A FRAMEWORK FOR ASSESSING E-COMMERCE IN SUB-SAHARAN AFRICA

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ABSTRACT

Over the past three decades, Sub-Saharan Africa has been viewed as the "forgotten continent". With her many problems of hunger, epidemics, war, and other related socio-economic problems, the diffusion of the Internet and related technologies might be the last thing to be associated with Africa. However, we are experiencing the contrary. Sub-Saharan countries are experiencing tremendous growth in Internet connectivity, the use of computers, and in the diffusion of wireless communications. Although still at its starting stages, electronic commerce is one of the growth areas for information and communication technologies (ICTs) in Africa. This paper presents a research framework for assessing electronic commerce in Sub-Saharan Africa. It describes the nature of the digital divide, and explains the need for the commercial applications of the Internet in developing countries in general. Further, it presents literature on e-commerce frameworks, ICT diffusion, and ICTs in developing countries that shed light on different aspects of e-commerce in Sub-Saharan Africa. Finally, it proposes a consolidating framework that synthesizes these various literature streams and lays groundwork for a focused body of research in this area.

Keywords: Digital divide, electronic commerce, Sub-Saharan Africa, developing countries

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.

> *Koffi Annan, Secretary General of the United Nations*

This statement by the Secretary General (UNCTAD, 2002) points to the paramount importance of electronic commerce (e-commerce) diffusion as a major impetus for socioeconomic development in developing countries. However, Petrazzini and Kibati (1999: 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." It is critical to focus attention on these low-income regions of the world, so that we can begin to make headway into balancing out this situation.

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, & Goodman, 1993; Petrazzini & Kibati, 1999). The reasons for this state of affairs are numerous and beyond the scope of this paper. Moreover, this part of the world is probably the region most in need of research attention that can contribute to the improvement of its undeveloped technological state. This paper joins the growing body of literature that studies the factors that affect the diffusion and expansion of information and communication technologies (ICTs), particularly the Internet, into Sub-Saharan Africa (see Mbarika (2002) for a review).

In studies of economic development, Africa is divided into two general regions based on general homogeneity of development patterns: North Africa and Sub-Saharan Africa. The development patterns of North Africa are very similar to those of the Middle East. Thus, these

two socioeconomic regions are often classified together, even though they are geographically on different continents. In the SSA region, the Republic of South Africa is an unusual case. The apartheid policy, scrapped only in 1994, led to the development of an essentially dualistic socioeconomic society, in which the indigenous White population live in a society much like Europe, whereas the majority Black population live in conditions much like that in the rest of SSA. Thus, South Africa is often considered separately from the other countries in SSA. Because of its unique socioeconomic characteristics, in this study, we are interested only in Sub-Saharan Africa minus the Republic of South Africa.

In view of the many benefits that could accrue SSA countries that implement successful e-commerce infrastructure, a study that focuses on such an under-researched part of the world—though it is the major part of the world's second largest continent—becomes interesting and relevant. We borrow from the literature that looks at other developing countries with socio-economic structures similar to those of Africa in general and SSA in particular. This study synthesizes the literature on e-commerce diffusion and presents a research framework to examine the physical, economic, and socio-political infrastructure needed for the establishment of viable e-commerce in SSA. We begin by discussing the Internet's potential for surmounting the digital divide, and the unique potential of e-commerce for economic development in SSA. The main part of this paper examines various frameworks that bring to light different aspects of how SSA countries can adopt and diffuse e-commerce. We conclude by synthesizing this literature to produce an overall framework for assessing e-commerce diffusion in SSA.

The Digital Divide

The digital divide is a widely discussed phenomenon whereas 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. Unlike in many classical economic arguments of income disparity, there is no claim in this case that the advances in information and communication technologies (ICTs) 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. 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, 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 socioeconomic regions that the development literature commonly refers to as the North (referring primarily to Canada, the United States, and Western Europe) and the South (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 & Smith, 2000; Travica, 2002), a revolutionary technological tool that enables efficient transfer of information on a global scale. This global information can 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 North has in abundance many of the resources that the South could use to solve some of its problems, but that geographical, political and cultural barriers exist that make it difficult to transfer these solutions effectively.

