Strategy and the Internet. *Harvard Business Review* (79:3), pp. 63-78.

Powell, Mike (2001). Knowledge, culture & the Internet in Africa: A challenge for political economies. *Review of African Political Economy* (28:88), pp. 241-260.

Pugh, Derek S. and David J. Hickson (1976). Organizational structure in its context. The Aston Programme I, Westmead, UK.

Raman, K. S. and C. S. Yap (1996). From a resource rich country to an information rich society: An evaluation on information technology policies in malaysia. *Information Technology for Development* (7:3), pp. 109-131.

Ramani, Srinivasan (2001). The digital divide. Asia Society. http://www.asiasociety.org/speeches/ramani.html (as of October 2003).

Robinson, John P., Philip R. Shaver and Lawrence S. Wrightsman (1991). Criteria for scale selection and evaluation. *Measures of personality and social psychological attitudes*. John P. Robinson et al, eds. San Diego: Academic Press.

Rogers, Everett M. (1995). *Diffusion of innovations*. New York: Free Press.

Rose, Gregory and Detmar W. Straub (1998). Predicting general IT use: Applying TAM to the Arabic world. *Journal of Global Information Management* (6:3), pp. 39-46.

Rosenfeld, P., L. Doherty, J. Kantor and J. Greaves (1989). Attitude assessment in organizations: Testing three microcomputer-based survey systems. *Journal of General Psychology* (116), pp. 145-154.

Sachs, Jeffrey D. and Andrew M. Warner (1997). Sources of slow growth in African economies. *Journal of African Economies* (6:3), pp. 335-376.

SAIDE (1999). Report of the south African institute for distance education: Country visits. World Bank, Geneva.

Salem, Shawky (1986). Information infrastructure in the Arab countries: An analysis. *Journal of Information Science* (12:5), p. 217.

SATELLIFE (2001). SATELLIFE: The global health information network. SATELLIFE. http://www.healthnet.org (as of October 2003).

Saunders, R. J. (1982). Telecommunications in developing countries: Constraints on development. *Communication economics and development*. M. Jussawall and D. M. Lamberton, eds. Honolulu: The East-West Center, pp. 190-210.

Schech, Susanne (2002). Wired for change: The links between ICTs and development discourses. *Journal of International Development* (14:1), pp. 13-23.

Schmidt, Roy C., Kalle Lyytinen, Mark Keil and Paul Cule (2001). Identifying software project risks: An international Delphi study. *Journal of Management Information Systems* (17:4), pp. 5-36.

Schultz, Randall L. and Dennis P. Slevin (1983). Implementation exchange: The implementation profile. *Interfaces* (13:1), pp. 87-92.

Shore, Barry and A. R. Venkatachalam (1996). Role of national culture in the transfer of information technology. *Journal of Strategic Information Systems* (5), pp. 19-35.

Singh, Joginder P. (1990). Managerial culture and work-related values in India. *Organization Studies* (11:1), pp. 75-101.

Splettstoesser, Dietrich and Ade Towry-Coker (1999). Model of an information and decision centre for developing countries. *Journal of Global Information Technology Management* (2:1), pp. 10-30.

Sprano, Esther (2000). E-commerce capable: Competitive advantage for countries in the new world e-conomy. *Competitiveness Review* (10:2), p. 114.

Standish (1994). The CHAOS report. Report, The Standish Group, West Yarmouth, Massachusetts.

Steiner, Christopher B. (1994). *African art in transit*. Cambridge: Cambridge University Press.

Straub, Detmar W. (1994). The effect of culture on IT diffusion: E-mail and fax in japan and the u.S. *Information Systems Research* (5:1), pp. 23-47.

Straub, Detmar W. (2001). APIT and ACIT. Georgia State University. http://www.cis.gsu.edu/~dstraub/Research/ACIT-APIT/index.htm (as of October 2003).

Straub, Detmar W., Donna L. Hoffman, Bruce W. Weber and Charles Steinfield (2002a). Toward new metrics for net-enhanced organizations. *Information Systems Research* (13:3), pp. 227-238.

Straub, Detmar W., Karen D. Loch, Roberto Evaristo, Elena Karahanna and Mark Srite (2002b). Toward a theory based definition of culture. *Journal of Global Information Management* (10:1), pp. 13-23.

Straub, Detmar W., Karen D. Loch and Carole E. Hill (2001). Transfer of information technology to developing countries: A test of cultural influence modeling in the Arab world. *Journal of Global Information Management* (9:4), pp. 6-28.

Straub, Detmar W., Donna L. Hoffman, Bruce W. Weber, Charles Steinfield (2002). Measuring e-commerce in net-enabled organizations: An introduction to the special issue. *Information Systems Research* (13:2), pp. 115-124.

