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Information and Communication Technologies for Development in
Botswana

Thesis

Presented to the

College of Information Science and Technology

and the

Faculty of the Graduate College

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In Partial Fulfillment

of the Requirements for the Degree

Master of Science

University of Nebraska at Omaha

By

Legodile Kwapa

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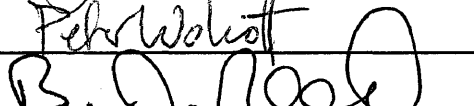
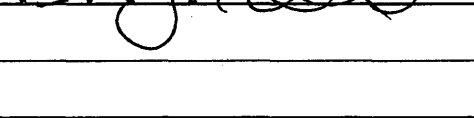


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THESIS ACCEPTANCE

Acceptance for the faculty of the Graduate College,
University of Nebraska, in partial fulfillment of the
requirements for the degree
Master of Management Information Systems,
University of Nebraska at Omaha.

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Date 30 MARCH 2007

Information and Communication Technologies for Development in Botswana

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Abstract

Information and Communication Technologies for Development in Botswana takes an exploratory look at the use of information and communication technologies by information technology professionals in organizations. The study makes a link between the micro and macro perspectives of development. Organizations at the micro level are the vehicles of development and an understanding of how they are leveraging their available technology for development enable the gap between the micro and macro perspectives to be better understood.

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1. Introduction

Numerous studies have explored how Information and Communication Technologies (ICT) have successfully been applied in developing and transitional economies to achieve economic development (World Bank Report, 2003; Duncombe & Heeks, 2002; Pigato, 2001; Kirkman, Cornelius, Sachs & Schwab, 2002; Forestier, Grace & Kenny, 2002; Marker, McNamara & Wallace, 2002; UNDP, 2005; ITU, 2003). Even though these studies looked at ICT and development in Botswana, few studies explore how micro-level usage of ICT by organizations in Botswana translates into different forms of development. In the third Botswana Human Development Report of 2005, entitled "Harnessing Science and Technology for Human Development," prepared by the United Nations Development Programme (2005), the Minister of Communication, Science and Technology, Ms Pelonomi Venson remarked, *"that despite its extensive telecommunications infrastructure and one of the highest Internet bandwidths in Africa, Botswana has so far been unable to leverage communications and information technologies to help improve the lives of its people and take advantage of the opportunities presented by the global marketplace"* (UNDP Botswana, 2005). This statement is a significant indicator that further research is still needed to explore how ICT usage in Botswana contributes to economic development.

The 2001 International Telecommunications Union (ITU) case study of Botswana's telecommunication industry characterized Botswana as an effective model of telecommunications regulations in Sub-Saharan Africa and its regional cooperations (ITU, 2001; HDR, 2005). Despite having one of the best telecommunication infrastructures in the region, coupled with good governance and a long-term national program aimed at meeting UN Millennium Development Goals (MDGs), Vision 2016, to guide its development efforts, Botswana has yet to fully leverage its telecommunication infrastructure stated Ms. Venson, the Minister of Communication, Science and Technology in her 2005 reflection on the findings of 2005 Human Development Report entitled "Harnessing science and technology for Human Development" (HDR, 2005).

Organizations such as the World Bank, through its Information for Development Programme (InfoDev), International Telecommunications Union (ITU), the International Monetary Fund (IMF), and various branches of the United Nations play an important role in gathering vital ICT statistics data on developing countries. The World Bank (2003) views the debate on whether to invest in technology as having shifted away from whether cash- and resource-strapped developing countries should spend the little resources they have on investments in technology (especially when there are more pressing needs such as healthcare and education to consider), to what levels of technology investments are appropriate? (World Bank, 2003). In light of these issues the question being

investigated in this research is “how does the use of Information and Communication Technology by IT professionals at the organizational level in a Southern African developing country help the developing country to achieve its development goals?”

The purpose of this exploratory research study is to provide a better understanding of the linkage between the micro-level and macro-level perspectives of development. Factors such as good governance, sound fiscal stability, and high literacy rates are conventionally thought to be precursors to development. This research helps explain why factors such as good governance, high literacy rates, and investments in Information and Communication Technologies do not always result in what is often seen as the next logical step—development. This research helps bring an understanding to human factors that must be considered in order to reach development goals.

In arriving at a definition for the meaning of Information and Communication Technology (ICT), this study drew upon literature from the World Bank (2003), International Telecommunications Union (ITU) (2003), and United Nations Development Program (2003), and examined how these leading organizations in the field define ICT. Marker, McNamara and Wallace (2002) in their article entitled “The Significance of information and communication technologies of reducing poverty,” defined ICTs in their study as technologies that facilitate

communication and the processing and transmission of information by electronic means. Duncombe and Heeks (1999) in their article "Information, ICTs and small enterprise: Findings from Botswana," defined ICTs as an electronic means of capturing, processing, storing and disseminating information. For the purpose of this study the term Information and Communication Technology (ICT) is defined as technologies that give human beings the ability to transmit data, voice, and video through mediums such as air, microwave, optic fiber, and physical wires. The definition of ICT includes telecommunication networks, computer hardware and software applications, telephones, cell phones, fax machines, and personal digital assistants.

According to Schumpeter (2002) development is comprised of two dimensions—one that deals with economic development as a historical problem and the other deals with processes that effect changes in the economy. Externalities in economic development affect the social realm. Development in this study is comprised of economic development, social development, and human development. The study drew upon the existing United Nation's literature (BHDR, 2005; HDR, 2006) involved in development initiatives to understand what constitutes human, social, and economic development. Economic development was defined by numerous researchers as generally being observable through increases in monetary value or measurable forms of economic output

(Schumpeter, 2002; Sachs, 2004, 2005; Duncombe & Heeks, 2002; Aghion, 1999).

Human development is defined as the process whereby people's choices are increased through expansion of their capabilities and functioning. At any level of development the most essential capabilities for human development are life expectancy, access to healthcare, and a decent standard of living and level of education (HDR, 2006; Oyeshile, 2004; Malila, 1997; Aghion, 1999; Sen, 1993, 2002). Social development is the process that brings about sustainable forms of well-being ranging from the individual to the societal level. This encompasses issues such as poverty traps, unequal access to information and resources, governance, civic engagement, and the ability to make independent life choices (Sen, 1993, 2002).

This exploratory qualitative research explores how (ICT) is being used in organizations by Information Technology (IT) professionals and which uses of ICT have implications for development. This research explored the literature available and discovered the following themes as being important to developing countries: culture and its effects on governance, poverty traps, the market mechanism, economic enablers, foreign direct investment, and lastly credit was explored to provide a better development perspective in developing countries. After the literature review, a case study was conducted on Botswana. Different

themes such as the economy, education, Botswana's development plan, Vision 2016, and the United Nations Millennium Development Goals (MDGs) in regards to Botswana are briefly discussed to provide a better context of Botswana. In the results section, macro-level indicators on Botswana and a discussion of the survey are presented. The report concludes with analysis of the results and provides recommendations based on the conclusions of this study.

The rest of this paper is organized into sections as follows: 1) the theoretical perspectives looks at the models of development, 2) the literature review sections explore past and current literature on ICT and development. The main subsections of the literature review are measures of development, the role of governance and poverty traps, effects of culture on governance, market mechanism, Schumpeter's (2002) thoughts on development, economic enablers, and the availability of credit. The final subsections discuss the need for better policy. 3) the conceptual framework section looks at how the level of skills sets and usage of ICT impact the forms of development. Section 4) presents the research design and methodology used in the study, 5) a background look at the Republic of Botswana focusing on the national economy, education, the ICT and policy infrastructure, and the UN Millennium Development Goals in relation to Botswana and the national Vision 2016 which guides policy related to development is used to provide the context for the exploratory case study. Section 6) presents and analyzes the results from the survey, and 7) the final

section discusses contributions, research implications, and concluding statements.

2. Theoretical Perspective

Information and Communications Technologies appear to be an important enabler in helping countries to more effectively combat social ills, such as poverty traps and other socio-economic problems associated with development (Marker, P. & et al, 2002; Chrisanthi, A., 1998; Cecchini, S., & Scott, C., 2003). The “Model of IT for Development” (Qureshi, 2005) is a macro-level study that explores important constructs for how ICT affects development. The “Model of IT for Development” is derived from multiple case studies based on the best practices from the domains of ICT and development studies. Laudeman’s (2005) “3-legged stool” is used to introduce the notion that at the micro-level, organizations’ technology, individual skills, leadership, and structure and functions are all important components that have a bearing on organizations and their development agendas.

According to Qureshi (2005), the need for social and economic analysis has become paramount, especially in the light of rapid globalization. International agencies are said to attempt to predict the effects of government policies in relation to Information Technology investments and economic growth based on macro-economic models. As Qureshi (2005) points out, macro-economic

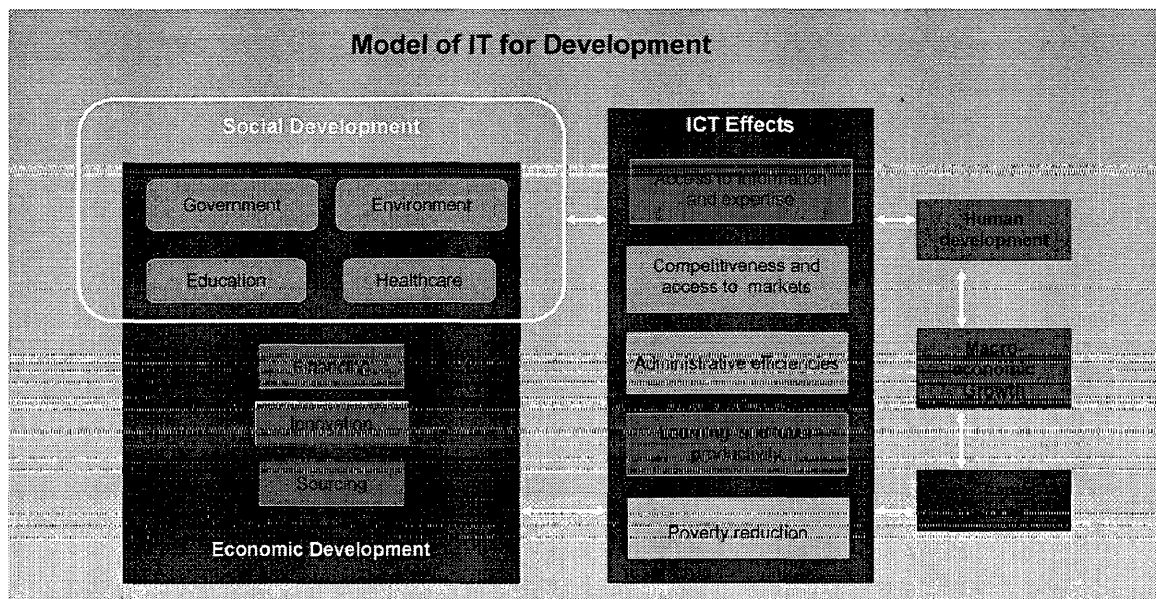
analysis cannot explain why IT policies do not always have the effect of creating development or why certain investments in IT infrastructure do not bring about social or economic change. Studies such as Montealegre (1999) which looked at technology and its adaptation in developing countries and Furuholt and Orvik (2006) which look at a failed ten year project to implement ICT at a college in Africa support this claim. Qureshi (2005) further adds that “bottom up approaches tend to work better than top down approaches and that government policies should facilitate drivers for social, institutional alongside economic growth.” This is illustrative of the notion that macro-economic indicators, although suited for measuring overall GDP growth, are not well suited for painting a rich enough picture of both social and human development on the ground. One possible explanation for why micro-economic indicators could be better indicators of economic development in the context of developing nations could be related to technological determinism.

According to Mark Warschauer (2003), technological determinism is the concept that the mere presence of technology without much consideration about its adaptation will effect change. Technological determinism in recent years has been discredited by the academic community (Warschauer, 2003). Technological determinism has since been replaced by a concept called social informatics. Social informatics demands that technology and the context it is applied in should be viewed as a system. This system should not overlook both the hardware and

software, types of support that will be available, the infrastructure, and the stakeholders involved including the stakeholders' roles and inter-relationships with one another and with other elements of the system (Warschauer, 2003). Social informatics provides a better understanding of what is happening on the ground. Another possible explanation is that "bottom-up" development approaches often conflict with central planning approaches that are often "top-down" approaches used by governments (Fredericksen & London, 2000). Wunsch (1987) points out that "top-down management structures sacrifice the benefit of critical knowledge from the practitioners doing the actual work."

Figure 2.1 below is the Model of IT for Development.

Figure 2.1 Model of IT for Development



Source: Qureshi, 2005

In figure 2.1 above socio-economic development is comprised of two components, that is, social systems and economic system which affect levels of development. The Model of IT for development by Qureshi (2005) provides a bird's eye view of how ICT has been used to impact economic and social development. The model has three domains: 1) social development domain, which encompasses Government, environment, education, and healthcare; 2) economic development domain which encompasses financing, innovation, and sourcing; and lastly 3) which is the domain of ICT that effects people's access to information and their expertise, competitiveness and access to markets, administrative efficiencies, learning and labor productivity, and poverty reduction. The effects of ICT appear to have a strong impact on the level of human development, which has been shown to be correlate to macro-economic growth resulting in per-capita growth and a positive impact on economic development (Qureshi, 2005). The importance of the Model of IT for Development in this study will be to provide a basis on which to explore current macro-level data of the different components of development.

Figure 2.2 by Laudeman (2005) below is the "3-legged stool" which illustrates that technology use in an organization alone is not enough to achieve development. The organizational structure and functions have to be in tune with the types of technology used and the staff has to be trained to take advantage of the technology.