Another class of solutions that the Internet promises developing countries is the provision of efficient communications within and among developing countries, so that citizens can effectively help each other to solve their own problems. Those in developed countries take for granted sources of widespread public information such as television broadcasting, telephone services, educational institutions and public libraries. 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 developing countries.

Electronic Commerce

Electronic commerce, the conduct of business using the Internet, is just one dimension of the benefits that the Internet can bring to SSA (Chifwepa, 1998; Mbarika, Jensen, & Meso, 2002). We listed other important dimensions above. However, e-commerce stands out because it involves citizens of SSA participating in commercial enterprise that generates income from economic activities (UNCTAD, 2002). Thus, e-commerce is self-propagating and self-sustaining (at least, as long as it is conducted effectively). Moreover, it provides employment and generates government revenues in taxes. All of these benefits are the ultimate goals of development researchers and organizations. Thus, focusing on the commercial applications of the Internet in SSA is a valuable perspective, since such applications have significant beneficial effects on all other applications of the Internet, which helps bridge the digital divide.

The terms "e-commerce" and "e-business" are often used interchangeably, both applying to aspects of conducting business using the Internet. However, some distinguish between the two terms. Such researchers usually use e-commerce to refer to business-to-consumer (B2C) business transactions, while e-business refers to business-to-business (B2B) transactions, as well as internal organizational use of the Internet for business operations (such as intranets). In this paper, we will use only the term "e-commerce", applying it to all aspects of doing business using the Internet. We follow Zwass' (1996: 3) definition: "Electronic commerce (E-commerce) is the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks." However, in this paper, we restrict our definition of e-commerce to business activity that specifically uses the Internet, which is a somewhat narrower scope than what Zwass defined. Although we recognize that electronic data interchange (EDI) and electronic funds transfer (EFT) are forms of e-commerce that existed before the advent of the Internet, businesses are now increasingly implementing these applications using the Internet. Thus, we do include EDI and EFT in our scope as long as they are implemented using the Internet. We will qualify the scope of the e-commerce activities by specifying whether they are B2C, B2B, or internal.

REPRESENTATIVE FRAMEWORKS FOR ASSESSING E-COMMERCE DIFFUSION

In this study, we will draw from the literature on electronic commerce and on e-commerce diffusion to identify frameworks that capture key components that can help us understand the critical factors determining e-commerce diffusion into Sub-Saharan Africa. In the midst of a large amount of different research streams on e-commerce frameworks, ICT diffusion, and ICTs in developing countries, we have identified three unique e-commerce frameworks that provide value to our analysis with a specific focus on the Sub-Saharan Africa region, a region that is home to 33 of the 48 least developed countries in the world.

First, we have Zwass' (1996) generic "framework for electronic commerce", that assesses the different dimensions of e-commerce in general. This framework attempts to be universally applicable, though it actually works best in the context of a developed country. Second, we have a unique "framework for assessing the global diffusion of the Internet" produced by the Global Diffusion of the Internet (GDI) Project (Wolcott, Press, McHenry, Goodman, & Foster, 2001). This framework specifically considers diffusion, and it explicitly addresses the realization that nations, such as those within the Sub-Saharan Africa region, vary widely in their e-readiness; that is, their state of preparation for viable, beneficial Internet usage. The final framework that we find valuable for our purposes is one proposed by Travica (2002), which directly examines the factors necessary for the commercial application of the Internet in a developing country context. However, this framework addresses e-commerce specifically from a B2C perspective. We also examine this framework within the context of Sub-Saharan Africa.

In the following sections, we will examine each of these frameworks in detail, explaining why they are particularly representative of their respective streams, and discuss their contributions to our investigation of e-commerce diffusion in SSA. We will note where these frameworks do not address the needs of our specific focus, and we will then identify the questions that still need answers.