TIA (1995). Falling through the net: A survey of the "have nots" in rural and urban America. Telecommunications and Information Administration, U.S. Department of Commerce, Washington, DC.

Tractinsky, N. and Sirkka L. Jarvenpaa (1995). Information systems design decisions in a global versus domestic context. *Mis Quarterly* (19:4), pp. 507-534.

Travica, Bob (2002). Diffusion of electronic commerce in developing countries: The case of costa rica. *Journal of Global Information Technology Management* (5:1), pp. 4-24.

Turban, Efraim, Jae Lee, David King and H Michael Chung (2000). *Electronic commerce: A managerial perspective*. Upper Saddle River, NJ: Prentice-Hall.

UNCTAD (2002). E-commerce and development report 2002. United Nations Conference on Trade and Development, New York.

UNDP (2001). Human development indicators. United Nations Development Programme, New York.

UNDSD (2003). About the united nations division for sustainable development. United Nations Division for Sustainable Development. http://www.un.org/esa/sustdev/about_us/aboutus.htm (as of October 2003).

UNECA (1999a). Electronic commerce in Africa. United Nations Economic Commission for Africa, Addis Ababa, Ethiopia.

UNECA (1999b). The process of developing national information and communications infrastructure (NICI) in Africa. United Nations Economic Commission for Africa. http://www.uneca.org/adf99/nici.htm (as of October 2003).

UNECA (2000). Subregional development centres (SRDC). United Nations Economic Commission for Africa. http://www.uneca.org/srdcs_home.htm (as of October 2003).

UNOCHA (2003). Countries of the African continent. United Nations Office for the Coordination of Humanitarian Affairs. http://www.irinnews.org/audiovisual/africamap/Africa.asp (as of October 2003).

Vadapalli, Anand and K. Ramamurthy (1998). Business use of the Internet: An analytical framework and exploratory case study. *International Journal of Electronic Commerce* (2:2), pp. 71-94.

Wallsten, Scott J. (2001). An econometric analysis of telecom competition, privatization, and regulation in Africa and latin America. *Journal of Industrial Economics* (49:1), pp. 1-19.

Wheeler, Brad C. (2002). NEBIC: A dynamic capabilities theory for assessing net-enablement. *Information Systems Research* (13:2), pp. 125-146.

Wigand, Rolf T. (1997). Electronic commerce: Definition, theory, and context. *Information Society* (13:1), pp. 1-16.

Wild, Kate and Stephen MnCube (1996). Information and communication policy: Issues and initiatives on south Africa. *Information Technology for Development* (7:4), pp. 183-193.

Wixom, Barbara H. and Hugh J. Watson (2001). An empirical investigation of the factors affecting data warehousing success. *MIS Quarterly* (25:1), pp. 17-41.

Wolcott, Peter, Larry Press, William McHenry, Seymour E. Goodman and William Foster (2001). A framework for assessing the global diffusion of the Internet. *Journal of the Association for Information Systems* (2:6).

World Bank (2001). World development indicators. World Bank, Washington, D.C.

World Bank (2003). Country classifications. World Bank. http://www.worldbank.org/data/countryclass/countryclass.html (as of October 2003).

WTO (1996). General agreement on trade in services: Annex on telecommunications. Trade agreement, World Trade Organization, Uruguay.

Zahra, S. A. and G. George (2002). The net-enabled business innovation cycle and the evolution of dynamic capabilities. *Information Systems Research* (13:2), pp. 147-150.

Zhu, Kevin and Kenneth L. Kraemer (2002). E-commerce metrics for net-enhanced organizations: Assessing the value e-commerce to firm performance in the manufacturing sector. *Information Systems Research* (13:3), pp. 275-295.

Zwass, Vladimir (1996). Electronic commerce: Structure and issues. *International Journal of Electronic Commerce* (1:1), pp. 3-23.

APPENDIX A: RTF VERSION OF SURVEY

LOUISIANA STATE UNIVERSITY AND A & M COLLEGE
E. J. OURSO COLLEGE OF BUSINESS ADMINISTRATION
DEPARTMENT OF INFORMATION SYSTEMS AND DECISION SCIENCES

Dear e-business expert:

The research team on Sub-Saharan Africa at Louisiana State University in Baton Rouge, USA would like to request your help with our research project. We are studying experts' perceptions on the most pertinent issues affecting the success of electronic business in Sub-Saharan Africa (SSA). We have identified you as an expert on electronic business in Sub-Saharan Africa. Even if you are not from this particular region of Africa, your input is very valuable. In addition, please kindly copy and forward this survey to other experts inside or outside your organization whom you personally consider appropriate.