Figure 2.2 The "3-legged stool" of IT use

Source: Laudeman, 2005

Laudeman (2005) asserts that for an organization to reap the benefits of the types of technology it has invested in, organizations need to have the talent to be able to use the technology effectively so that leadership is lubricant that enables the talent, technology, and organization to achieve economic development.

In order to understand the important role organizations play in the development context of a nation, it is important to examine the organizational unit from the micro-level. The organization, which can be taken here to mean a private enterprise, a non-governmental entity, or government entity, is examined through the concept of organizational capacity. An organization for the purposes of this study refers to people and resources under a permanent structure that is legally

recognized by the national government. Organization capacity is explored in the context of organizations in a mixed economy in which private sector enterprises, non-governmental entities, and government entities are the key forms of organizational types that drive development in the economy. Fredericksen and London (2000) state that “no organization will achieve sustained success with out some additional basic capacities, such as competent management, skilled employees, adequate space and equipment (technology), sound fiscal practices, and programs relevant to the market served.” Ebbe and Narayan-Parker (1997) define local organizational capacity, “as being the ability of people to work together, trust one another, and organize to solve problems, mobilize resources, resolve conflicts, and network with others to achieve agreed-upon goals.”

3. Review of the literature

3.1 Development

In an effort to provide a better understand the phenomenon of development, this study drew upon the works of early twentieth century economist, Joseph Schumpeter (2002) and his thoughts on development. According to Schumpeter, the problem of development has two dimensions. First, that economic development is a problem of economic history, in regards to changes in industrial organization and economic geography. The second dimension of development is that the investigation of the manner (how) and the processes (what) that result in

the occurrence of concrete changes within in the economy. The importance being that the effects of economic development have externalities in the social realm which affect the economy (Schumpeter, 2002). If the events and the processes that result in changes in the economy could be understood, then these events or processes could be triggered or replicated to foster economic development as needed (Schumpeter, 2002).

An alternative view of development was also drawn from the World Bank (2005). The World Bank's view of development is that it is "not only limited to economic growth which increases a nation's total wealth, therefore allowing greater ability to fight poverty and other social problems, but also addresses the questions of equitable distribution, quality of life and human development in general" (World Bank, 2005). In this study development will be taken as being situated in a democratic mixed economy where wealth generation alone is not the ultimate goal. A mixed economy is taken to mean an economy that is a hybrid of both government and private enterprises. A large portion of the population should also be allowed to experience a significant trickle-down effect of the development process. It is also important to bear in mind that it is possible to experience economic growth under different economic systems and model. This study, however, does not cover the other forms of economic and political systems that are present in the world, and instead leaves such exploration for future studies.

3.2 Measures of development

In order to understand development in general, it is important to understand how it is measured by the various forms of development entities. The United Nations' bodies and other organizations such as the World Bank and the International Monetary Fund (IMF) use macroeconomic measures to compare nations. These indicators are important because they allow countries to be able to measure their progress longitudinally. The Human Development Index (HDI) is a summary composite index that the United Nations uses to measure member states' average achievements in the three aspects of human development which are longevity, knowledge, and a decent standard of living (UNDP, 2005). HDI is one of the more important indicators used because it takes into account critical issues like eradication of extreme poverty and hunger, achieving universal primary education, reducing child mortality, improving maternal health and combating HIV/AIDS, malaria and other diseases (HDR, 2006). Due to the HDI being an aggregate measure that doesn't account for equity, political participation, and gender, among other issues, it is adjusted by the Gender-Related Development Index (GDI) to reflect the inequalities between men and women in regards to life expectancy, literacy rates, and standard of living as estimated by earned income (Purchasing Power Parity in US\$) and gender (UNDP, 2005). Gender Empowerment Measure (GEM) is another important indicator, which accounts for both political and economic factors in order to measure each gender's level of participation and decision-making. Sen (2002) remarks that, "distributional

questions are far more complex and far-reaching than the recognition that they typically get in the usual advocacy of globalization and the championing of high rates of economic growth.” These indicators are very important in the case of development because they provide a mechanism that enables researchers and practitioners to ensure that policy formulations do not leave large portions of the population disenfranchised by policy makers. Gross Domestic Product (GDP) allows researchers to calculate at the macro-level whether the economy grew or not.

3.3 Realities faced by Developing countries

3.3.1 Role of governance and Poverty Traps

“The key problem for the poorest countries is that poverty itself is a trap. When poverty is very extreme, the poor do not have the ability by themselves—to get out of the mess” (Jeffery Sachs, 2005). E-government initiatives have enabled some nations to achieve better operational efficiencies in regards to servicing their constituent stakeholders by forcing the various government ministries or entities to rethink their business process. The new approach of being more customer-centric has lead to large-scale re-engineering projects, as suggested by Ciborra and Navarra (2004) and illustrated by the implementation of e-government in Singapore (Ke & Wei, 2004). Marker et al. (2002) and Laudeman (2004) emphasize the importance of governance and leadership styles as being

very important in guiding the development agenda and ensuring that support structures are in place to nurture development.

Ciboria and Navarre (2005) in their paper entitled “Good Governance, Development Theory and Aid Policy: Risks and Challenges of E-Government in Jordan” suggest that good governance and economic and political stability are among some of the most important variables that make the difference to donor organizations. “Lack of transparency leads to rent seeking activities that provide negative externalities to the market, distorting it and leading to stagnation” (Ciboria & Navarre, 2005). In short, corruption increases the cost of doing business, increases the burden of poverty traps on the poor, and adversely affects development in a nation.

Food insecurities are a major source of poverty traps and a high governance priority for developing nations. Jeffery Sachs (2005) explains the poverty traps as being “mainly a rural phenomenon of peasant farmers caught in a spiral of rising populations and stagnation of falling food production per person.” Adam Lishan (1997) in his article “Electronic Communications Technology and Development of the Internet in Africa” notes that “Destabilization that is rooted in food insecurities, poverty and low levels of education can also be improved through efficient communication.” Senior UNCTAD economic affairs officer, Charles Gore (2003) in his working paper entitled “Globalization, the International Poverty Trap and

Chronic Poverty in the Least Developed Countries,” argues that, even though there might be good governance in a country, it is not enough to lead to development, if the country is over-burdened by “\$1-a-day” poverty which precludes money for basic necessities such as healthcare. Gore (2003) is of the belief that the natural climate of the countries that are prone to natural disaster also deepens poverty levels. Jeff Sachs in his book *The End to Poverty* reinforces the notion that good governance used as criteria by economists to analyze poor countries. Consequently, some economists portray poverty as a lack of good governance, even though there are often extreme environmental factors present beyond the control of the developing nations. Poverty traps and food insecurities are important to keep in mind especially when looking into the challenges faced by governments in developing countries.

3.3.2 Effects of Culture on Governance

Culture as defined by the Unabridged Dictionary (2005) can be witnessed in the way people conduct business in an environment or country, and influences key socio-economic activities that have been found to have a correlation to development. A more precise definition by Answers.com (2007) defines culture as “the totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought”. Good governance in this study is taken to mean a government that shows fiscal responsibility and has effective democratic processes with oversight by citizens and other stakeholders.

If detrimental patterns of behavior patterns and beliefs are passed down from generation to generation, they are thought to negatively impact the governance structures of a nation.

Thomas Friedman (2005) in his book "The World is Flat" makes the point that "to reduce a country's economic performance to culture alone is ridiculous, but to analyze a country's economic performance without reference to culture is equally ridiculous." Friedman (2005) believes many economists and political scientists want to analyze economies in this manner of cultural occlusion. This statement implies that it is important for researchers to take into account the importance of their subjects' cultural condition, but also cautions against thinking of culture as providing explanations for the entirety of a nation's demise.

Malila (1997) points out that "whilst the analysis of democracy in Africa in general and in Botswana in particular, has been centered mainly on competitive elections, little has been written on democratization and other processes that are essential to the substance of democracy." Etzioni (1989) argues that "It is an essential characteristic of successful democracies that the power of governing elites is countervailed by that of the non-governing elites. In this formulation the state is the biggest and most formidable organization, the main accumulator and controller of resources" (Malila, 1997). As a result, Etzioni (1997) explains that the prominence of the state and corresponding weakness of the civil sector in Africa

is due in part to the vast resources under government control combined with the governing elites' vast control of resources. This problem is further compounded by the fact that the non-governing elite does not have an autonomous economic base. Etzioni argues that "the state in Africa often seeks to neutralize civil society by either absorbing or suppressing it." This is also achieved by ensuring that "a number of the cabinet ministers and members of parliament are drawn from the top echelons of the civil society." Anthony Lake (1995) of the U.S. State Department puts forth the idea in his article "An African Culture of Democracy" that at the "local level, responsive government means moving away from the centralization of power that was promoted under autocratic and Marxist regimes." Stephen Hayes, who is president of the United States Corporate Council on Africa (CCA), furthers this point by arguing that "the problem with African countries themselves is that they don't have a private sector history. They don't know what a private sector is, except what they learned from an education system largely modeled on discarded economic theory."

Public-private sector cooperation means that governments must develop new relationships with their private sectors, and this inevitably means moving towards a more democratic economic system according to Hayes (2003). America does not understand very different ways Africa operates commercially and economically, traditionally and culturally, Hayes (2003) explains. "The reason for this being that the United States has a tradition of disregarding culture in terms of

the 'great assimilation.' Its not part of our foreign policy, and I believe there's a great need for the understanding of different cultures to be incorporated in to our foreign policy." A major deterrent to conducting business in Africa is attributed by Hayes (2003) to Africa's governance systems. That is to say "contracts are revoked when new administrations take over in many countries, and there's no consistency of commercial law" (Hayes, 2003).

Orakwue (2002) argues that even though African leaders have played a great part in the underdevelopment of their respective countries through greed and outmoded future outlooks, it is now non-governmental organizations (NGOs) that have stepped in to undermine civil authority. That is, NGOs have become the watchdogs through whom aid funding is being funneled from abroad, and this process is undermining the power of local governments (Orakwue, 2002). Tony Blair, before embarking on his trip to West Africa in February 2002, is cited by Orakwue as having met privately with only NGOs in London without any representation from African countries themselves. Yet, as Orakwue emphasizes, "these organizations' trustees, directors and senior management are mostly devoid of an African presence. But they are the ones now taking charge of Africa's arteries: its public services especially education and health."

Patterson and Bozeman (2002) point out that, not all FDI and other technology transfer mechanisms have the same impact on the receiving nation. That is,

creating and maintaining a stable macroeconomic policy environment; secondly establishing comprehensive machinery for science and technology initiatives that lead to competent staff and diffusion of technology in order for an innovative culture to become entrenched in the society; thirdly, building science and technology to be able to adapt to the challenges of continuous change and to be able to innovate trend-setting technological change (Patterson & Bozeman, 2002). A reason identified by Patterson and Bozeman (2002) for African countries' failures to advance in science and technology fields is attributed to the restraining influence of economic structural adjustment programs (ESAPs) that are imposed by such organizations as the International Monetary Fund and the World Bank. Oyeshile (2004) points out that

“Corruption is not to be treated as a cause of its own, it is in part the result of certain cultural and structural imbalances among African nation states involving factors such as multi-ethnicity, injustice, marginalization and the concept of the state as an entity to be milked dry. This is due to the fact that after the Second World War, the hasty decolonization of Africa created artificial multi-ethnic states when independence was granted to the former colonial territories without any attempt to tailor the new states in accordance with ethnic and cultural realities” (Oyeshile, 2004).

Pressure on African governments to act against corruption has come internally from the emergence of pro-democracy forces since the 1990s that have drawn

large numbers of people in the arena of political debate and who clamored for more openness, transparency, and accountability on the part of their governments (Fombad, 1999). Externally, pressure against corruption was exerted as a result of foreign donors and international institutions no longer willing to condone corrupt practices; instead these donors and institutions link their continuous financial support to countries where there was some evidence of democracy, good governance, and accountability (Fombad, 1999). “In Botswana, the government enacted the Corruption and Economic Crime Act, 1994 (CEC) under which an anti-corruption agency, the Directorate of Corruption and Economic Crime (DCEC) was established” (Fombad, 1999).

Fombad (1999) credits the inadequacies of the criminal justice system in African governments as creating the need for adoption of other strategies such as the specialized anti-corruption agencies, in order to combat the levels of corruption. The creation of the DCEC soon after the series of high level corruption scandals highlights the Botswana government’s determination to solve the problem (Fombad, 1999). As developing nations become members of the digital world, they will have to learn to police corruption in the digital realm as well.

Oyeshile (2004) emphasizes that “even economic progress, growth in industries, and scientific and technological achievements, do not translate into development unless they are coated with enduring human values.” Oyeshile identifies the

breakdown of kinship, which was the center stone of morality, as leading to excessive corruption because actions traditionally were judged by how they would impact the tribe; as a result of the lack of kinship due to urbanization, people no longer feel responsible to their society.

3.3.3 Market Mechanism

Sen (1993) argues that “the extent of a person’s opportunity to achieve must relate to the set of alternative achievements from which he or she can choose any one.” Freedom here is mainly concerned with “the process of autonomous choice—having the levers of control in one’s own hands (no matter whether this enhances the actual opportunities of achieving our objectives).” In understanding the relevance of market mechanisms, technology and the use of technology appear to be important. Economic development is usually measured by taking into account fluctuation in macro-economic measures such as GDP. As such, it is important to consider the types of opportunities perceived as feasible in order to gain a better understanding of markets and the use of technology.