General Technical Overview of Electronic Commerce (Zwass, 1996)

Since around 1993, when the Internet began to be researched in the IS literature, there has been a number of frameworks developed that examine different dimensions of infrastructure, features, and factors necessary for the support of e-commerce. Ngai and Wat (2002) located 275 articles on e-commerce in nine prominent information systems journals. They classified these articles into the categories of e-commerce applications, technological issues, support and implementation, and other. Some of these studies have investigated what electronic commerce really *is*, attempting to arrive at definitions and conceptual frameworks that help get a grasp on this relatively new phenomenon (Wigand, 1997; Zwass, 1996). Furthermore, various studies have tried to better understand the key issues that determine the incidence of practicing e-commerce (Vadapalli & Ramamurthy, 1998) and how businesses can use e-commerce for competitive and strategic advantage (Javalgi & Ramsey, 2001).

In the inaugural issue of the *International Journal of Electronic Commerce*—"the first scholarly publication entirely devoted to E-commerce"—Zwass (1996) presents a hierarchical framework that delineates various levels of what makes up e-commerce. This framework attempts to be generic and universally applicable. However, it is tailored to the context of developed countries, and implicitly assumes the social and legal backdrop of the United States of America. Although we are studying e-commerce in Sub-Saharan Africa—a very different context—we need to understand how researchers have conceptualized e-commerce in the contexts where it has proven most successful. Whether e-commerce 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:

I. **E-commerce infrastructure:**
1. **The physical layer** pertains to wide-area telecommunications infrastructure.
2. **The network layer** consists of public and private communication utilities.
3. **Hypermedia** and multimedia object management includes http and other protocols.

II. E-commerce services:

4. **Secure messaging** includes secure e-mail and electronic funds transfer.

5. **Enabling services** include electronic catalogs and copyright-protection services.

III. E-commerce products and structures

6. **Products and systems** include online shopping and infotainement.

7. **Electronic markets and electronic hierarchies** are the highest level of Zwass' (1996) framework.

Zwass' (1996) framework approaches e-commerce primarily from a technical and application perspective. It focuses on what e-commerce can do for its individual and business users, and what it practically takes to enable such functionality. His framework provides several valuable perspectives to our study by distinguishing levels of e-commerce technical infrastructure that need to be developed for the effective and advanced practice of e-commerce. His distinction between the physical and network layers of infrastructure is important, because 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-commerce. These dedicated data lines become an issue of concern in Sub-Saharan Africa as this is the region with the lowest number of land telephone lines per capita in the world. In fact, most Sub-Saharan countries have less than one line per 100 citizens (Mbarika, Byrd et al., 2002).

Levels 3 to 6 of the framework capture enabling technologies and e-commerce applications of increasing complexity; these levels are similar to dimensions in the other frameworks we review here. However, Level 7 is unique among the frameworks, 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: 8)

Electronic marketplaces and hierarchies present one of the most promising applications of e-commerce in providing economic returns to businesses. However, although Zwass (1996) provides valuable perspective on technical and application-oriented levels of e-commerce, noticeably outside his scope is an examination of the environmental situation that fosters the viable conduct of e-commerce. He does not discuss pertinent environment factors in detail, such as the legal environment, the state of economic development, and the consumer culture. Zwass approaches e-commerce from the perspective of an economically developed country with a democratic free market economy, which is indeed the predominant state in which people currently practice e-commerce.

While Zwass only briefly acknowledges "major differences in national and regional development of infrastructure, as well as in the national governance of telecommunications" (1996 p. 4), such differences are quite conspicuous within the Sub-Saharan Africa region. Here, the idea of a democratic free market is often merely a dream. In fact, until recently, government monopolies have run the telecommunications sectors, using antiquated technologies to provide very poor services (Mbarika, Byrd et al., 2002). Moreover, in most Sub-Saharan Africa countries, it is very difficult and takes unbearably long to acquire licenses to start a business of any sort. Often, entrepreneurs can acquire such licenses only after giving some form of bribe.