As a token of gratitude for your taking the time to read our e-mail, we would like to offer you a copy of the results of this survey even if you are not able to complete it for whatever reason. If you would like a copy of the results, please just e-mail us with a request, or fill in your e-mail address at the end of the survey if you do complete it. Mr. Hamadoun Touré, the Director of the International Telecommunication Union's Bureau of Development, has affirmed that this study could contribute towards achieving one of ITU-D's goals of harnessing the potentials of ICTs for socioeconomic development of developing countries. Business managers, policy makers, and government and NGO officials like you will use the results of this study in furthering the development of e-business in SSA.

Please kindly take the time to complete this survey. All individual responses will remain confidential. You have the option to provide any additional information so that we may contact you for possible follow-up questions. However, we will not share any names or identifying information that you give us. Furthermore, we will present all data collected from this questionnaire in aggregate only. Your participation in this study is purely voluntary, and you may stop at any time.

By completing and returning the survey, you are indicating that:

- You are willingly and voluntarily participating in this study, and
- The information you provide (except your name) may be included in any report, presentation, and/or publication of the results of this study.

Please kindly complete and return the survey as soon as possible. If you have any questions or comments, please don't hesitate to contact us by e-mail or telephone. Please print out this survey and return it to us by fax or postal mail. Our contact information is:

E-mail: jokoli1@lsu.edu or vmbarika@lsu.edu
Phone: +1 (225) 578-4792 or +1 (225) 715-4621
Fax: +1 (208) 728-3172 or +1 (240) 214-0745

Postal mail:

Chitu Okoli
3199 CEBA Building, ISDS Dept.
Louisiana State University
Baton Rouge, LA 70803
USA

Thank you very much for your kind assistance. Your responses will be very valuable in the successful development of electronic business in Sub-Saharan Africa.

Sincerely,

Victor W. A. Mbarika, Ph.D., Assistant Professor of ISDS
Chitu Okoli, M.Sc., Doctoral Candidate in ISDS

Department of Information Systems and Decision Sciences
Louisiana State University
Baton Rouge, USA

Expert assessments of e-business in SSA

Important definitions for this survey

- **Sub-Saharan Africa (SSA):** For this survey, SSA refers to all African countries excluding North Africa (Morocco, Algeria, Tunisia, Libya, and Egypt), ***and excluding the Republic of South Africa***. Although North and South Africa are very important, they are unique cases that deserve their own specialized surveys.
- **Electronic business (e-business):** Business-to-business sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks.
- **Internet:** E-mail, the World Wide Web (WWW), FTP, chat, instant messaging, Voice over IP, USENET newsgroups, and other services.
- **ICT or IT:** Information and communication technologies (ICTs) or information technologies (IT) include all telephone, computer and network-based technologies: phones, computers, faxes, networks, wireless, satellites, the Internet, and so on.
- **SME businesses:** In this survey, please answer regarding **small and medium-sized enterprises (SMEs) in urban cities** of Sub-Saharan Africa. However, please write comments about rural businesses, and SSA businesses of other sizes.

Select one country in Sub-Saharan Africa for this survey: _____

In the space above, please write the country in Sub-Saharan Africa *(not including the Republic of South Africa)* that you are most familiar with. Please answer all the questions of this survey for this one country. If there is no one country you are particularly familiar with, list all the countries or write a region of SSA for which you will answer this survey.

Please answer all questions in this survey to the best of your ability.
Please use extra paper for your comments if you need to.

Electronic business outcomes in Sub-Saharan Africa

Capabilities: Please indicate how much you agree or disagree that urban SME businesses in your country will have the following e-business capabilities **by the end of 2004**.

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
Information: Product information will be available online for business customers, including product search capabilities.	○	○	○	○	○	○	○
Transaction: Business customers will be able to use websites to place, track, and review orders.	○	○	○	○	○	○	○
Interaction: Business customers will be able to manage online accounts, customize their view of the website, and conduct real-time chat with customer service representatives.	○	○	○	○	○	○	○
Supplier connection: Businesses will place online orders from suppliers, use electronic data interchange (EDI), and electronically share inventory information with suppliers and business partners.	○	○	○	○	○	○	○
Intranet: Within a business, employees will be able to use the Internet to share information internally, communicate with each other, and run applications.	○	○	○	○	○	○	○

Value impacts: Please indicate how much you agree or disagree with these statements about the impacts of e-business in the context of urban SME businesses in your country.