The “fundamental theorem of welfare economics,” according to Sen (1993), does not concentrate on states of imbalance in economic markets, and Pareto efficiency does not deal with the distribution of income and equity. Pareto efficiency is the notion that there is an achievable place where one person can be better off without making another worse off in a manner that has nothing to do

with equitable distribution of resources. Failure to take market imbalances and patterns of distribution of income in a nation into account are just some of the factors that make the study of economic development in developing countries complicated. Understanding how technology has driven development in a particular instance is crucial, then it is important to account for the extent of distortions in the data caused by market imbalances and patterns of distribution in income.

For Pareto efficiency to lead to social optimality, then certain factors such as caste, tribe, and social class status within some countries need to be explored further. Sen (1993) addresses this issue when he writes: "To use the competitive market equilibrium to achieve any social optimality you have to get the initial distribution of resources right, and depending on how equity-conscious our social objectives are, this could require a total reallocation of ownership patterns from whatever pattern we may have inherited historically." These factors should be accounted for, when looking at the phenomenon of development holistically.

3.3.4 Schumpeter's thoughts on Development

In order to understand the phenomenon of development from a perspective other than macro-economic indicators, existing literature was surveyed for alternative theories of development. According to Joseph Schumpeter (2002), the problem of development can

be looked at in two ways. Firstly, that economic development is a problem of economic history and economic geography, meaning that development within a particular location and time must take into account changes in industrial organization, in the methods of production and quantities produced, in technology and welfare, and the emergence of new industries and the decline of others. Secondly, how and by what processes do concrete changes occur within in the economy? How do you purposefully record the regularity in the way that everything new arises, and if so how do you replicate these regularities to stimulate development? Schumpeter believed it was important to understand “how things happen and the circumstances under which they happen.” The static point of view of the economy says that economies adjust in a specific and determinant manner to any given change, that is social, geographic, ethnic, or to the general cultural environment. In Schumpeter’s view static economic development is not realistic, as no development emanates from the economy itself, but only development that conforms to one pattern of imagination or does not conform to it. The effects of economic development have externalities in the social realm which will affect the economy (Schumpeter, 2002). In other words, a better understanding of actions that lead to circumstances favorable for development would allow developing countries to improve the welfare of their nations through the use of technology.

3.3.5 Economic Enablers

Schumpeter (2005) argued that there were five important elements of an economic environment that were important for achieving development. They were an increase in population; a rise in capital; progress in the methods of production; progress in the economic organization of the industrial society; and development of consumer wants (derived demand). Amartya Sen (2001) argues “It is hard to participate in the expansionary process of the market mechanism (especially in a world of global trade) if one is illiterate and unschooled, or if one is weakened by undernourishment and ill health, or if social barriers (such as discrimination related to race or gender) exclude substantial parts of humanity from fair economic participation.” Social changes usually have to take place in order for social development to arise. To borrow the words of Schumpeter (2005), “Performance in any field of social activity has the effect of influencing all other areas of social life and changing the presumptions and conditions of human behavior in all areas.”

Thomas Friedman (2005) in his presentation to the World Bank based on his book entitled “The World is Flat,” argued that ICT were leveling the international business field by blurring previous barriers to trade such as time, language, and geographic location. In his view, the world had changed and business processes were shifting from the old vertical hierarchy to new horizontal. India was cited as an example of a developing country that utilized ICT to flatten the global

economic field; this “flattening” allows India to benefit from supply chain, off-shoring and outsourcing, primarily with countries in the developed West. The existences of entities such as NASCOMM are clear manifestations of the magnitude that outsourcing and off-shoring reached by the end of the past century. In 2004, the Indian total exports for the software and services IT industry was about \$12.9 billion, grew to \$17.7 billion in 2005 and \$23.4 billion by 2006 (NASCOMM, 2007).

Duncombe and Heeks (2002) examined the challenges of information and information-handling technologies within rural micro-enterprise in Botswana that lack access to ICT. The similar factors that are prevalent in other developing countries such as the need to make ICT affordable and therefore accessible to the poor seemed to be prevalent. In the development context, micro-enterprises are important for employment creation and income generation for poor and disadvantaged populations (ILO, 2000). The types of micro-enterprises studied were in rural locations, were informal and not registered with the government. These enterprises are important because they form the unofficial part of the economy where the poor earn their living. Previous research found factors such as remote locations, inadequate education, poor business skills, lack of affordability, and limitations to transport were at the heart of the problem (Duncombe & Heeks, 2002). ICT are an important enabler for acting as catalysts in developing that were previously crippled by difficulties in communications capabilities.

3.3.6 Sourcing of resources

This section examines the different sources of funds from a micro- to macro-level. Erich W. Streissler (1994) in *Schumpeter in the History of Ideas*, explains that the "Static theory for Schumpeter is the theory at a point of time, for given circumstances, under unchanging conditions, static theory being with largely equivalent with equilibrium analysis, while dynamic theory concerns itself with the 'phenomena of development'; with 'the great tendencies of development.'" Schumpeter distinguished the capitalists from the entrepreneurs; that is, for Schumpeter the theory of the entrepreneur is the center piece of dynamic analysis (Streissler, 1994). Carl Knies in his treatise *Geld and Credit (Money and Credit) 1873 and 1879*, characterizes the entrepreneur as being a different economic-actor from the capitalist and that the distinctive class of entrepreneurs has been created by the credit market (Streissler, 1994). The concept of credit is a very important factor in exploring development. Knies wrote that, "the credit market makes possible the division of the asset owner and of the principle enterprise. The operations as such of an enterprise can be made for a particular calling... the class of the entrepreneurs arises next to that of the rentiers" (quoted in Streissler 1994). This is illustrated by the fact that micro-credit has become a major factor in development within the past few years. Credit and ICT are important for entrepreneurs in the developing world to grow.

Knies, like Schumpeter, saw credit as being an enabler that allows capital to follow from the hand of capitalists into the more innovative and motivated hands of the entrepreneurs. John Stuart Mill (1871) in his chapter "Credit as a substitute for money," characterized credit as "but a transfer of capital from hand to hand, it is generally, and naturally, a transfer to hands more competent to employ the capital efficiently in production." He further explains that "while credit is thus indispensable for the rendering the whole capital of the country productive, it is also a means by which the industrial talent of the country is turned to better account for purposes of production." Mill, Knies, and Schumpeter help us understand that in development, credit is an economic enabler that if regulated and made accessible, has great potential in the development arena.

Akpan (2003) points to evidence which indicates that for the most part economic globalization occurs only among Northern countries; a larger percentage of Foreign Direct Investment (FDI) occurs among the Organization for Economic Co-operation and Development (OECD) countries and a few countries in Asia and Latin America. Akpan further states that globalization has been accompanied by a "growing economic marginalization of many 'Third World' states as trade and investment flows within the rich North intensify to the exclusion of much of the rest of the globe." Globalization leads to more marginalization of the least developed countries whose major exports are primary goods (such as agriculture), which exist in very volatile markets. The world's

Least Developed Countries (LDCs) that trade primarily in agricultural produce are worse off in a global market because of the unreliability of the climate and crop yields. Dulle (1999) argues that a possible way to stabilize agriculture in developing countries through the use of ICTs, would be to enable research information to be shared amongst institutions. Such a system would allow early warnings to be sent to farmers and could also be used for informational or educational purposes. Even though improvements in the food supply might not lead to better international trade, they would go a long way to reduce hunger. Dulle (1999) wrote "Agricultural sector is one of the potentially beneficial areas for the applications of communications technology and the fact that most African countries depend on agriculture as the backbone of their economies." Thomas Friedman (2005) in his book *The World is Flat* has a recurring idea that the liberalization of domestic markets and privatization of industries is not enough to usher in economic development. Friedman states that the society has to be open-minded and adaptable in order to accept the best practices and ideas from foreign countries or their people. Sachs (2005) in *The End of Poverty* also has similar notions of cultural barriers and governance failures that hold back development because they indirectly affect investors' perceptions.

3.3.7 The Need for Better Policy

Research by Avgerou Chrianthi (1998) in her article "How can IT enable economic growth in developing countries" showed that the expenditure of developing countries on ICTs did not necessarily lead to economic development. There had to be organizational and business process adjustments before the countries could reap the benefits from their IT investments. The article also stressed that importing best-practices and ignoring the indigenous managers also led to policies that were out of context for each country's unique situation. Another problem was that even though, countries became compliant with global best-business practices, there was no guarantee that the country or business would even be competitive. Morales-Gomez and Melesse (1998) in their article "Utilizing Information and Communication Technologies for development: The social dimensions" also point out that ICTs are not the panacea for all the developing world's development problems. Morales-Gomez and Melesse emphasize that unless developing countries reassess their colonial style forms of government, the equity and equality of its citizens than socio-economic development will not benefit its people who are already marginalized and impoverished.

Morales-Gomez and Melesse also fear that "investing in new technologies will draw capital away from basic needs, and contribute to an increase in the external debt or transform the developing country into new profitable markets for large

transnational corporations at the service of local elites, thus creating new forms of dependency.” ICTs have to be applied to each unique cultural setting in a way that its people can understand its meaning—in a language and culture that captures the way people understand and communicate their every day realities.

Adam Lisham (1996) describes one of the key problems holding back development in Africa even when there were unlimited funds available to be used for development initiatives as being that of obsolete policies and regulations. In Lisham’s words “the gap between Africa and the developed world countries continues to widen as a result of blockage by obsolete policies and regulations. The situation is exacerbated by outdated equipment and artificially high charges.” In most cases, according to Lisham’s research, most African countries telecom policies were made by people who knew very little about telecom. Lisham (1996) also identifies food insecurity as being one of the biggest factors of impoverishment in Africa; he states that communications technologies could help mitigate the issue. Ramiro Montealegre (1999) discusses five IT implementation models that can be used in the least developed countries. These models are (1) the environmental determinism model, (2) managerial actionalism model, (3) organizational evolutionism model, (4) the institutionalism model, and (5) the system interactionism model. The model Montealegre advocates for use is the interactionist model because it takes into account the economics and unique socio-political context of each country.

Sy Goodman (1993) noted back in 1993 that as a result of unskilled and untrained personnel, user organizations were forced to hire expatriate staff who lacked knowledge about the local organizational cultures and thus designed poor systems. She also observed that part of the problem was also associated with well intentioned donor organizations that donated technology without ensuring there were competent people who knew how to use it. This led to a situation where planning was not properly done and computers were simply applied to inefficient manual processes. Part of the problem Goodman notes is that Africa has so many varied cultures in each country and that there is no simple answer or way to look at the whole picture.

4. Conceptual Framework

Figure 5.1 Conceptual framework

The conceptual framework looks at how IT professional use ICT to do their work and how such usage leads to development. The definitions for the framework are provided below.

Education/Skills sets

In this study, education and skill sets are taken to mean the level of education attained, and any training in computer related disciplines ranging from regular users such as data entry clerks to super users such as administrators and developers. It is assumed that the knowledge is transferable to the relevant context, and that it is being applied.

ICT Enabled organizations

These are government and private sector organizations that are using technology to help them achieve their development goals. These organizations are involved in activities that are related to the development of developing nations. These organizations could be for-profit private entities that expand the local economy or government entities that seek to deliver public services more efficiently and effectively. The main agents that drive the use of technology are the Information Technology personnel.

Development

In this study development is comprised of three components, which are economic development, social development, and human development.

Economic development, is the increase in monetary value or economic output, ceteris paribus that can be observed using GDP, GNP, PPP, and other macro-economic measures.

Human development is the process whereby people's choices are expanded through an increase in their capabilities and functioning. At any level of development the most essential capabilities for human development are life expectancy, access to healthcare, a decent standard of living, and a minimal education level (HDR.UNDP, 2006; Oyeshile, 2004; Malila, 1997; Aghion, 1999; Sen, 1993, 2002).

Social development is the process that brings about sustainable forms of well-being ranging from the individual unit up to the societal level. This encompasses issues such as poverty traps, unequal access to information and resources, governance, civic engagement, and choices that pertains to individual lives (UNDESA, 2006; Sen, 1993, 2002)

Information and Communication Technologies (ICT)

The term Information and Communication Technologies in this paper is taken to mean telecommunication networks, computer hardware and software, telephones, cell phones, fax machines, personal digital assistants, portable devices with voice and video streaming.

5. Research Design/Methodology

5.1 Strategy of Inquiry:

An explorative qualitative field study was conducted on Botswana to gain a better perspective as to how usage of ICT by IT professionals in organizations had an impact on economic, social, and human development. The exploratory field study identified the skill sets, types of ICT, and the usage of technology by workers whose job descriptions required them to use technology. The unit of analysis for the survey was IT professionals working in organizations in Botswana.

5.2 Researcher's Role

The original plan was to travel to Botswana for three months to conduct an initial survey followed by personal interviews of one private sector and one public sector entity. Unfortunately, due to resource constraints, the trip to Botswana was not feasible. Instead of handing out survey instruments hand by hand; an alternative approach was to conduct an online survey. Unfortunately, the online

survey reduced the pool of potential respondents to only IT personnel with access to the internet at work. Follow up emails and phone calls were made to the potential respondents in Botswana which proved both expensive and difficult as the responses were anonymous.

5.3 Sources of data

Primary data was mostly derived from the survey. Secondary data was gathered from United Nations' statistics, Botswana governmental reports, Botswana Ministry of Finance and Development Planning, Botswana Central Statistics Organization, Botswana Institute for Development and Policy Analysis, Institute for Security Studies, reports prepared by United Nations' agencies, Southern African Development Community (SADC), International Telecommunication Union and Botswana newspapers and other regional news sources. The official government websites led to many good local data sources. The bibliography sections of peer-reviewed research articles were also used to discover more relevant data on Botswana.