While it is critical to understand the structure of e-commerce in general, our particular focus in this study is to examine how Sub-Saharan countries can establish e-commerce. While it is quite valuable for a general perspective, Zwass' (1996) framework is not as helpful for our targeted focus. Two theory bases that direct us towards our particular goal are IT diffusion and e-commerce in developing countries. We will proceed to review the pertinent literature in these streams to understand e-commerce in SSA better.

Framework for National Internet Diffusion (Wolcott et al., 2001)

A somewhat different approach to studying e-commerce diffusion comes from a more holistic evaluation of a country or region's infrastructural preparedness to engage in Internet and

e-commerce activities. 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 & Benbasat, 1991; Rogers, 1995). Since 1997, the Mosaic Group has undertaken the Global Diffusion of the Internet (GDI) Project, 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 time, and has been conducted for almost 30 countries, representing every continent and every major socioeconomic group of countries. Among Sub-Saharan countries, the GDI investigators have surveyed Cameroon, Kenya and Uganda. The GDI Framework has six dimensions that it uses to conceptualize the state of Internet diffusion in a country.

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. Sub-Saharan Africa has historically lagged behind the rest of the world in constructing viable connectivity infrastructure needed as the back-end for e-commerce activities. On a brighter side, in recent years, the Sub-Saharan Africa region has experienced exponential growth in computers and Internet penetration (Mbarika, Jensen et al., 2002). By the end of 2002, all capital cities within the region had some form of Internet access. While the state of infrastructure is improving, numerous challenges remain.

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 being accessible in rural areas. In Sub-Saharan Africa, many still regard Internet and related technologies as

an "urban luxury", so most rural areas lack either telephone or Internet presence, and hence e-commerce is currently impossible. This is an important issue to address, as Sub-Saharan Africa has a 65-70% rural population.

3. **Organizational Infrastructure** refers to the market environment for Internet service providers (ISPs), including the extent and nature of privatization of national telecommunications. This area is showing some promise as more Sub-Saharan countries are privatizing their telecommunications corporations. However, Western companies, especially from the US and Europe, are buying most of the privatized entities. It is uncertain how this will benefit the Sub-Saharan Africa region in the end, as most of the profits from the privatized entities go back to the West, a phenomenon reminiscent of the colonial era.

4. **Pervasiveness** of use among individuals measures Internet use per capita. This is still very low in Sub-Saharan Africa, with only 5.6 Internet users per 1000 citizens, compared to the world average of 60.5 (ITU, 2001).

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 still generally low in SSA, there are bright spots representing sectoral absorption of the Internet and related technologies. Various studies report on Internet use in commerce (Mbarika, Jensen et al., 2002), healthcare (Mbarika, 2003), academia and government (Chifwepa, 1998).

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. Although still in its infancy, we will later discuss numerous instances of Internet use in SSA that give an idea of the degree of its sophistication.

The GDI Framework is unique in that it has two general emphases. On one hand, it looks at the absolute degree to which countries use the Internet (as measured in Connectivity and Organizational Infrastructure, and Sophistication of Use). On the other hand, it has a strong

diffusion focus, examining how widely the Internet is used geographically, and among individuals (Pervasiveness) and 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 and CIDCM 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".

One shortcoming, though, of the GDI Framework is that it solely describes the state of Internet diffusion without attempting to diagnose problems or prescribe solutions, which some other e-readiness tools do (Bridges.org, 2001). All the same, the GDI Framework is a valuable contribution to our investigation of the diffusion of e-commerce in Sub-Saharan Africa. Its dual emphasis on Internet use and Internet diffusion fit our needs here well. Unlike Zwass' (1996) framework discussed earlier, the GDI Framework squarely recognizes that developing countries

lack much of the critical infrastructure necessary for the Internet that developed countries take for granted. Thus, it explicitly examines not only the technical infrastructure necessary for the Internet, but also the organizational infrastructure necessary for the healthy establishment of Internet practice in a country.