	DDD	DD	D	N	A	AA	AAA
E-business activity will increase **revenues**.	○	○	○	○	○	○	○
E-business activity will **save costs**.	○	○	○	○	○	○	○
E-business activity will save employees' **time and effort**.	○	○	○	○	○	○	○
E-business activity will result in **new jobs** in your country.	○	○	○	○	○	○	○
E-business activity will result in people **losing their jobs** in your country.	○	○	○	○	○	○	○

Please write any comments about electronic business outcomes in SSA that have not been covered in this survey:

ICT POLICY in Sub-Saharan Africa

Some policies ***influence*** information and communication technologies (ICTs) by encouraging or setting a trend, whereas others ***regulate*** ICTs by implementing and enforcing definite laws. Some policies target the ***supply*** of ICTs by focusing on organizations that create and provide ICTs, whereas others target the ***demand*** for ICTs by focusing on people and organizations that use them.

How much do you agree or disagree with the following statements about **current** policies concerning ICTs in your country?

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
The government **influences the supply** of ICTs (for example: by funding ICT research and innovation; providing educational and training services; and subsidizing ICT development).	○	○	○	○	○	○	○
The government **influences the demand** for ICTs (for example: by providing skill training; subsidizing the costs of purchasing ICTs; and providing programs for ICT awareness and promotion).	○	○	○	○	○	○	○
The government **regulates the supply** of ICTs (for example: by requiring computer education; removing economic barriers to ICT trade and innovation; and establishing standards and requirements for research and development in ICTs).	○	○	○	○	○	○	○
The government **regulates the demand** for ICTs (for example: by requiring specific ICT-related standards, products or processes be used by government agencies or businesses with government contracts).	○	○	○	○	○	○	○
Privatization and liberalization: The government gives ownership and control of telecommunications provision to private enterprises, and private enterprises can freely compete in the mobile phone, ICT and ISP markets.	○	○	○	○	○	○	○
E-business promotion: The government generally supports and actively promotes the practice of e-business.	○	○	○	○	○	○	○
Intellectual property rights: The government actively enforces the protection of patents, copyrights, trademarks, and other intellectual property rights.	○	○	○	○	○	○	○
E-business user rights: E-business users have well-defined and actively-enforced legal rights when engaging in e-business regarding purchase protection and privacy.	○	○	○	○	○	○	○
Awareness of e-business: People are generally aware of the concept and benefits of electronic business.	○	○	○	○	○	○	○

Please write any comments about ICT policy in SSA that have not been covered in this survey:

ICT INFRASTRUCTURE in Sub-Saharan Africa

How much do you agree or disagree with the following statements about **the current state** of infrastructure for information and communication technologies in **urban cities** in your country?

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
There is an adequate number of national and international **trunk/backbone (long distance)** phone and data circuits.	○	○	○	○	○	○	○
There is a steady supply of **electrical power**, whether by national grids or backup electrical generators.	○	○	○	○	○	○	○
There is an adequate number of **ICT workers** skilled in developing and maintaining ICTs, training others how to use ICTs, and managing ICT infrastructures.	○	○	○	○	○	○	○
There is an adequate number of **wireless networks**, such as VSAT, satellite and microwave links.	○	○	○	○	○	○	○
Urban citizens have adequate access to **phone services**, whether land telephone lines, mobile/cellular phones, or payphones.	○	○	○	○	○	○	○
Urban citizens have adequate **access to the Internet**, whether from home, work, Internet cafes, telecenters, or other locations.	○	○	○	○	○	○	○
Computers, networks, Internet access, and other ICTs are **affordable** for most urban SME businesses.	○	○	○	○	○	○	○
The ICT equipment and services available to urban SME businesses are generally of **high quality**.	○	○	○	○	○	○	○

Please write any comments about ICT infrastructure in SSA that have not been covered in this survey:

Institutions and commerce in Sub-Saharan Africa

How much do you agree or disagree with the following statements about governance institutions in your country?

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
Voice and accountability: Citizens can freely choose their government. They can exercise political rights and civil liberties, and the press is independent from government control.	○	○	○	○	○	○	○
Government regulation and bureaucracy: The government **does not** control goods markets, interfere with the banking system, nor excessively regulate or control private business and international trade.	○	○	○	○	○	○	○
Risk of repudiation: There is a **low** risk that the government will modify its contracts by scaling them down, postponing them, or outright repudiating them.	○	○	○	○	○	○	○
Rule of law: The government justly enforces contracts, and protects individuals and businesses against violence, theft and fraud.	○	○	○	○	○	○	○

How much do you agree or disagree with the following statements about the general commercial environment in your country?

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
Corruption: Bribery and corruption are **rare** when dealing with the government or businesses in relation to contracts, loans, licenses, tax assessments, fines, and other necessary services.	○	○	○	○	○	○	○
Electronic payment systems: Banks support electronic merchant payment systems such as credit and debit cards.	○	○	○	○	○	○	○

Which of the following descriptions most adequately reflects the distribution environment for physical products in your country?