5.4 Data collection tools/techniques

A convenience survey was carried out of IT professionals employed by different types of governmental and private sector organizations in Botswana. It was discovered during the duration of the online and informal interview survey, that a lot of the Information Technology departments in Botswana were sometimes

staffed by only one person. Because of the small size of Botswana IT departments, I had to constantly research new qualifying prospects to send surveys to. Distance and communications costs made the administration of the survey very costly, as respondents had to be constantly reminded to look into the survey. All respondents were informed of the Internal Review Board approval number and advised of the right to not answer any or all questions of the survey.

5.5 Participants

The participants were individuals who worked in either the private sector or public sectors of Botswana at the time of the study. Each subject was an IT professional who was involved in an organization that used Information and Communication Technology (ICT). Respondents were selected based on their job description and referrals from fellow Information Technology workers in Botswana. The number of IT professional was smaller than originally anticipated as will be noted in the result section; the total number of IT people surveyed was less than a thousand. Most of the participants were emailed the online survey. The survey was sent to IT professionals employed in heterogeneous entities that were engaged in a wide scope of activities.

Companies that were contacted were: Letshego, a micro-lending private entity; Ministry of Works and Transport; Ministry of Labour and Home Affairs; University of Botswana; Botswana Government Value Add Tax Division; Ministry of

Education, Legae Academy, a private secondary School; Ministry of Science, Technology and Communication; Botswana Barclays Bank; Standard Charter Bank; Botswana Telecommunications Corporation; United Nations Development Programme Botswana; Botswana Export Development and Investment Authority; Marsh Insurance company; and Directorate of Crime and Economic Corruption.

5.6 Site Selection

Botswana was chosen because of the close alignment of the country's national Vision 2016 and the United Nations' Millennium Development Goals; this meant that data on Botswana would be available from the government and the United Nations' agencies. Additionally, the researcher was born in Botswana and speaks the national language, Setswana. Development policies in Botswana are guided by six-year National Development Plans (NDPs). The NDPs are guided by the country's "Long Term Vision for Botswana: Towards Prosperity for All," popularly know as "Vision 2016," which provides a broad framework for Botswana's development. Vision 2016 was drafted in August 1996 by a nine-person Presidential Task Force ([Botswana Government Website, 2005](#)). The United Nations Development Programme (UNDP) made an analysis of UN MDGs and Botswana's Vision 2016 Goals. The UNDP status report on Botswana clearly showed that each of the goals of Botswana's Vision 2016 could be directly correlated to a goal of the UN MDGs (UNDP Botswana, 2004). The 2001 ITU

study on Botswana stressed that Botswana was a good example of model ICT governance (ITU, 2001).

6. Case study: look at the Republic of Botswana

Botswana is ranked among a few of African countries that have attained the status of a middle-income country. It is one of the fastest growing economies in the world, fueled primarily by its mineral wealth ([Botswana Government Website, 2005](#)). In a speech the former President of Botswana, Sir Qwet Masire, explained that, unlike its neighboring countries, Botswana did not have any fertile lands or valuable resources before it was given its independence in 1966 and was therefore not developed by the British. Botswana was intended to be incorporated into the now Republic of South Africa (UNDP Botswana, 2004). By the 1990s, through good management of its mineral resources and wealth, Botswana managed to foster a climate conducive for both development and business. Human development and social welfare have made great strides in healthcare, education, and economic enablers ([Botswana Government Website, 2005](#)).

The central research question:

How does the use of Information and Communication Technology by IT professionals in Botswana at the organizational level help Botswana achieve its development goals?

6.1 Economy

Botswana in the 1960s and 1970s was one of the few independent African countries that embraced a multi-party political system and democratic elections. This made the country compare favorably to other proximate countries, according to Malila (1997); this favorable comparison was partly because Botswana was situated in a very turbulent region (Malila, 1997). Botswana became the highest per capita recipient of aid for donor countries that believed that supporting this promising democracy would improve prospects for peaceful transformation in the Sub-region (Stedman,1993; Malila,1997). The 2001 Botswana National population census estimated the population of Botswana to be around one million, seven hundred thousand, with 50.8% of the population living in the rural areas and the remaining 49.2% in urban areas. The two main cities are Gaborone and Francistown, which had populations of 224,286 and 106,553 respectively in 2000 (BEDIA, 2005). There are about 9,501 males and 3,107 females in the transport and telecommunications industry in the whole of Botswana. Distribution of the Botswana workforce by industry sector industry was as follows: private 164,488; parastatal 12,863; central government about 96,702; and local government about 24,662 people (CSO, 2006).

Botswana owes much of its export income to mineral resources. "Diamond mining has fueled much of the expansion and currently accounts for more than one-third of GDP and 70-80% of export earnings. Tourism, financial services,

subsistence farming, and cattle ranching are among the other key sectors” (World Fact Book, 2005). According to the African Development Bank (ADB, 2000) group report on Botswana, the country’s agricultural sector has experienced negative growth since the 1990s and shows very low levels of investment in irrigation.

The manufacturing base is also weak with only 5.9% of GDP in 1999 (ADB, 2000). Ranching is the most common economic activity and is the traditional symbol of prosperity. The Botswana Meat Commission (BMC) has monopoly rights to export beef to foreign markets. BMC was the first company in southern Africa to attain the ISO 9002 certification of quality for its production processes (Alliedmeats, 2002). Kenneth Goods (1999) is of the view that, “the rise of wealth and power within cattle-owning economy of Botswana has been accompanied by the creation of poverty and weakness.”

6.2 Education

In the 2005 Budget Speech delivered to the National Assembly on February 7th 2005, the Minister of Finance and Development Planning reiterated “that pursuant to the Vision 2016’s pillar of ‘an Educated and Informed Nation’ and the Millennium Development Goal of ‘Achieving Universal Primary Education,’ Botswana had about a 100% primary to junior secondary education.”

National Development Plan Nine was responsible for the expansion of the University of Botswana (UB) to increase its enrollment to 15,000 full-time students and to offer long-distance programs. This is a major improvement for the nation with a population of only about 1.7 million in 2004 (Botswana National Budget speech, 2005). Education is the most important determinants as to whether development can be sustainable by successive generations. As Jeffery Sachs (2005) summarized it, "technological know-how is not automatically inherited. Each new generation must learn technological expertise." This is an important fact for Botswana that has been hard hit by HIV/AIDS. The working-age group, aged 15 to 45 years, is hardest hit with 330,000 people infected with HIV, according to the University of California San Francisco Center for HIV information (2005). In the words of K.Y. Amoako Chairman of the Commission on HIV/AIDS and Governance in Africa (CHGA), "HIV/AIDS is the greatest leadership challenge in Africa today. Across the board, we see how HIV/AIDS and its wider social and economic impacts are standing in the way of the sustainable development of Africa." The UNDP report on Botswana (2005) reports that HIV/AIDS is threatening to reverse all the economic development the country has achieved since its independence.

6.3 Information and Communication Technology Infrastructure and Policy

In 2001, the International Telecommunications Union (ITU) published a report that looked at Botswana as an effective model of telecommunications regulation in sub-Saharan Africa and its regional cooperation. The study focused on the Botswana Telecommunications Authority (BTA) and the Telecommunications Regulators' association of Southern Africa (TRASA). The case study suggested that Botswana be used as a future model for other countries to learn how to set up effective self-regulating agencies. At the time of the study in 2001, Botswana ranked 114 out of 162 on the United Nations Development Programmer's Human Development Index (HDI). This was the sixth highest in sub-Saharan Africa, but low on the global scale (ITU: Case study on Botswana, 2001).

In spite of Botswana being elevated to a middle-income country status, Botswana still has a long way to go towards achieving its MDGs and breaching the digital divide. Online access is mostly limited to the rich, people with online access at work, and university students. According to the ITU case study, "one Internet café owner reported about 100 to 150 customers per day. [There are is estimated to be] between 50,000 to 60,000 Internet users in Botswana, including those who access the Internet at work, school or Internet cafés" (ITU: Case Study on Botswana, 2001). Access at home is further limited to the middle class with

telephones and electricity at home. The parastatal Botswana Telecommunications Corporation (BTC) held monopoly rights over all telecommunications in the country until 1996. At the time of this writing, the Botswana Telecommunication Corporation is undergoing liberalization and privatization (*Voice Newspaper*, 2006), the effects of which are still to be seen. It is hoped that the BTC liberalization and privatization will lead to increased competition with enhanced quality services at reduced cost (Msct.gov.bw, 2006)

The reason for the government's initial decision to set up parastatals like other developing countries was to fulfill the market need, where private enterprise had failed due to the small client base. Due to being a monopoly, the BTC has not had any competition before 1996, resulting in its high charges which are sometimes three times more than an average person earns. The Botswana Telecommunications Corporation (Amendment) Act in 1996 eliminated BTC's legal monopoly on the provision of all public telecommunication services. The act, did not however remove BTC's Voice monopoly. At the time of this writing there were about ten Internet Service Providers in the whole country. Bandwidth is very expensive in Botswana Pulas (BWP), at 64,000 a month— about the cost of a T1 line in the United States. There was no consumer broadband internet access in Botswana at the time of this writing. All internet traffic in Botswana flows through BTC which is in effect the country's only internet reference exchange point. The BTC is also required to ensure universal service to every

village, with an average of about 250 to 500 people with at least three to seven telephone lines. The cost of these lines is subsidized by the government because it is not economically viable to run lines to these often dispersed and isolated villages. The statistics and facts above were derived from the 2001 ITU case study on Botswana (ITU, 2001).

6.4 Millennium Development Goals (MDGs)

Botswana adopted the United Nations' Millennium declaration in 2000, outlining its commitment to make significant and lasting strides towards eradicating extreme poverty and hunger; achieving universal primary level education; to promote gender equality and empowerment; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases (UNDP Botswana, 2003).

In the World Bank report entitled "ICT and MDGs: A World Bank Group Perspective," ICTs are being used in some developing countries to combat poverty, and in education and healthcare to foster relationships between countries and donor organizations. For ICTs to be effectively used to accelerate development in the developing world, the literature seems to suggest that key environment factors such as sound fiscal policy, political stability, and a healthy workforce are very important. For instance, in helping to alleviate and reduce poverty, ICT can help countries improve their rating in measures, such as the

human development index and the network economy index [a composite of three components, which are stakeholders willingness to use ICT, the environment for which the ICT will applied to and how the stakeholders use the ICTs] (World Bank, 2003).

In Botswana, as in India, the rural poor do not have ready access to information about markets and commodity prices. Botswana rural communities mostly trade in cattle because the country is 75% semi-desert and crop yields are very low, forcing subsistence farming. Cattle and livestock ranching are two of the few agriculturally and economically viable options open to the poor. Adam Lishan (1997) and Jeffery Sachs (2005) indentify in both of their works food insecurity as one of the major determinants of what hinders development in sub-Sahara Africa. In India, rural small-scale dairy farmers were able to use kiosks to learn about market conditions that led to their being able to leverage their market positions (World Bank, 2003).

6.4 Vision 2016

The Democratic Republic of Botswana has a national vision that is commonly referred to as Vision 2016, which is a framework for long-term development of Botswana. It is a national development manifesto of the people of Botswana. The vision outlines goals for education (up to an equivalent of high school), an informed nation (transparent information access), a prosperous nation

(sustainable growth and diversification, the environment), national productivity (employment, GDP PER CAPITA), and national innovation, and a form of national governance that can be characterized as compassionate and is socially responsible to its citizens (income distribution, poverty, social safety net, health, HIV/AIDS). The goals of the vision also include a democratic, open, and accountable government (open, transparent governance, attitude and quality of leadership) in order to foster a united and proud nation (family values, traditions, and history) (Botswana Government, 2005). In the Botswana 2005/2006 budget speech, the overarching theme was called "Building an Innovative Economy for the 21st Century," and Vision 2016 goals that called for Botswana to be "a prosperous, productive and innovative nation," were quoted (Botswana 2006 Budget Speech). In the same 2006 Botswana budget speech, innovation was characterized as being a by-product of investment in research and technology using Information and Communications Technology. Innovation was seen as being key to meeting the goals set forth in Vision 2016. In order to improve the bandwidth and connectivity issue, the parastatal Botswana Telecommunications Corporation is laying fiber-optics in Botswana and is also involved in a project aimed at laying undersea fiber optic on the east and west coasts of Africa. There is a new research project Nteletsa II Rural Telecommunications Strategy aimed at discovery of the best technical solutions for implementing the rural telecommunications program. The draft Information and Communications Technology Policy named "Maitlamo" proposes appropriate legislative changes

that enable an environment more suitable of e-business and e-government activities. A new agency called the Botswana Research Science and Technology Investment Agency is to be established 2006/2007 fiscal year to administer government funding for competitive research projects in science and technology. In the 2005/2006 budget speech there were also plans for a draft bill to be prepared for 2006/2007 that would provide provision for a regulatory body to improve efficiency in service delivery through consolidation of the Postal Services, Telecommunications, Broadcasting, and all other ICT sub-sectors (Botswana Budget Speech, 2005/2006).

7. Results and Analysis

7.1 Findings

The Model of IT for Development (Qureshi, 2005) was used to categorize and classify the most current data available on the Republic of Botswana at the time of the writing. The economy is examined through the following categories: financing and innovations. Human development is examined through healthcare and education measures. The social dimension of development is measured through issues of access. For findings, the paper henceforth will focus primarily on human and economic development; the researcher acknowledges the importance of social development and would include it as part of a more extensive study. The question of social development and ICT is very complex

and a further exploratory study would still barely skim the surface of this complex topic.