The GDI framework, however, does fall short of our goals for this study in that it examines diffusion of the Internet in general, rather than focusing specifically on electronic commerce. As a result, it does not consider many important factors that are necessary for the establishment of vibrant e-commerce practice beyond what is necessary for using the Internet in general. The GDI Framework does measure sectoral absorption, which measures the degree to which commercial enterprises are committed to using the Internet, among other things, but this is inadequate to reflect the nature and viability of e-commerce practice. The third framework we will examine here goes beyond both Zwass' (1996) and the GDI Framework to address specifically the diffusion of e-commerce in developing countries.

Framework for B2C E-Commerce in Developing Countries (Travica, 2002)

An increasing amount of research has studied the factors that affect development of the Internet and e-commerce in developing countries (Dutta, 1997; Mbarika, Byrd et al., 2002; Montealegre, 2001; Travica, 2002; Wolcott et al., 2001). Major findings are that diffusion of the Internet and e-commerce operates differently in developing countries compared to developed countries. There is a strong need to understand the contextual settings of the developing countries being studied in order to effectively apply Internet and e-commerce technologies— developed in the West—to these countries.

Table 1: Infrastructural conditions for B2C e-commerce

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-commerce	• 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 post 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

In studying e-commerce diffusion into a region, it is helpful to identify the various aspects of physical, cultural, economic and legal infrastructure that are necessary to support successful diffusion. In his study of e-commerce diffusion in Costa Rica, Travica (2002) developed a framework based on six layers (Table 1) of infrastructure required to support e-commerce 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.

COMPOSITE FRAMEWORK FOR E-COMMERCE IN SUB-SAHARAN AFRICA

We have discussed three general theory bases that help our understanding of different aspects of the Internet and e-commerce in Sub-Saharan Africa. While each of these frameworks is valuable, we need a more comprehensive framework to capture all pertinent dimensions that might encompass research on e-commerce in Sub-Saharan Africa. Such a framework would give researchers a frame of reference for better understanding e-commerce in SSA. They could investigate the current state of SSA—or a specific SSA country—in each category, and then propose policy and business strategy measures to develop the category. To develop such a framework, we first briefly compare and contrast the contributions of the frameworks we have reviewed by identifying and categorizing factors that aid the assessment of e-commerce diffusion in SSA.

A general theory of e-commerce, typified by Zwass' (1996) framework, gives an overview of the different levels of the technical infrastructure and business issues that contribute to the practice of e-commerce. This application-oriented perspective is very practical and focused, but it requires a further recognition of the organizational and environmental context in which e-commerce occurs. This is particularly necessary for our study of developing countries.

The IT diffusion literature aids our understanding of the technological, organizational, and institutional factors that affect the diffusion of innovations. In particular, Wolcott et al's (2001) GDI Framework focuses on country-level Internet diffusion, and is very strong in including dimensions that are especially pertinent to developing countries. These include both factors describing the organizational context and factors that specifically reflect a view of technological diffusion. However, the GDI Framework describes the state of the Internet in

general. Without a specific focus on commercial factors, it is insufficient for studying the diffusion of e-commerce.

Research on IT and electronic commerce in developing countries considers the many issues that these countries face, factors that are often taken for granted in the developed countries in which most theories of e-commerce and IT diffusion are set. Travica (2002) provides a good framework that captures many of these issues in dimensions that foster analysis that is more detailed. It 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-commerce. However, this framework is limited in that it targets only B2C transactions involving physical goods, which is only one segment of e-commerce.

Comparing the various factors featured in these three frameworks, we consolidate the factors into a more comprehensive framework, displayed in Figure 1, that permits a focused body of research in e-commerce in Sub-Saharan Africa. Conceptually, all the levels of the three frameworks can be divided into three general concerns: the availability of the Internet, the use of the Internet, and commerce.