○	**Poor**	Basic postal services sparse and expensive. Road infrastructure seriously deficient even in larger cities. Airfreight services unavailable or prohibitively expensive.
○	**Substandard**	Basic postal services available but not reliable. Road infrastructure passable in larger cities, but does not reach remote areas. Airfreight services very expensive and infrequent.
○	**Fair**	Postal services well developed. Main cities linked by reliable road infrastructure. Airfreight services regular though still infrequent.
○	**Good**	Private delivery services available as alternative to traditional postal service. Roads to most locations in good condition. Regular and continuous airfreight services.
○	**Excellent**	Delivery services widely available. Airfreight well developed. Cities and towns well connected by highways and/or secondary roads. Sophisticated, specialized, distribution services.

Please write any comments about institutions and commerce in SSA that have not been covered in this survey:

Business attitudes and behaviors related to e-business in SSA

How much do you agree or disagree with the following statements about implementation factors for **a typical ICT project** (especially e-business) in urban SME businesses in your country?

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
Top managers support the project by word and action.	○	○	○	○	○	○	○
Users are closely involved in the design and development of the system.	○	○	○	○	○	○	○
Users are computer literate and they are adequately trained in using the system.	○	○	○	○	○	○	○
There is at least one person (not necessarily a top manager) who purposefully champions the project by encouraging and advocating it.	○	○	○	○	○	○	○
The systems development team is skilled in the pertinent technologies.	○	○	○	○	○	○	○

Please indicate how much you agree or disagree with these statements about the work environment in urban SME businesses that implement or consider implementing ICTs (such as e-business) in your country.

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
Business employees generally do not trust ICTs or e-business.	○	○	○	○	○	○	○
Business employees are generally concerned about data security when considering using ICTs.	○	○	○	○	○	○	○
Managers typically prefer to adopt ICTs or e-business only if it has been proven to be effective.	○	○	○	○	○	○	○
Managers are usually hesitant to attempt new ICT or e-business applications.	○	○	○	○	○	○	○
Managers frequently use their authority and power when dealing with subordinates.	○	○	○	○	○	○	○
Managers do not usually delegate important tasks to employees.	○	○	○	○	○	○	○
Subordinates are usually afraid to express disagreement with their superiors.	○	○	○	○	○	○	○

Please indicate how much you agree or disagree with the following statements about the amount and nature of travel for **managers of ICTs or e-business** in urban SME businesses in your country. *(For these questions, include the Republic of South Africa as a "technologically-advanced" country.)*

DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree	DDD	DD	D	N	A	AA	AAA
Most have traveled to a technologically-advanced country for **business purposes**.	○	○	○	○	○	○	○
Most have traveled to a technologically-advanced country for **personal (non-business) purposes**.	○	○	○	○	○	○	○
Most have attended a computer-related conference **either within Sub-Saharan Africa or in another developing country**.	○	○	○	○	○	○	○
Most have attended a computer-related conference **in a technologically-advanced country**.	○	○	○	○	○	○	○

Please write any comments about the attitudes of business employees and managers related to using or developing e-business in SSA that have not been covered in this survey. In particular, please give any comments about **cultural influences** on the use of e-business:

Demographics: Please tell us about yourself

Please tell us about which organization you are presently affiliated with (or have been affiliated with in the past) that has given you the most experience with e-business issues in Sub-Saharan Africa. What type of organization is this? Select the one that fits best:

○ Commercial enterprise (for profit) ○ Government agency or organization ○ Academic institution
○ Nongovernmental organization (NGO) *(a not-for-profit voluntary citizens' group organized on a local, national or international level)*

In which country is this organization located? _____

How many years and months in total have you been actively affiliated with all organizations where you did work related to e-business issues in Sub-Saharan Africa? _____years and _____ months.

Please give some specific details about your expertise in e-business in Sub-Saharan Africa:

How many years in total have you lived in the following countries or regions? *If none, write "0".*

Anywhere in Sub-Saharan Africa (other than the Republic of South Africa)? _____ years.
In the Republic of South Africa? _____ years.
In North Africa? _____ years.
In any technologically-advanced countries outside of Africa? _____ years.

Are you female or male? ○ Female ○ Male

How old are you? _____years.

What is the highest academic degree, diploma or certificate you have received? _____

Final comments

Thank you very much for your responses to our specific questions. E-business in Sub-Saharan Africa is a complex issue, and our survey can only touch on some of these. We would very much appreciate your expert comments on a few more important areas.

Please write any other important comments about e-business in SSA that have not been covered in this survey.

Please write any comments about this survey itself (for example, about its design or administration).