7.1.2 Economy

The gross domestic product (GDP) per capita annual growth rate was about 5.1% from 1975 to 2003. GDP per capita (PPP US\$) was about 8,714 in 2003 (HDR, 2006). The Model of IT for Development categorized economic development as being comprised of financing and innovation. Statistics from the UN Human Development Reports (2006) were used to collect information on the economy of Botswana for both financing and innovation indicators as shown on table 7.1 and 7.2 respectively.

7.1.2.1 Financing

Table 7.1 Financing indicators on the economy of Botswana (1990-2003)

Financing indicators	1990	2003
Official development assistance (ODA) received (net disbursements) (as % of GDP)	3.9	0.4
Total debt services as (% of GDP)	2.8	0.7
Net foreign direct investment inflows as (% of GDP)	2.5	1.1

Source: <http://hdr.undp.org/statistics/data/countries>. 2005

Aid funds represented in table 7.1 as ODA shrunk from 3.9% of GDP to under 0.4% in 2003. A simple reason for the reduction in ODA was that GDP was growing annually over the period of 1990-2003 and the inflow of ODA funds was

not being increased accordingly. The positive health of the economy can also be observed by the reduction of the total debt services as the percent of GDP declined from 2.8% in 1990 to 0.7% in 2003. The significance of Botswana having a healthy economy, is that securing foreign investment funds for domestic projects would be possible (HDR, 2006). This ability to secure funding would allow the country to fund ambitious ICT projects in the future if it needed to. Net foreign direct investment inflows as a percentage of gross domestic product declined by forty-five percent between the periods of 1990 to 2003.

7.1.2.2 Innovation

Table 7.2 Innovation indicators on Botswana

High-technology Exports				Patents Granted to residents	Receipts Of royalties and license fees		Research And development	Researchers In R&D		
(% of merchandise exports)				(per million people)	(US\$ per person)		(R&D) expenditures (as % of GDP)	(per million people)		
1990		2003		2002	2003		1997-2002c		1990-2003c	
..	z	(.)	C	0	0.3	e	..	z	..	z

Source: <http://hdr.undp.org/statistics/data/countries.2005>

Notes:

c. Data refer to 2001

e.Data refer to the most recent year available during the period specified.

The table 7.2 above clearly shows there is no major innovation taking place in Botswana. As can be seen from table 7.2, Botswana does not export any of the capacity of its ICT infrastructure nor any locally grown technology. Residents hold no patents and there isn't any major investment in research and design.

There aren't significant numbers of researchers in the country carrying out research activities. These indicators on the level of innovation in Botswana show that the ICT infrastructure in place might not be getting used to its potential. Lack of any substantive research could be one of the reasons Botswana is not seeing any major return on its investment in ICT.

7.1.3 Human Development

7.1.3.1 Healthcare

Table 7.3 Healthcare indicators on Botswana

Public Health expenditure		Physicians		HIV prevalence		Life Expectancy At Birth			
(% of GDP)		(per 100,000 people)		(% ages 15-49)		(years)			
2002		1990-2004 ^a		2003 ^b		1970-1975 ^c		2000-2005 ^c	
3.7	z	29	z	37.3 [35.5 - 39.1]	z	56.1		36.6	
							z		Z

Source: <http://hdr.undp.org/statistics/data/countries>. 2005

Notes:

a. Data refer to the most recent year available during the period specified.

b. Data refer to point and range estimates based on new estimation models developed by the Joint United Nations Programme on HIV/AIDS (UNAIDS). Range estimates are presented in square brackets. Regional aggregates refer to 2004

c. Data refer to estimates for the period specified.

Table 7.3 shows the extent of how Botswana has been hard hit by HIV/AIDS, which has dropped the life expectancy from 56 years between the periods of 1970-1975 to about 36 years for the period 2000 to 2005. In spite of advances in healthcare over the past twenty-five years, HIV has adversely affected life expectancy and threatened the well-being of the Botswana people. Public health expenditure as a percentage of GDP was approximately 3.7 in 2003 and there

were estimated to be about 29 physicians for every 100,000 people for the period 1990-2004. These statistics on health are disturbing because the HIV epidemic is threatening Botswana's working population. Without people to man the infrastructure it will be very difficult for the country to reap back the rewards of the investment in technology. The most significant effect of HIV in relation to ICT is that HIV is a menacing threat to the mental capital Botswana has built up over the past forty years of independence.

7.1.3.2 Education

Table 7.4 Education indicators on Botswana

Public expenditure on education				Public expenditure on education, tertiary				Adult Literacy Rate				Tertiary students in science, math and engineering	
(as % of total government expenditure)				(% of all levels)				(% ages 15 and above)				(% of all tertiary students)	
1990a		2000-2002b		1990a		2000-2002b,a		1990c		2003c		1998-2003d	
17	z	25.6	z	..	z	18.6	z	68.1	z	78.9	f	19	z

Source: <http://hdr.undp.org/statistics/data/countries.2005>

Notes:

a. Expenditures by level may not sum to 100 as a result of rounding or the omission of the categories expenditures in postsecondary education and expenditures not allocated by level.

b. Data refer to the most recent year available during the period specified.

c. Data for 1990 refer to estimates produced by UNESCO Division of Statistics based on data prior to 1990; data for 2003 refer to national literacy estimates from censuses or surveys conducted between 2000 and 2004, unless otherwise noted. Due to differences in methodology and timeliness of underlying data, comparisons across countries and over time should be made with caution. For more details, see http://www.uis.unesco.org/ev.php?ID=4930_201&ID2=DO_TOPIC.

f. Estimate produced by UNESCO Institute for Statistics in July 2002.

The expenditure on education as a percentage of total government expenditure rose from 17% in 1990 to just over 25% for the period 2000 to 2002. 18.6% of the

education expenditure was spent on tertiary education and 19% of students in tertiary between the periods of 1998 to 2003 majored in science, math and engineering. The level of adult literacy also rose by fifteen percent from 68% in 1990 to about 78% in 2003. Botswana appears to be on the right track in regards to investing more in the education of its citizens, which can be observed by the increase in the adult literacy rate. Achieving a high adult literacy rate nationally is desirable because if online access is made available, then people will be able to use online resources such as services provided by the government and private sectors and local organizations, and potentially the capacity of those organizations would be improved.

7.1.4 Social Development

It is difficult to link ICT to social development. The themes that relate more to access issues were discussed earlier in the literature reviews such as the role of governance, effects of culture on governance, the market mechanism, credit and economic enablers. For instance, in Botswana women held 11.1% of seats in parliament and 53% of women in the workforce held professional and technical positions. The ratio of estimated female to male earning was estimated to be about 61% (HDR, 2006).

Table 7.5 Women empowerment indicators on Botswana

Adult Literacy Rate		Youth literacy rate		Female economic activity rate	
<i>(female rate as % of male rate)</i>		<i>(female rate as % of male rate)</i>		<i>(% of male rate, ages 15 and above)</i>	
2003 ^e		2003 ^e		2003	
107	H	109	h	78	z

Source: <http://hdr.undp.org/statistics/data/countries>. 2005

Note: e.Data refer to national literacy estimates from censuses or surveys conducted between 2000 and 2004, unless otherwise noted. Due to differences in methodology and timeliness of underlying data, comparisons across countries and over time should be made with caution. For more details, see http://www.uis.unesco.org/ev.php?ID=4930_201&ID2=DO_TOPIC.

h.Estimate produced by UNESCO Institute for Statistics in July 2002.

Table 7.5 shows that literacy rates in the categories of adult and youth literacy were significantly higher for women in both categories when literacy rates were drilled down by gender. Yet, the economic rate of women was only 76% of the male activity rate. Women appear to be better educated, or at least more literate than their male counterparts, but do not play as big a part in the labor force as men do. The reason for the lower rate of economic activity for women than of men is not clear in the literature. This could be due cultural influences, pertaining to the role and status of women in society.

7.1.5 Information and communication technology

Table 7.6 ICT indicators on Botswana

Telephone mainlines		Cellular Subscribers		Internet users	
(per 1,000 people)		(per 1,000 people)		(per 1,000 people)	
1990b	2003b	1990b	2003b	1990b	2003b
21	75	0	297	0	..
z	z	z	z	z	z

Source: <http://hdr.undp.org/statistics/data/countries>, 2005

Note:

b. Telephone mainlines and cellular subscribers combined form an indicator for Millennium Development Goal 8

The ICT sector in Botswana has grown in the past few years as can be observed from table 7.5. The number of telephone landlines per 1,000 people grew from 21 to 75 landlines per 1,000 people. From having no cellular infrastructure and cellular subscribers in 1990, Botswana leapfrogged to about 297 cellular subscribers per 1,000 people by 2003. Table 7.6 shows that there were about sixty thousand internet users in Botswana for the year 2005. This means about sixty thousand new users have been created over a period of about thirteen years.

Table 7.7 Internet subscriber and computer ownership in Botswana

	Internet			PCs		
	Hosts total	Hosts per 10'000 Inhabitants	Users (000s)	Users 100 Inhabitants	Total In thousands	Per 100 Inhabitants
	2005	2005	2005	2005	2005	2005
Botswana	2097	11.85	60	3.39	80	4.52

Source: ITU (Internet host data: Network Wizards, RIPE), 2006

Note:

Figures in italics are estimates or refer to years other than those specified.

Table 7.6 also shows that there were about eighty thousand computers in use in Botswana in 2005. As explained in the next section, there are less than one thousand IT professional in the whole of Botswana, meaning there is one IT professional per hundred computers and per sixty users, which is a good ratio. This shows that there is abundance in ICT skills sets in Botswana.

7.2 Survey Results

The Botswana Central Statistics Office (CSO) in March 2005, estimated about eight hundred and thirty-six people were employed in the computer industry. CSO defines the computer industry as “computing and related activities including data entry/processing & software consultancy organizations” (CSO, 2006). This means that the population of IT professionals is probably less than one thousand for the whole country. The results reported below are of the survey that was conducted in Botswana using an online survey. The response rate of the survey as about 21% of 100 surveys emailed to participants.

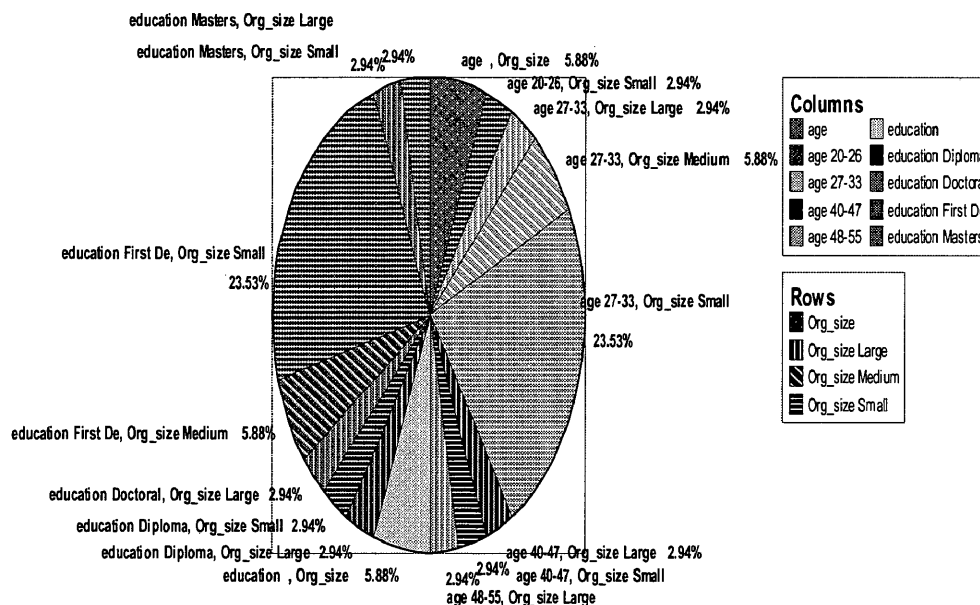


figure 7.1 Survey Demographics

Table 7.8 Respondents by sector

Sector of economy employed	NGO 0	Private 47.00%	Government 43.00%
Size of organization	small 61.40%	Medium 14.30%	Large 14.30%

As noted earlier, respondents were from the Democratic Republic of Botswana government and private sectors, where they worked mainly for small organizations in which there were about ten people as can be seen from figure 7.1 and table 7.7. Sixty-eight percent of the respondents interviewed were between the ages of twenty to thirty-three. Male respondents made up about seventy-one percent of all responses and had attained their first university degrees. Most respondents spoke both official languages, Setswana and English, fluently, and had worked for about two years in their current positions. Nineteen percent had been in their current positions for at least four years.

The majority of the organizations from where respondents were drawn were involved in one of the components of development, namely human, social or economic development. Some of the organizations surveyed dealt with two or more of the components of development as defined in the study.

7.2.1 Education/ Skill sets

Based on the diverse demographic and functions of the surveyed respondents, Information Technology (IT) professionals in Botswana are involved in a wide range of activities that span the technology spectrum. Use of different skill sets enables IT professional to employ a wider array of technical solutions to their business units in order to enable their organizations to achieve their development goals. Figures 7.2 and 7.3 below represent the skill sets and the types of professional certification IT professionals hold in Botswana.