We can divide the diffusion issues identified in the literature into three general areas: sophistication of Internet use, telecommunications/Internet environment, and the traditional commercial infrastructure. For the most part, our model is generic in the sense that it can apply to any developing country, and even to most developed countries. However, the contents of the traditional commercial infrastructure dimension, particularly the cultural aspects, make this framework specific to Sub-Saharan Africa, as distinct from other regions of the world. We will elaborate on this distinction when we discuss that component. In the rest of this paper, we generally describe each component of this framework, highlighting the state of SSA in each regard.
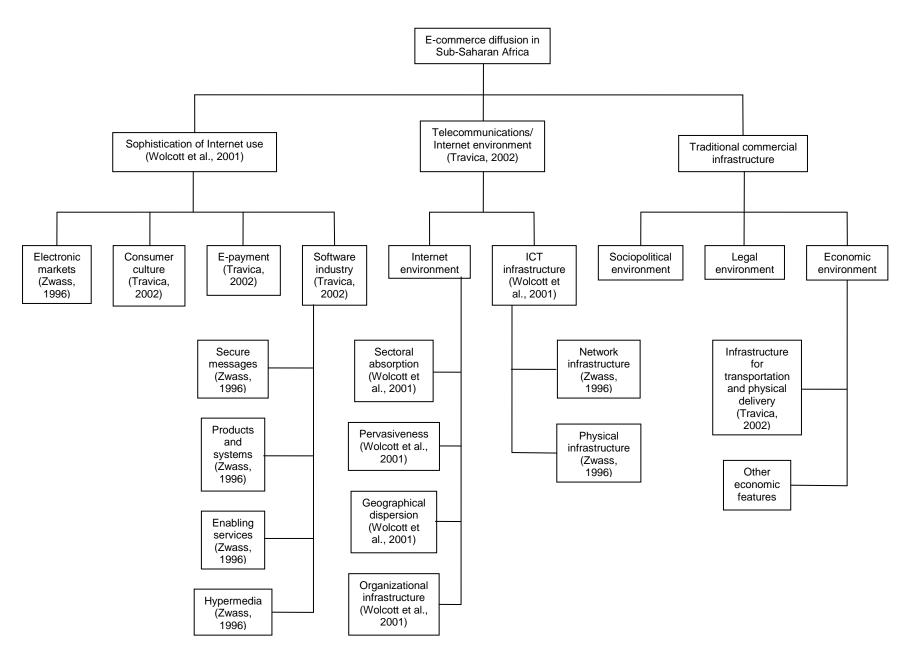
Figure 1. Framework for assessing e-commerce diffusion in Sub-Saharan Africa

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Sophistication of Internet Use

Based primarily on Wolcott et al's (2001) construct of the same name, this category covers the various issues that concern African users' ability, training, and inclination that enable them to use the Internet effectively. Wolcott et al's (2001) scale would probably classify most Sub-Saharan countries as, "Minimal: The user community struggles to employ the Internet in conventional, mainstream applications." This category consists of the sub-categories of electronic markets (Zwass, 1996), consumer e-commerce culture, e-payment mechanisms, and the software industry (Travica, 2002).

Electronic Markets and Electronic Hierarchies

Electronic markets for products are presently very limited in SSA. 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, 1999). This area might have very much potential in developing e-commerce in SSA because it involves internal trade among African business partners. Whereas there are many limitations to B2C e-commerce, as we have described, electronic marketplaces could help foster B2B e-commerce among those African businesses that have such capabilities. Dr. Quenum & Associates have made a fledging attempt to provide such an electronic marketplace at their AfricaBiz Forum (http://businessafrica.hispeed.com/africabiz).

Customer E-Commerce Propensity

The peoples' beliefs and values, ingrained by their cultural context, significantly affect their thinking and perspective, and hence their approach to using technology (for a review, see Straub, Loch, Evaristo, Karahanna, & Srite, 2002). One of the aspects of e-commerce that is most 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, e-commerce took off rapidly largely because consumers 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 the merchant would deliver after several days.