Thank you very much for completing this survey! Your responses will be very valuable in the successful development of e-business in Sub-Saharan Africa. **To receive a copy of the results when the study is completed, please write your e-mail address here:**

E-mail address: _____

APPENDIX B: WWW VERSION OF SURVEY

Expert assessments of e-business in SSA

The Information Systems and Decision Sciences Department at Louisiana State University is surveying experts on their assessments of the most pertinent issues affecting the success of electronic business (e-business) in Sub-Saharan Africa (SSA). Mr. Hamadoun Touré, the Director of the International Telecommunication Union's Bureau of Development, has affirmed that this study could contribute towards achieving one of ITU-D's goals of harnessing the potentials of ICTs for socioeconomic development of developing countries. The results of this important study will be valuable to business managers, policy makers, and government and NGO officials in SSA. *(For a copy of results, please provide your e-mail address at the end of the survey.)* We appreciate your taking the time to help us better understand these issues. **Please answer *all* questions to the best of your ability.**

Important definitions for this survey

Sub-Saharan Africa (SSA): For this survey, all African countries excluding North Africa (Morocco, Algeria, Tunisia, Libya, and Egypt), and ***excluding the Republic of South Africa***. Although North and South Africa are very important, they are unique cases that deserve their own specialized surveys.

Electronic business (e-business): Business-to-business sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks.

Internet: E-mail, the World Wide Web (WWW), FTP, chat, instant messaging, Voice over IP, USENET newsgroups, and other services.

ICT or IT: Information and communication technologies (ICTs) or information technologies (IT) include **all** telephone, computer and network-based technologies: phones, computers, faxes, networks, wireless, satellites, the Internet, and so on.

SME businesses: In this survey, please answer regarding **small and medium-sized enterprises (SMEs) in urban cities** of Sub-Saharan Africa. However, please write comments about rural businesses, and SSA businesses of other sizes.

Select one country in Sub-Saharan Africa for this survey:

Please select the country in Sub-Saharan Africa *(not including the Republic of South Africa)* that you are most familiar with. Please answer all the questions of this survey for this one country. If there is no one country you are particularly familiar with, select a region or all of SSA *(these options are at the bottom of the list)*.

--Select an option--

Electronic business outcomes in Sub-Saharan Africa

Key: DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree

Capabilities: Please indicate how much you agree or disagree that urban SME businesses in your country will have the following e-business capabilities **by the end of 2004**.

	DDD	DD	D	N	A	AA	AAA
Information: Product information will be available online for business customers, including product search capabilities.	○	○	○	○	○	○	○

Transaction: Business customers will be able to use websites to place, track, and review orders.

Interaction: Business customers will be able to manage online accounts, customize their view of the website, and conduct real-time chat with customer service representatives.

Supplier connection: Businesses will place online orders from suppliers, use electronic data interchange (EDI), and electronically share inventory information with suppliers and business partners.

Intranet: Within a business, employees will be able to use the Internet to share information internally, communicate with each other, and run applications.

Value impacts: Please indicate how much you agree or disagree with these statements about the impacts of e-business in the context of urban SME businesses in your country.

	DDD	DD	D	N	A	AA	AAA
E-business activity will increase **revenues**.							
E-business activity will **save costs**.							
E-business activity will save employees' **time and effort**.							

Please write any comments about electronic business outcomes in SSA that have not been covered in this survey.

POLICY for information and communication technology (ICT) in Sub-Saharan Africa

Key: DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree

Some policies ***influence*** ICTs by encouraging or setting a trend, whereas others ***regulate*** ICTs by implementing and enforcing definite laws. Some policies target the ***supply*** of ICTs by focusing on organizations that create and provide ICTs, whereas others target the ***demand*** for ICTs by focusing on people and organizations that use them.

How much do you agree or disagree with the following statements about **current** policies concerning information and communication technologies in your country?

	DDD	DD	D	N	A	AA	AAA
The government **influences the supply** of ICTs (for example: by funding ICT research and innovation; providing educational and training services; and subsidizing ICT development).							
The government **influences the demand** for ICTs (for example: by providing skill training; subsidizing the costs of purchasing ICTs; and providing programs for ICT awareness and promotion).							
The government **regulates the supply** of ICTs (for example: by							

requiring computer education; removing economic barriers to ICT trade and innovation; and establishing standards and requirements for research and development in ICTs).	○	○	○	○	○	○	○
The government **regulates the demand** for ICTs (for example: by requiring specific ICT-related standards, products or processes be used by government agencies or businesses with government contracts).	○	○	○	○	○	○	○
Privatization and liberalization: The government gives ownership and control of telecommunications provision to private enterprises, and private enterprises can freely compete in the mobile phone, ICT and ISP markets.	○	○	○	○	○	○	○
E-business promotion: The government generally supports and actively promotes the practice of e-business.	○	○	○	○	○	○	○
Intellectual property rights: The government actively enforces the protection of patents, copyrights, trademarks, and other intellectual property rights.	○	○	○	○	○	○	○
E-business user rights: E-business users have well-defined and actively-enforced legal rights when engaging in e-business regarding purchase protection and privacy.	○	○	○	○	○	○	○
Awareness of e-business: People are generally aware of the concept and benefits of electronic business.	○	○	○	○	○	○	○

Please write any comments about ICT policy in SSA that have not been covered in this survey.