	Networking	Database	Project Management	Packages (e.g. ERP suite,)	Desktop Support	Hardware	!other	Totals
Project management:	1	1	1	0	0	1	0	4
Technical Support Services:	6	6	4	2	2	4	1	25
Data analyst	1	3	0	2	2	1	0	9
Application Development:	0	1	0	0	1	1	0	3
!other:	1	1	2	0	0	1	1	6
TOTALS	9	12	7	4	5	8	2	47

Figure 7.2 "What is your area of expertise in your organization (primary responsibilities)? " vs "Types of professional industry certifications? (Select all that apply)"

From figure 7.2 the most common area of expertise is that of technical support specialists who have some form of certification in either networking or databases. The more rare skill sets appear to be those of application developers and project managers. The most common certifications were those that covered database

technologies followed by networking technologies. As shown in figure 7.3 only 25% of the project managers have a project management certification. At least 33.3% of the application developers had a certification that dealt with a development technology such as database technology.

	Networking	Database	Project Management	Packages (e.g. ERP suite)	Desktop Support (e.g. MCDST, MCAD,	Hardware (e.g. A+)	!other	Total
Project management:	25.0	25.0	25.0	0	0	25.0	0	100
Technical Support Services:	24.0	24.0	16	8	8	16	4	100
Data analyst (reporting, system analysis, Quality analyst, etc):	11.11	33.33	0	22.22	22.22	11.11	0	100
Application Development:	0	33.33	0	0	33.33	33.33	0	100
!other:	16.66	16.66	33.33	0	0	16.66	16.66	100

Figure 7.3 Row percentage for each area of expertise by professional certification held

From figure 7.2 and 7.3 it is apparent that there is still need for more project managers, applications developers, and systems analysts. If Botswana is going to maximize it's invest in its ICT infrastructure it is going to need the skill sets such as project management, system analysis, and application development to develop the applications to export to its neighbors and other foreign markets. Further research would need to be carried out to discover what would be the optimal composition of Botswana's Information Technology professionals, such as the ratio of project managers to system analysts, application developers, and

technical support professionals. Figure 7.4 below introduces the first part of the conceptual model.

Figure 7.4 ICT skill sets

In order for Botswana to be able to use the ICT investments in both public and private sector organizations, it will need professionals who understand the use and potential use of the technologies at varying levels of abstraction. Figure 7.4 demonstrates that technological skill sets are necessary and a prerequisite for ICT to generate benefits, be it monetary or intangible.

7.2.2 Use of ICT in organizations by IT professionals

The types of ICT and the usage of such technologies in organizations surveyed were very important to this study.

	Improve communication between co-workers	Reduce communication costs	Provide faster access to more timely information	Provide faster service to customers	Other	Totals
strongly disagree:	1	0	0	0	0	1
somewhat disagree:	0	0	0	0	0	0
neither agree or disagree :	0	0	0	0	0	0
somewhat agree :	0	0	1	0	0	1
strongly agree:	5	4	3	4	0	16
TOTALS	6	4	4	4	0	18

Figure 7.5 "To what degree do you agree with the following statement "Technology has allowed me to complete tasks more quickly than using a manual method?" vs "In what ways do you think technology makes delivery of services by your organization more profitable? "

The majority of respondents as shown on figure 7.5 were in strong agreement that the use of technology increased the efficiency with which they did their jobs and helped the organization as a whole by enabling co-workers to better communicate and co-ordinate their duties. Twenty-five percent of respondents agreed that technology enhanced their ability to better perform their jobs; they also agreed that the use of ICT led to cost savings in communications costs as shown on figure 7.6. Apart from saving communications cost, the same group of respondents also pointed to ICT as enabling them to provide faster services to their clients by allowing them to reduce the process durations. Eighteen percent

of those respondents who strongly agreed that technology enabled them to perform the jobs more effectively also believed ICT helped them make better business decisions by providing them with more timely information.

	Improve communication between co-workers	Reduce communication costs	Provide faster access to more timely information	Provide faster service to customers	Other	Total
strongly agree:	31.25	25.0	18.75	25.0	0	100

Figure 7.6 Row percentage level of confidence in use of ICT by benefits

Types of communications technologies used for dissemination of information and communication with stakeholders on a daily basis are shown in figure 7.7 below. The most commonly used communication technology is still the landline telephone followed by email. Fax remains a major technology for basic simplex communication. Email was used as the primary form of sharing office documents and forms between dispersed work teammates. Fax was used primarily to transmit forms with remote locations as it is a simple and efficient technology for simple one-way information flows. Telephones were usually used in conjunction with the use of fax.

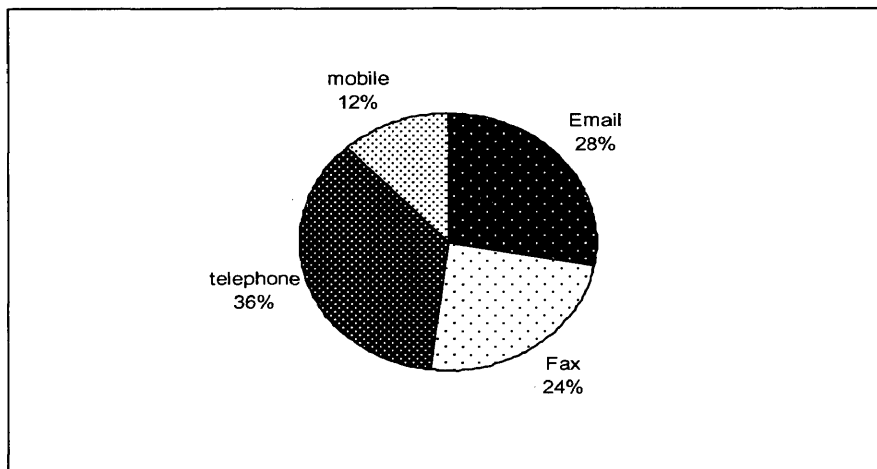


Figure 7.7 Types of communication technologies used daily by percentage usage

Different forms of information systems were used in both sectors. Table 7.8 below shows the different types of information systems used in both the government and private sectors.

Types of Information Systems in use
Virtual support systems
Accounting Information systems
Reporting and statistical tools
Geographic Information systems
Government data networks
Data mining applications
Distributed case management systems
Human Resource Information Systems

Table 7.9 Types of Information Systems in Use

The types of information systems that were identified in the survey are listed in table 7.8. Virtual support systems in Botswana were primarily being used to provide online assistance to clients remotely. Virtual support systems were being used to provide help-desk type of competencies to clients over the network. Other types of information systems such as human resources, accounting, and

data warehouses could be found in both the private and government sectors. The government had its own intranet called the government data network that provide the government IT infrastructure. Reporting and data mining tools were being used for business intelligence purposes, such as the fine grain drilling down of information. Geographic information systems were being used by government organizations to map out areas for development. Different branches of the law used the case management system to help them keep track of investigations. Such systems led to operational efficiencies by allowing investigators to relate cases to other open investigations, enabling investigators the possibility of solving more cases. As shown in table 7.8, the types of information systems predominately being used in Botswana are targeted at achieving administrative and operational efficiencies. No explicit evidence was found of ICT being used to support the strategic goals of the organizations; it was unclear if organizations had an articulated information technology strategic plan to support the business processes. The national Vision 2016 talks about ICT, but no documents were found that mapped how ICT would be leveraged to achieve the goals.

Figure 7.8 Use of ICT by IT professionals in organization

Figure 7.8 shows ICT skill sets are important in order to activate the benefits of ICT use in organizations. The types of technology used and the manner in which the applications are used depends on the ICT skill sets of the users. Education facilitates understanding the use of applications and their benefits in regards to solving operational inefficiencies or creating competitive advantages. Informed users of information systems encourage more effective information flows. Better information flows impact the manner in which development occurs.

The following vignettes are extracted from a blog about the experiences of a foreign IT consultant involved in a failed development project in Botswana. The vignettes are important as they provide insights as to why the use of ICT in organizations is affected by the different skill sets of IT professionals and why the use of IT professionals is necessary.

Vignette 1

Satellite Internet in Botswana

There was a potentially very relevant development project in Botswana, where a number of NGOs were provided with free two-way satellite infrastructure. This gave them the potential for permanent broadband Internet access in a connectivity-starved environment. Unfortunately, the project failed dismally. Working with one of these NGOs it was easy to see where the project went wrong. The lessons learned here can easily be applied to other scenarios.

Source: <http://allafrica.com/stories/printable/200608150412.html>

Vignette 1 establishes the context of the scenario in Botswana. A noble initiative was undertaken to provide numerous NGOs with broadband Internet. The project failed due to a number of factors illustrated by vignettes 2 through 6.

Vignette 2

Solutions are technology focused

The satellite technology project was created by technologists. They saw that there were NGOs with no Internet connection and they came up with satellite as a solution. The environment was never given sufficient consideration. The NGO was never consulted about how relevant the solution would be to them. They did not adequately consider what the NGO would actually use the Internet for. Even the question of whether the NGO had the technical capacity to use the connection was ignored.

<http://allafrica.com/stories/printable/200608150412.html>

Vignette 2 illustrates there was a need for both technical and soft skill sets within the ICT talent pool in Botswana. Vignette 2 provides a good example of how good intentions do not always have good outcome and at times lead to a waste in resources. Project management and analyst skill sets were missing from the satellite project. For instance, requirements were not gathered from the NGOs, the information flows and change management issues were ignored. If requirements and consultations were carried out with stakeholders, then the

implementers would not have overlooked training as a core process of the project. The IT professional mistakenly thought the stakeholders shared their perceived benefits of the technology such as communications capabilities. Vignette 2 is also demonstrative of how important it is to take into account the organizational capacity of entities if the entities are to maximize their technological investments.

Vignette 3

NGOs do not understand how new technology can impact on them

Even after the satellite infrastructure was installed, the NGO never knew how it could tie into their administration and projects. They knew that the Internet could be used to send email, but that was the extent of its integration. The technology was wasted because the organization did not understand the full potential that it held for them.

<http://allafrica.com/stories/printable/200608150412.html>

Vignette 3 presents the consequences of the failure to take the organizational capacity, such as the NGO's lack of technological savvy and understanding of how technology could tie into their strategic goals into account. The wrong utilization of technology by IT professionals in regards to how they developed solutions is illustrative of how soft skills are needed to cultivate an awareness of how technology could help the NGOs achieve their goals. IT professionals need to demonstrate their use of ICT in their organizations as a method of educating stakeholders and securing stakeholder buy-in. As a consequence of a lack of buy-in by the stakeholder, the technology project was a failure because the technology was not used.

Vignette 4

Technology projects are seen as rollouts with little concern for individual scenarios

When technology projects are rolled out, there is insufficient attention given to the requirements of individual cases. In the organization that I worked with, there were several computers, but no network installed. This meant that broadband Internet access was only available on one computer, resulting in severe under- utilization.

<http://allafrica.com/stories/printable/200608150412.html>

Vignette 4 shows that computers were not networked. ITU statistics such as the numbers of computers in Botswana are misleading due to the fact that the perceived productivity usage of computers that might be implied. If the computers are not connected to a network, then sharing of documents has to be based on diskettes and other inefficient modes of transmission such as human office messengers driving from site to site. Use of human messengers to transport data defeats the purpose of having a telecommunications infrastructure in place. Underutilization is a hidden cost to Botswana, as the resources could be redeployed to where there is a need. I recall computers that were not networked laying idly in labs at an institution I briefly worked at.

The above vignettes 1 to 4 illustrate that without the appropriate talent pools, technology can be applied incorrectly to solve the wrong problems due to a lack of adequate analysis of the situation by IT professionals. The vignettes are from a blog from an IT consultant who worked for an NGO in Botswana. Use is important because the IT professionals are using technology as they understand it to solve the problems of receiving organizations.

7.2.3 Telecommunication Infrastructure

The telecommunication infrastructure is the vessel that ensures that information can be transmitted in a predictable and dependable manner. Confidence in the network is a key factor if solutions are to be developed that rely on it. Figure 7.9 below provides a picture of the stability of the telecommunication infrastructure in Botswana over the past year. After respondents were asked about interruption over the past year, a follow up question was asked to find out the perceived loss of a telecom outage. The majority of respondents reported fairly limited outages and the main impact was generally a loss of ability to communicate with clients. Another problem reported by others who experienced fairly regular outages reported that it impacted their ability to coordinate with their co-workers.

	Could not communicate with co-workers	Could not communicate with customers	Could not with vendors	Totals
never:	1	0	0	1
Limited (1-3):	3	6	0	9
Fairly frequent (4-6):	5	2	2	9
Very frequent (7-9) :	0	0	0	0
Extremely frequent (more than 10):	1	0	0	1
TOTALS	10	8	2	20

Figure 7.9 "How often has your work been interrupted by telecommunication problems in the past year?" vs "Please explain how your work was affected by telecommunication outage?"

The next set of questions was designed to find out the types of workflow processes that were in wide use, such as whether the workflow was still paper based or electronic. Figure 7.10 shows that there is still a good mix of companies that use processes that range from being primarily paper based to those that are entirely electronic. The majority of companies have migrated towards more electronic forms of business processes and workflows. An unstable telecommunication infrastructure based on the response would prove to be a possibly crippling factor. Fortunately for Botswana the infrastructure seems to be stable enough to support business processes reliably and consistently.

	Could not communicate with co-workers (including intra-organization)	Could not communicate with customers	Could not with vendors (suppliers etc)	Totals
Not at all (fully paper based):	1	0	0	1
Limited impact (paper & electronic):	0	4	0	4
Critical (slow down business):	3	0	0	3
Very critical (major financial set backs):	1	1	0	2
Extremely critical (major processes all fully electronic):	5	3	2	10
TOTALS	10	8	2	20

Figure 7.10 "How important is the telecommunication network stability/quality for your project?" vs "Please explain how your work was affected by telecommunication outage?"

Figure 7.1 Role telecom infrastructure in development

Without a stable telecommunication infrastructure it is difficult to benefit from investment in ICT. Figure 7.11 shows how important the stability of

telecommunications infrastructure is to the way IT professional deploy and use ICT. Few respondents reported having only limited problems with the reliability of the telecommunication infrastructure.