In SSA, virtually all consumer purchases occur 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 good. This may hamper consumers' transition to virtual shopping.

E-commerce involves using Internet-connected personal computers 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.

Another relevant consumer culture characteristic is the use of e-mail. E-mail is an essential part of smooth e-commerce 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, an important aspect of the e-commerce infrastructure is missing.

Electronic Payment

Payment systems are a critical piece of an effective e-commerce infrastructure. Credit card payments have become the de facto standard for e-commerce implementations because they can be electronically transmitted and verified. However, Sub-Saharan citizens do not widely use credit cards, 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, fraud is rampant, associated with the low standards of living. 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 widespread in B2C e-commerce, they are not the only payment method. Most sites also accept checks and money orders, though these methods significantly extend the time between order placement and the receipt of merchandise.

<u>Software Industry</u>

For e-commerce 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-commerce websites and support software. Even in cases where businesses can purchase e-commerce packages 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 Center 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. Such dependency on expatriates may not help develop the necessary expertise among nationals for the development and maintenance of the systems. Local limiting conditions such as poverty or political instability will not affect this expertise. Thus, we 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.

We subdivide the software industry into four of Zwass' (1996) levels: hypermedia; secure messages; enabling services; and products and systems.

- **Hypermedia**: 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. The high costs of connecting to the Internet worsen this situation.

- **Secure messaging**: 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 poor financial infrastructure for functional electronic funds transfer.

- **Enabling 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.

- **Products and systems**: 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).

Telecommunications/Internet Environment

In our framework, this category corresponds most closely to Travica's (2002) Telecommunications construct, rather than to the constructs in other frameworks of similar names. The two sub-categories here are ICT infrastructure (Wolcott et al., 2001), consisting of Zwass' (1996) physical layer and network layer; and the Internet environment, consisting of Wolcott et al's (2001) Sectoral Absorption, Pervasiveness, Geographical Dispersion, and Organizational Infrastructure.

To enable the use of the Internet, a country needs a solid telecommunications infrastructure. In the past, telecommunications development has usually been measured in terms of teledensity, the number of land telephone lines per capita (Mbarika, Byrd et al., 2002).

However, with the increasing spread of wireless telecommunications, we need a broader perspective in identifying telecommunications infrastructures that enable the spread of the Internet.

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, Byrd et al., 2002).

Internet Environment

- **Geographical Dispersion**: 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, 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.

- **Organizational Infrastructure**: 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 (SNOs) to allow for competitive, market-driven telecommunication markets (Hamilton, 2001a).

- **Pervasiveness**: 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).

- **Sectoral Absorption** (Internet use in academia, commerce, healthcare, and government): While the Internet is used to some degree in SSA in all four sectors, fewer than 5% of these organizations have Internet connections beyond dial-up.

ICT Infrastructure

The GDI system would classify most Sub-Saharan countries as having "thin" connectivity infrastructure. There is frequently no domestic backbone, and most International links are less than 64Kbps (ITU, 2001). Based on Zwass' (1996) infrastructure layers, we subdivide the ICT infrastructure into physical and network:

- **Physical infrastructure**: SSA has relatively poor wide-area telecommunications infrastructure (Odedra et al., 1993; Petrazzini & Kibati, 1999). The traditional plain old telephone system (POTS) 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 et al., 2002). However—and largely for this very reason—wireless cellular networks are burgeoning, constituting the largest growth area in SSA telecommunications (Okoli & Mbarika, 2002).

- **Network layer**: Few 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).

Traditional Commercial Infrastructure

One area in which there is little research concerns how societal institutions affect e-commerce in Sub-Saharan Africa. In general, the economics (Easterly & Levine, 2002) and ICT (King et al., 1994) literatures recognize the importance of the institutional and commercial environment on economic performance in general, and specifically on ICTs. However, this has not been a common factor in the e-commerce literature we have studied. Travica (2002) did include transportation and delivery as constructs in his framework, which are important aspects of the economic environment, in addition to other aspects. However, we believe the sociopolitical environment and the legal environment in which businesses operate are also

important factors of the traditional commercial infrastructure that would have bearing on e-commerce diffusion in SSA.