INFRASTRUCTURE for information and communication technology (ICT) in Sub-Saharan Africa

Key: DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree

How much do you agree or disagree with the following statements about **the current state** of infrastructure for information and communication technologies in **urban cities** in your country?

	DDD	DD	D	N	A	AA	AAA
There is an adequate number of national and international **trunk/backbone (long distance)** phone and data circuits.	○	○	○	○	○	○	○
There is a steady supply of **electrical power**, whether by national grids or backup electrical generators.	○	○	○	○	○	○	○
There is an adequate number of **ICT workers** skilled in developing and maintaining ICTs, training others how to use ICTs, and managing ICT infrastructures.	○	○	○	○	○	○	○
There is an adequate number of **wireless networks**, such as VSAT, satellite and microwave links.	○	○	○	○	○	○	○
Urban citizens have adequate access to **phone services**, whether	○	○	○	○	○	○	○

land telephone lines, mobile/cellular phones, or payphones.

Urban citizens have adequate **access to the Internet**, whether from home, work, Internet cafes, telecenters, or other locations.	○	○	○	○	○	○	○
Computers, networks, Internet access, and other ICTs are **affordable** for most urban SME businesses.	○	○	○	○	○	○	○
The ICT equipment and services available to urban SME businesses are generally of **high quality**.	○	○	○	○	○	○	○

Please write any comments about ICT infrastructure in SSA that have not been covered in this survey.

Institutions and commerce in Sub-Saharan Africa

Key: DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree

How much do you agree or disagree with the following statements about governance institutions in your country?

	DDD	DD	D	N	A	AA	AAA
Voice and accountability: Citizens can freely choose their government. They can exercise political rights and civil liberties, and the press is independent from government control.	○	○	○	○	○	○	○
Government regulation and bureaucracy: The government **does not** control goods markets, interfere with the banking system, nor excessively regulate or control private business and international trade.	○	○	○	○	○	○	○
Risk of repudiation: There is a **low** risk that the government will modify its contracts by scaling them down, postponing them, or outright repudiating them.	○	○	○	○	○	○	○
Rule of law: The government justly enforces contracts, and protects individuals and businesses against violence, theft and fraud.	○	○	○	○	○	○	○

How much do you agree or disagree with the following statements about the general commercial environment in your country?

	DDD	DD	D	N	A	AA	AAA
Corruption: Bribery and corruption are **rare** when dealing with the government or businesses in relation to contracts, loans, licenses, tax assessments, fines, and other necessary services.	○	○	○	○	○	○	○
Electronic payment systems: Banks support electronic merchant payment systems such as credit and debit cards.	○	○	○	○	○	○	○

Which of the following descriptions most adequately reflects the distribution environment for physical products in your country?

○ **Poor:** Basic postal services sparse and expensive. Road infrastructure seriously deficient even in larger cities. Airfreight services unavailable or prohibitively expensive.
○ **Substandard:** Basic postal services available but not reliable. Road infrastructure passable in larger cities, but does not reach remote areas. Airfreight services very expensive and infrequent.
○ **Fair:** Postal services well developed. Main cities linked by reliable road infrastructure. Airfreight services regular though still infrequent.
○ **Good:** Private delivery services available as alternative to traditional postal service. Roads to most locations in good condition. Regular and continuous airfreight services.
○ **Excellent:** Delivery services widely available. Airfreight well developed. Cities and towns well connected by highways and/or secondary roads. Sophisticated, specialized, distribution services.

Please write any comments about institutions and commerce in SSA that have not been covered in this survey.

Business attitudes and behaviors related to e-business in Sub-Saharan Africa

Key: DDD=Strongly Disagree; DD=Disagree; D=Slightly Disagree; N=Neutral; A=Slightly Agree; AA=Agree; AAA=Strongly Agree

How much do you agree or disagree with the following statements about implementation factors for **a typical ICT project** (especially e-business) in urban SME businesses in your country?

	DDD	DD	D	N	A	AA	AAA
Top managers support the project by word and action.	○	○	○	○	○	○	○
Users are closely involved in the design and development of the system.	○	○	○	○	○	○	○
Users are computer literate and they are adequately trained in using the system.	○	○	○	○	○	○	○
There is at least one person (not necessarily a top manager) who purposefully champions the project by encouraging and advocating it.	○	○	○	○	○	○	○
The systems development team is skilled in the pertinent technologies.	○	○	○	○	○	○	○

Please indicate how much you agree or disagree with these statements about the work environment in urban SME businesses that implement or consider implementing ICTs (such as e-business) in your country.