7.2.4 Development

Type of service	Form of development	ICT	Importance for development
Banking services	Economic	Internet, web applications (online banking), debit and credit card facilities (MasterCard and Visa)	A more mature financial infrastructure is attractive to potential investors, tourists
Education	Human	e-learning applications (WebCT), online research databases, office productivity suites (Powerpoint, Excel)	Affords training to people who could have been excluded due to geography and improves the teaching skills of educators
Insurance	Economic	Web applications	A mature insurance industry is also a factor considered a part of a mature business environment for potential investors
Law enforcement	Social	Case management software	To ensure civility of society through enforcement of law, stable countries attract

			tourists and trade partnerships
Cultural preservation and youth empowerment	Social and human	Web applications	Access to information, skills training, cultivation of micro business initiatives by youth, empowerment of remote offices
Telecommunications	Human	Fax, telephone, cellular phone, email, collaboration software, instant messenger (Yahoo, MSN, AOL)	Mediums for sharing of ideas, collaboration of remote teams, maintains social networks and communities
Health fund administration	Human	Telephone, fax ,email	Improving life expectancy, quality of life

Figure 7.2 Importance of uses of ICT on Development

Figure 7.12 shows the types of ICT being used in organizations in Botswana and lists only a few of the potential benefits that were a consequence of usage in some instances. For instance, by the banking sector embracing and using ICT in Botswana, the capabilities of the banking sector as a whole was increased as banks could now offer remote management of customer accounts through web interfaces. Offering support for international forms of plastic money such as

MasterCard and Visa facilities generates money income for the local economy from tourists. Online banking and credit facilities are both signs of a mature banking sector, which is attractive for business looking to expand into Botswana and tourism.

Availability of internationally reputable insurance companies also adds to Botswana's attractiveness as an investment destination. Information systems are a big part of what drives information driven industries such as insurance companies. The importance of the availability of skill sets, the quality of the telecommunication infrastructure, and the effectiveness of law enforcement greatly impact economic development. Economic development would be adversely impacted if companies such as banks and insurance companies found it difficult to conduct business in Botswana and left the country.

Education has been expanded to wider geographic areas through use of ICT. Entities such as the National Universities are training educators to improve their effectiveness and to extend their reach to students beyond the confines of the physical classroom. In order to benefit more students through the use of modern technologies, educators and students participate in long distance learning initiatives such as e-learning. Prior to the introduction of e-learning, all long distance education had been primarily achieved through the use of correspondence surface mail. The use of e-learning and multimedia applications

has made the dissemination of skill transfers easier to administer to even the most remote areas. The government investment in rural telecommunication can now be leveraged to bridge the digital divide.

The use of ICT in managing activities such as health administration is important in fostering social development indirectly through operational and administrative efficiencies. These efficiencies are of paramount importance especially when faced with an epidemic such as HIV that is a serious threat to the future of Botswana.

Results also suggested that organizations as defined earlier were a major component in the development arena. These organizations demonstrated that when examined from the micro-level perspective of how employees in the organization used and adapted the technology, organizations effectively employing technology were better able to achieve their development objectives.

Fredericksen and London (2000) further elaborate that “the elements of capacity do not operate in isolation from one another, but rather serve to support other components of the organization.” That is, if the employees of an organization have been trained to use the technology available to solve problems, the use of the technology is also an indicator of the organizational capacity as technology spans all departments. As the results from table 7.2 showed, Botswana still

needs to dedicate more resources to education related to research and development if it is to reap the desired rewards of its investment in technology. The amount and specific kinds of resources Botswana would need to dedicate to research and development could be investigated by future research.

James Wunsch (1986) analyzed 15 rural development projects in order to gain a better perspectives of the problems associated with organizational capacity. The common issues in the studies that Wunsch (1986) identified were that the nature of the local socio-economic systems influenced the flow of resources to various target groups. If misunderstood, socio-economic systems negatively impacted the successful outcomes of the projects. James Wunsch (1986) attributed the failure of organizational capacity in the 15 rural development projects to project economics, erroneous models of on-the-ground realities, and uninformed and unrealistic design solutions. Project economics proved to be unrealistic as the nature of the local socio-economic systems was usually misunderstood and led to project coordinators making erroneous economic assumptions and decisions (Wunsch, 1986).

Another recurring issue was related to the design element of the proposed solutions. Designs were found to be uninformed and have inflexible design parameters that were unrealistic given their allocated resource, Failure to adequately understand the local contexts led to poor site selection, combined

with the design problems mentioned above threatened the success of projects. Wunsch (1986) emphasized this point by stating that “since traditional values and patterns were ignored, ‘innovations were not well received, projects failed due to lack of support from the local power structure.’” Top-down technology decisions that did not understand the realities on the ground or were not in tune with the political interests of the project coordinators did not succeed. It appears that adaptability of software to real world needs of project beneficiaries is correlated to the software being used by beneficiaries. Other major issues involved a lack of planning to include support structures in the original project planning, inconsistent priorities among organizations involved, and a failure to gather the relevant information to help guide the organization’s decision making process.

Schermerhorn and McCarthy (2004) argue that, “although government can create a positive environment for economic development, this alone cannot guarantee success. Long-term, sustainable advancement depends on the creation of a management infrastructure capable of taking full advantage of emerging environmental opportunities.” One of the biggest threats to organizational capacity is taken as the underutilization of human capital. That is, the cumulative impact of lost productivity as a result of marginal performance or worker disengagement (Schermerhorn & McCarthy, 2004).

Figure 7.13 shows how each component of the conceptual framework fits in.

Figure 7.3 Conceptual framework of ICT and Development

The significance of figure 7.13 is that it shows how the different components, namely Education/ICT skills, telecommunication infrastructure, and the forms of application of ICT by IT professional will cumulatively have a bearing on how development will occur. For example, inexperienced IT professionals might fail to leverage the benefit of communication technologies by poorly configuring the applications. A poor telecomm infrastructure with a high rate of outages will lead to economic losses such as lost productivity and possibly failure to deliver services.

Vignettes 5 and 6 provide offer insight into how IT professionals utilizing ICT in organizations may fail, at least at the organizational level in Botswana, to reap benefits from technology, despite the country's favorable environment of good governance, good infrastructure, and a growing economy.

Vignette 5

Capacity building is not prioritized

When the satellite infrastructure was installed, only the secretary, whose computer was used to host the connection, was ever shown how to use it. When she left the organization shortly afterwards, nobody knew how the connection worked. Even worse, nobody within the organization understood how the Internet could help them, so there was no motivation for them to learn.

<http://allafrica.com/stories/printable/200608150412.html>

Vignette 5 echoes the recurring lack of stakeholder training and education about the benefits of the project. Technology needs people with the appropriate skills sets to use it in order to generate benefit. Vignette 5 shows what the outcomes of a lack appropriate skill sets leads to, which is infrastructure and computing resources that are not utilized or underutilized. If the computing power is not used, then resources were wasted in procuring computers when no administrative efficiencies at the most basic levels are achieved. If IT professionals are not using ICT to empower users with the right tools and connectivity, then it will be difficult to reap the benefits from the broadband. In short, organizational capacity is adversely affected by the lack of employee skill sets and awareness on how the appropriate adaptation and use of available technologies can be used to achieve organizational goals. Separately technical

skill sets and technological infrastructure are not very effective weapons against stagnation in the development of a nation, but well trained, technology-savvy employees enabled by the technology they understand and are competent in its use, can be effective players in the development arena.

Vignette 6

Technology solutions are too often not sustainable

The satellite rollout project incorporated one year of free Internet service. Beyond this point the NGO would have to pay the monthly fees to keep the Internet connection. There was some consideration given to sustainability models, but this was done without the participation of the NGO, who did not understand the satellite technology, let alone possible models to make it sustainable. In more extreme situations, an NGO might be forced to sign financially binding contracts to take advantage of short-term free services without a realistic understanding of the consequences.

<http://allafrica.com/stories/printable/200608150412.html>

Vignette 6 illustrates another reason why ICT projects in Botswana might not be turning out positive results. In this case, stakeholders were initially offered free satellite services that would later accrue to an unaffordable price for the NGOs. The technologists who thought up the scheme most probably mistook their perceived usage of the technology to be that identical to the recipient stakeholders. As discussed earlier in this paper, a failure to take into account the local context usually results in flawed perceptions of local realities and this tends to lead to disastrous decision making as a result of incorrect assumptions. It might be that these organizations never really needed computers and broadband to begin with. Yet their ability to sustain the total cost ownership (TCO) of the broadband use was probably not investigated. The TCO then makes such

projects unsustainable in organization with limited resources. Solutions in Botswana need to factor in the level of technical literacy, amount of data handled, the information flows, and whether the acquisition of computers and bandwidth will add value. Understanding the local realities and how technology will be leveraged to help foster development can not be stated enough, as they appear to be recurring themes in why projects fail.

8. Contributions and Implications for future research

This exploratory study examined the use of ICT for development in organizations by IT professionals in Botswana. It helped better clarify the link between micro- and macro-level perspectives of development. For instance, Botswana has the prerequisite resources at a macro-level that are conventionally thought to allow a nation to reap benefits from its investments in ICT infrastructure. There is also a larger pool of ICT skill sets in Botswana. The ratio of current users to IT support and physical computers is less than a hundred to one IT professional. But Botswana has not yet reaped the expected benefits from its technology investments at the time of this writing.

At the micro-level, technology endeavors are important in both the developing and the developed world, as the rate of adoption benefits from adaptation of technology to suit the local needs at the micro-level. There appears to be a link

between organizational capacity, adaptation of technology to reflect local needs, and successful transference and adoption of the technology solution.

Nineteen percent of students at tertiary level of education are taking science related majors. The telecommunication infrastructure is stable and reliable. These macro-level indicators appear to suggest a fertile ground for a successful technology environment, but as Qureshi et al. (2006) points out that databases, computers, and software applications are not always adopted and used effectively in organizations. Qureshi et al. (2005) claims that knowledge networking capabilities are activated by people with the need, interest, access, and initiatives to solve problems. Qureshi et al. (2006) proposes that knowledge activation within organizations or communities creates value out of the ICT infrastructure.

Organization capacity also appears to be a key concept when thinking about the agents of development as comprised primarily of people, technology, resources, and forms of organizational structures that govern the allocation of resources in order to fulfill their goals. At the micro-level, organizational capacity appears to be a logical development effort, as failure by organizations to achieve their development goals adversely affects developing nations, and as aid and grants are awarded to organizations. Lack of appropriate skill sets and perceived benefits of ICT at the organizational level are critical, especially in developing

countries that are resource-strapped. One of the contributions of this study was the preliminary discovery that when organizations are awarded or acquiring technology, they should take into account their organizational capacity. This view can be explored from the macro-level as to why Botswana might not be reaping the expected rewards of its technology investment. Notions such as social informatics also connect people and technological adaptation in relation to immediate contexts for more favorable outcomes of investment in technology, such as in the case of the ministry of Youth and Culture in Botswana.

This exploratory study examined the use of ICT in organizations by IT professionals and revealed that important insights, such as skill sets and adaptation impact use and the adoption of technology within organizations in Botswana.

Implications for research are that further studies need to be carried out to discover the distribution of the different categories of skill sets that the IT personnel in Botswana possess. To what extent is knowledge networking taking place in organizations in Botswana among IT professionals? To what extent do skill sets influence IT professionals' perception and use of ICT to solve problems in organizations? Do the organizational cultures in Botswana encourage employees to collaborate with each other or to compete with each other on projects? Can a specialized culturally sensitive technology solution be developed

and exported to the surrounding regions? What reforms would move Botswana from an assembly economy towards being a creative economy in regards to information communication technologies?

Further investigation could be conducted as to the technological capacity of organizations to effectively deliver on complex technical projects. Organizational capacity and Global Capability Sourcing could be explored in terms of developing countries. Further studies could also assess the technological capacity in organizations in relation to whether the organization possesses the appropriate levels of organizational capacity to effectively enable the organization to align people, other resources, and technology in regards to fostering development.

Future studies about how Botswana could reap better rewards from its technological investments could look at global capacity sourcing. The Global Capability Sourcing model by Qureshi and Keen (2006) puts countries in four quadrants: specialist services (offering specialized skills at a low reward for the worker), Assembly economy (workers are easily replaceable or trainable and rewards for workers are low), Outsourcing Crisis Generator (workers are easily replaceable or trainable and rewards for workers are high) and the Creative economy (workers difficult to replace or train and earn high rewards due to their specializations). Global capacity sourcing within the context of Botswana should

be explored to help Botswana find possible ways to reap returns from its technology and human investments.

9. Conclusions

This exploratory study looked at “how the use of Information and Communication Technology by IT professionals in Botswana at the organizational level helped Botswana achieve its development goals?” This exploratory study found that the skill sets of IT professional in Botswana appeared to be more geared towards supporting technologies and this had a big impact in the manner the application of technology being applied in organizations. The make up of the skill sets that the IT professional possessed appeared to be a major driver of how the application and benefits of technology are perceived.

The importance of understanding the underlying problems associated with the phenomenon of development in developing countries can not be under estimated and technology can not be used as a band-aid to remedy the problems. It is important that policymakers be well informed about issues in the developmental context. Understanding the current usage of ICT in Botswana at the organizational micro-level is the first step. This research contributes towards a better understanding of the significance of ICT at the micro-level in the hope that

more studies will be conducted on the subject matter. As the 2003 World Bank report points out:

“new technologies, it is now clear, are not an end in themselves. Nor will a one-size-fits-all approach prove effective—the challenges faced by developing countries vary too greatly by geography, culture and level of economic achievement. ICT cannot eliminate the need for political stability, physical infrastructure, human capacity and basic health care, or offer a panacea for all development problems.”