<u>Transportation and Delivery</u>

In Sub-Saharan Africa, only 15% of the roads are paved (World Bank, 2001). Good roads are essential for a vibrant internal trade system. This fact is not minimized by e-commerce 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 with poor transportation systems. While some might argue that those 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-commerce. Thus, their physical inaccessibility via transportation systems limits the potential benefits of e-commerce to rural Africans.

Mail and parcel delivery systems also present challenges to the development of e-commerce in SSA. Virtually every country in SSA is reached by a postal system. However, these systems do not reach every citizen, as around 66% of Sub-Saharan Africans live in rural areas (World Bank, 2001). 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 people use them primarily for the delivery of high-value goods and important documents.

<u>Cultural and Political Issues Affecting E-Commerce in Sub-Saharan Africa</u>

Many aspects of the cultural and political context of SSA could affect the adoption of e-commerce. E-commerce in SSA would not simply involve the application of e-commerce and IT diffusion principles developed in the West to a new context. Rather, the cultural context of SSA is sufficiently different that we expect significant differences in the way people would introduce and diffuse e-commerce in this region. In fact, this dimension of our framework is what makes it unique to Sub-Saharan Africa, as opposed to other regions of the world. The issues concerned in telecommunications/Internet environment and, to a lesser degree, the sophistication of Internet use are generally similar around the world. In other words, for these two dimensions, what is good for the United States would probably also be good for Brazil, as for India, and as for Kenya or Mozambique. However, when we consider the cultural issues in this section (and, to a lesser degree, the sociopolitical issues), what is good for one country with a certain cultural and sociopolitical setting is not necessarily good for another country with a different context. Here we will discuss five unique cultural factors in the SSA context that illustrate some of these issues: 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-commerce 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 in SSA are quite poor (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.

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 tensile contact. The purchasing culture involves going to a market place with variable prices, where the

consumer can feel and examine the product before bargaining with the vendor on what price to pay for it. The e-commerce model developed in the West does not consider variable prices. 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 advantage of them for the vendor to make a decent profit. Thus, B2C e-commerce is not likely to work well in SSA without major cultural adaptations.

3. **Corruption.** On the society level, one of the main problems that hinders the progress of e-commerce infrastructure is corruption and nepotism. 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 best education they can afford, and have the girls do work that is more "practical". One of these practical jobs assigned to women is selling products in the marketplace. A result of being encouraged to get into business is that a number of women develop quite a bit of business savvy and are able to become fairly successful (relative 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, relative to the gender balance (or imbalance in the United States).

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 locations are geographically remote and the incidence of illiteracy 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.

CONCLUSION

This paper presents a framework for assessing electronic commerce in Sub-Saharan Africa, a very under-researched part of the world, often referred to as the "forgotten continent". In the introduction, we described the nature of the digital divide, and explained the need for the commercial applications of the Internet in developing countries in general. Next, we presented different streams of pertinent e-commerce literature, represented by three specific frameworks, that shed light on different aspects of e-commerce in Sub-Saharan Africa. We then presented a consolidating framework that synthesized these various literature streams.

Based on the groundwork laid in this article, future studies can progress by assessing each category and sub-category of the framework in detail. Researchers could investigate the current state of Sub-Saharan Africa in each category, and then propose policy and business strategy measures to develop the category. This gives a comprehensive framework for a focused

body of research in this area. The basic framework presented here needs further extension. In particular, the framework could be refined to distinguish more clearly between the different needs of B2B and B2C e-commerce, both for physical goods and for services. With the preliminary framework in this study, we hope to assist in the establishment of self-sustaining Internet-based commercial enterprise in Sub-Saharan Africa, a critical need in bridging the digital divide.

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