	DDD	DD	D	N	A	AA	AAA
Business employees generally do not trust ICTs or e-business.	○	○	○	○	○	○	○
Business employees are generally concerned about data security when considering using ICTs or e-business.	○	○	○	○	○	○	○
Managers typically prefer to adopt ICTs or e-business only if it has been proven to be effective.	○	○	○	○	○	○	○
Managers are usually hesitant to attempt new ICT or e-business	○	○	○	○	○	○	○

applications.

Managers frequently use their authority and power when dealing with subordinates.	○	○	○	○	○	○	○
Managers do not usually delegate important tasks to employees.	○	○	○	○	○	○	○
Subordinates are usually afraid to express disagreement with their superiors.	○	○	○	○	○	○	○

Please indicate how much you agree or disagree with the following statements about the amount and nature of travel for **managers of ICTs or e-business** in urban SME businesses in your country. *(For these questions, include the Republic of South Africa as a "technologically-advanced" country.)*

	DDD	DD	D	N	A	AA	AAA
Most have traveled to a technologically-advanced country for **business purposes**.	○	○	○	○	○	○	○
Most have traveled to a technologically-advanced country for **personal (non-business) purposes**.	○	○	○	○	○	○	○
Most have attended a computer-related conference **either within Sub-Saharan Africa or in another developing country**.	○	○	○	○	○	○	○
Most have attended a computer-related conference **in a technologically-advanced country**.	○	○	○	○	○	○	○

Please write any comments about the attitudes of business employees and managers related to using or developing e-business in SSA that have not been covered in this survey. In particular, please give any comments about **cultural influences** on the use of e-business.

Demographics: Please tell us about yourself

Please tell us about which organization you are presently affiliated with (or have been affiliated with in the past) that has given you *the most experience* with e-business issues in Sub-Saharan Africa.

What type of organization is this? *Select the one that fits best.* ***Note:** A nongovernmental organization (NGO) is a not-for-profit voluntary citizens' group organized on a local, national or international level.*

--Select an option--

In which country is this organization located?

--Select an option--

If you selected "Other", please specify:

How many years and months in total have you been actively affiliated with **all** organizations where you did work related to e-business issues in Sub-Saharan Africa?

Years:

Months:

Please give some specific details about your expertise in e-business in Sub-Saharan Africa.

How many years in total have you lived in the following countries or regions? *If none, write "0".*

Anywhere in Sub-Saharan Africa (other than the Republic of South Africa)?	years.
In the Republic of South Africa?	years.
In North Africa?	years.
In any technologically-advanced countries outside of Africa?	years.

Are you female or male?

--Select an option--

What is your age range?

--Select an option--

What is your highest level of formal education?

--Select an option--

Final comments

Thank you very much for your responses to our specific questions. E-business in Sub-Saharan Africa is a complex issue, and our survey can only touch on some of these. We would very much appreciate your expert comments on a few more important areas.

Please write any other important comments about e-business in SSA that have not been covered in this survey.

Please write any comments about this survey itself (for example, about its design or administration).

Thank you very much for completing this survey! Your responses will be very valuable in the successful development of e-business in Sub-Saharan Africa.

To receive a summarized copy of the results when the study is completed,

please enter your e-mail address here:

Submit Survey

This survey was created with WebSurveyor

VITA

John Chituanya (Chitu) Okoli was born and raised in Nigeria. He attended Louisiana State University in Baton Rouge, United States of America, where he obtained a bachelor's degree (1996) in computer science and a master's degree (2002) in information systems and decision sciences. Since June 2003 he has worked for Concordia University in Montréal, Canada, as an assistant professor in the Department of Decision Sciences and Management Information Systems, in the John Molson School of Business. He currently teaches introductory management information systems, and business data communications.

Before beginning his doctoral program in business administration (major in information systems and decision sciences), Chitu Okoli worked for Cornerstone Community Outreach as a computer systems analyst, and for Roofers Equipment Mart/Lakefront Supply as an employee administrator and computer systems analyst. These Chicago-based organizations are branches of Jesus People USA, an intentional community in Chicago, where he lived and served from 1997 to 1999.

Chitu Okoli's dissertation represents his primary research interest—applications of the Internet in developing countries (especially in Sub-Saharan Africa), with a view to understanding how this amazing technological infrastructure can help developing countries face some of their persistent challenges. Other research in this stream includes the study of telemedicine in Sub-Saharan Africa.

In addition to this primary research area, Chitu Okoli researches strategic uses of the Internet for competitive advantage, and social issues surrounding the implementation of remote electronic voting systems. Some minor research areas in which he has worked include mobile group support systems and user information satisfaction.