The above statement is a clear indication of how important it is for policy makers to understand both development and ICT before attempting to tackle the development agenda in Botswana.

The lack of a significant numbers of researchers, systems analysts, project managers, and application architects in Botswana negatively contribute to its development agenda. Good ICT infrastructure has been put in place in Botswana, but there appears to be a mismatch in the types of skill sets needed to generate benefits from the infrastructure. As demonstrated by vignettes 1 to 6, the consequences of a lack of diversity of skill sets within the technical disciplines, which could be leading to the unexpected result of projects not achieving development goals due to the use of inappropriate solutions.

The contribution of this study was that it showed that in the case of Botswana good infrastructure, good governance, resources, and organizations with the directive of achieving development are not enough. The skill sets of the people staffing the organizations and developing the solutions to support the logistical and tactical goals of organizations are just as important. In order for Botswana to reap benefits from its investment in ICT, she needs to take stock of the proportions of skill sets needed to encourage the formation of well-rounded teams. What is needed are diverse and balanced teams in terms of skill sets to thoroughly design and implement holistic solutions that would enhance the efficiency of organizations through the use of information and communications technology (ICT). Having mainly IT people with purely technical skill sets to design and implement solutions in organizations is not enough. Further precautions such as balancing teams to prevent group think and outmoded thinking might be a step towards better use and adoption of technology in Botswana. People with soft skill sets are needed.

Further research will be needed to determine what the make up of the skill sets should be and how the make up of teams will impact the choice of ICT usage. The literature also attributed a common cause of technical project failures to a lack of commitment on the part of project teams or organizations to understand the local context and the realities their solution will have to have in order to change or transform; failure to understand the local contexts led to faulty

assumption and decisions, which in turn resulted in wrong prioritization of the most important needs and bad design decisions. If the technology was already mature and had been successfully applied in different context, projects teams and organizations still need to focus on the adaptation of that technology to suit the local realities. Technology has become a commodity in modern society and if organizations in developing countries are going to leverage it to achieve operation efficiencies and effectiveness in their mandates, then the types of people driving the technology will need to possess both technical and soft skill sets along with an adequate knowledge of the local environments.

10. Limitations of the research

The response rates of the survey were limited. Future studies should collect more data and a larger sample. Conducting an online-survey in Botswana without physically being there proved to be a major challenge as part of the respondents did not have time to answer the survey during work hours and the majority did not have internet access at their residences. A paper survey administered by people might be more successful in achieving higher response rates. Due to the low survey response rate, mostly secondary data was used together with the online survey as the main sources of data. Administration of future surveys would be better served by face to face administration of a paper-based survey followed by personal interviews with selected subjects, as was initially planned in this project but was not feasible at the time of data collection.

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Appendix A: Request for survey

MEMORANDUM

FROM: LEGODILE KWAPA

SUBJECT: REQUEST FOR COMPLETION OF SURVEY ON ICT FOR DEVELOPMENT

DATE:

This request is for your participation in completing a survey for a study to investigate the relationship between development initiatives, information and communication technologies (ICT) and how they impact development in Botswana. It is a thesis project by Legodile Kwapa. It is designed for self-completion over the Web. This survey is optional, you have the right to not answer any question(s) at any point in time and you have the right to stop taking the survey at any time. All the questions on the survey are optional. This research has been approved by the UNMC IRB and designated the following IRB #195-06-EX. If you have any questions or concerns, you can reach me at lkwapa@ist.unomaha.edu

The focus of the questionnaire is **Information and Communication Technology for Development in Botswana**: In this study development will be taken as being comprised of three components, namely economic development, social development and human development. *Economic development* is taken as an increase in monetary value or economic output. *Social development* is taken to mean the level of education, health status of people, civic engagement and *Human development* is taken to include factors such women empowerment, gender equality and equal opportunity. The term Information and Communication Technologies in this study is taken to mean telecommunication networks, computer hardware and software, telephones, cell phones, fax machines. The aim of the questionnaire is to identify how people are applying ICT based technologies in projects that are targeted at development within Botswana, in practice rather than in theory. The questions are simple and use a five-point scale, with space left for additional comments. I estimate that it will take about 25 minutes to complete.

Thank you for your cooperation.

Legodile Kwapa

Below is a link to the survey:

<http://survey.ist.unomaha.edu/phpESP/public/survey.php?name=ICT4DeSurvey>

Appendix B: ICT for Development in Botswana survey

Page 1 of 3

This questionnaire is part of a study to investigate how Information and Communication Technology (ICT) enabled development initiatives lead to development in Botswana. It is a thesis project by Legodile Kwapa. It is designed for self-completion over the Web.

In this study development will be taken as being comprised of three components, namely economic development, social development and human development. The term Information and Communication Technologies in this survey is taken to mean telecommunication networks, computer hardware and software, telephones, cell phones, fax machines. The questions are simple and use a five-point scale, with space left for additional comments. I estimate that it will take about 20 minutes to complete.

The data will be kept confidential but the statistical results will be made available to respondents, together with a comparison of their own replies with those of the other participants. You are under no obligation to participate in the surveys and have the right to stop taking the survey at any time.

I believe that the results of the study will be of personal value to respondents as well as to their organizations.

Thank you in advance for your cooperation.

Sector of the economy employed

- NGO
- Government
- Private Sector
- Other:

What is the size of your organization?

- Small (1-300)
- Medium (301-900)
- Large (Greater than 900)

The approximate number of organizational unit(s)/Department(s) with which you have regular contact with at work?

- 1-5

- 6-10
- 11-15
- 16-20
- 21-25
- 26-30
- Greater than 30

Your approximate age?

- Less than 20
- 20-26
- 27-33
- 40-47
- 48-55
- Greater than 55

Your gender?

- Female
- Male

Your level of education

- High School
- Diploma
- First Degree
- Masters Degree
- Doctoral Degree

Languages spoken (Select all that apply)

- English
- Setswana

Other:

Number of years working in your current position (job)?

1-2
 3-4
 5-6
 7-8
 more than 9

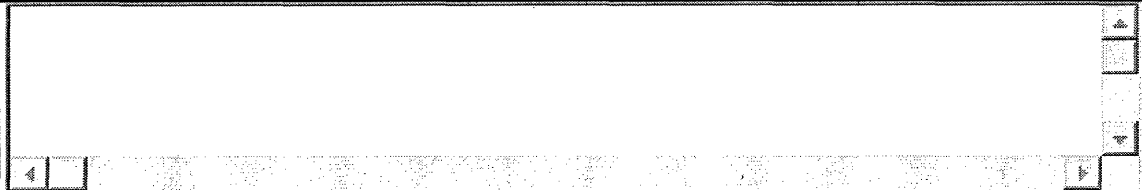
Previous work positions (jobs) held and duration(s)?

Does your organization deal with any projects that deals with human, social or economic development as defined above?

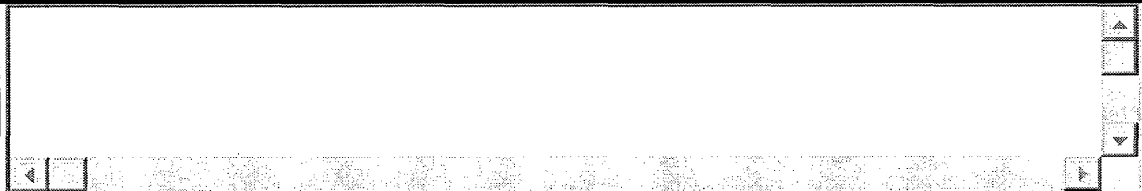
Yes
 No

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If your organization does deal with development? Please give brief description of project goals?



What is the distinctive area of expertise that your company provides?



Approximate your annual compensation in Pulas (salary/wages)

- P60,000 - 90,000
- P91,000 - 120,000
- P121,000 - 150,000
- P151,000 - 180,000
- P181,000 - 210,000
- P211,000 - 240,000
- P241,000 - P270,000
- P271,000 - 300,000
- Greater than P300,000

How do you communicate with your work mates(team members etc)? (1=Never 2=daily 3=weekly 4=monthly 5=at least once a year)

	1	2	3	4	5
Electronic Mail (i.e. email)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Instant Messenger (i.e. AOL chat, MSN chat, Yahoo Chat, ICQ chat etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landline Telephone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cellular phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video conferences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Facsimile (faxes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How important is the telecommunication network stability/quality for your project?

- Not at all (fully paper based)
- Limited impact (paper & electronic)
- Critical (slow down business)
- Very critical (major financial set backs)
- Extremely critical (major processes all fully electronic)

How often has your work been interrupted by telecommunication problems in the past year?

- never
- Limited (1-3)
- Fairly frequent (4-6)
- Very frequent (7-9)
- Extremely frequent (more than 10)

Please explain how your work was affected by telecommunication outage?

- Could not communicate with co-workers (including intra-organization)
- Could not communicate with customers
- Could not with vendors (suppliers etc)

What types of technologies do you depend on, to deliver services that are related to your organization's development goals? Please list?

What kinds of skills and technologies do you think, enable your organization to effectively achieve more of it's development goals? Please explain

To what degree do you agree with the following statement "Technology has allowed me to complete tasks more quickly than using a manual method?"

- strongly disagree
- somewhat disagree
- neither agree or disagree
- somewhat agree
- strongly agree

Which information technology skill sets do you think will be the most important in your organization in the next five years? (Select all that apply)

- Project and Risk management


- Tools (Brio, E-Phipheny, Crystal Reports, Microstrategy, Visual Studio.NET, etc)
- RDBMS (Oracle, DB2, MS SQL Server, Sybase, MS Access, etc)
- Programming Languages (.Net, Java, C++, SQL etc)
- Internet/Web Technology (UML, XML and Web Services, EJB etc)
- Platforms (Windows, Linux, IBM AS/400, Solaris, etc)
- TelCom & Wireless (ATM, Frame Relay, WAP, WML, TCP/IP, etc)
- Embedded systems (Windows CE, Palm OS, RTOS, VX works etc)

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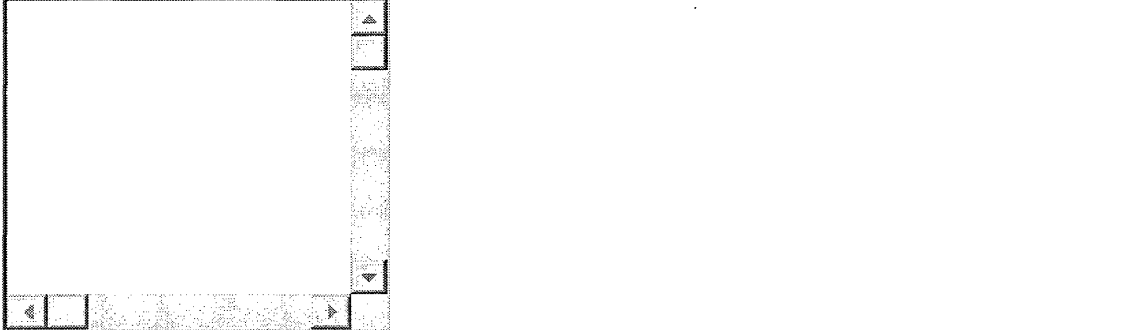
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Which technology skills do you think people in your field will have to possess then (in 5 years)?



Based on your personal view point how is the project you are associated with achieving its development goal(s)? Explain



Which technology could help your organization achieve its Development objectives ?

- Centralized Database System (to allow data to be shared more readily)
- Remote Database (i.e synchronized with central DB weekly)
- Using technology to empower basic users to power users (regional and remote offices)
- Packages (SAP ERP suite, Oracle apps, Peoplesoft, Genysis, Siebel CRM Suite, etc)
- Mobile Devices (e.g cellphones embedded with Windows ce, GPS, cameras, etc)

In what ways do you think technology makes delivery of services by your organization more profitable?

- Improve communication between co-workers (reduce rework, better co-ordination, etc)
- Reduce communication costs (email, instant chat, tele-conference, etc)
- Provide faster access to more timely information (to make more informed decision)
- Provide faster service to customers (reduction of cycle time, process duration, etc)
- Other:

Types of professional industry certifications? (Select all that apply)

- Networking (e.g. CISCO certifications etc)
- Databases (e.g. Oracle, SQL Server, etc)
- Project Management (e.g. PMI, PMP, etc)
- Packages (e.g. SAP ERP suite, Oracle apps, Peoplesoft, Genysis, Siebel CRM Suite, etc)
- Desktop Support (e.g. MCDST, MCAD,
- Hardware (e.g. A+)
- Other:

How does your organization mainly measure the progress of its development goal(s)?

- Weekly review
- Monthly review
- Quarterly review
- Half annual review
- annual report

Types of technology mobile devices used most frequently in your organization?(1=Never 2=daily 3=weekly 4=monthly 5=at least once a year)

	1	2	3	4	5	N/A
PDA (Personal Digital Assistant)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laptop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cellphone (regular)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cellphone with two-way radio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PDA cellphone (i.e. cellphones embeded with Palm OS, Windows CE)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How do you attend meetings? (1=Never 2=daily 3=weekly 4=monthly 5=at least once a year)

	1	2	3	4	5
Video-conference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conference call (phone)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Face-to-face boardroom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What is your area of expertise in your organization (primary responsibilities)?

- Project management
- Technical Support Services
- Data analyst (reporting, system analysis, Quality analyst, etc)
- Application Development
- Other: