
Adoption of information and communication technologies to the development of small and medium scale enterprises (SMEs) in Africa.N C Ozigbo¹ and P Ezeaku²**Abstract**

This study presents Information and Communication Technology (ICT) as a phenomenon that could assist entrepreneurs in small- and medium- scale enterprises fit into globalization to overcome poverty prevalent in most African countries. The study revealed the roles that ICT has played in the lives of entrepreneurs and how ICT can assist individuals develop competitive small enterprises. The study emphasized that the potential benefits of ICT on the development of SMEs in African countries are boundless, that consumers would have all the power to choose the best prices, given the friction free flow of information, and that businesses would find it easier to stay in touch with their customers and make better informed decisions. The study showed that most African countries' SMEs are unable to take advantage of economies of scale and capture market opportunities requiring large productive run, standard inputs and consistent standards, often lack training, market intelligence and the capacity for technological innovation. The study also provided strategic framework to enhance the competitiveness of African countries SMEs to assist them compete both in regional and global markets. The study recommended that more research be carried out to develop in depth the strategic framework of information and communication technology for the development of sustainable small- and medium-scale enterprises in Africa. The recommendation is expected to assist the policymakers plan more positively for the general good of the society.

Introduction

The small and medium scale enterprises (SMEs) have been credited with enormous contribution to the growth of the developed economies of the world. In the same vein, the information and communication technologies (ICTs) and

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particularly the internet have played their own part in those economies.

The American economy, the biggest economy in the world, depends largely on the success of SMEs for innovation, productivity, job growth and stability (Chandler, 1977). The rapid transformations of the high performing Asian countries such as India, Malaysia, Indonesia, Taiwan and Hong Kong have also been hailed as proof that SMEs are major catalysts to economic development. Their importance to any economy hinges on their ability to stimulate ingenious entrepreneurship, to provide employment to a greater number of people, to mobilize and utilize domestic savings and raw materials, to provide intermediate raw-materials or semi-processed products to large scale enterprises and to curtail rural-urban migration. The SMEs provide the cornerstones on which any country's economic growth and stability rests.

Studies have shown that the strategic significance of the information technology to the development of small and medium scale enterprises is hard to underestimate (Chandler, 1977; Porter, 1985; Tasse, 1992; Madon, 2000; UNCTAD, 2002). This technology is transforming the nature of products, processes and even competition itself. This information revolution is sweeping through our economy and no organization or company can escape its effects. It is observed that the result of the revolution is leading to dramatic reductions in the cost of obtaining, processing and transmitting information and at the same time changing the way business is done.

Porter (1995) emphasizes that information revolution is affecting competition in three ways:

- It changes industry structure; and in so doing alters the rules of competition.
- It creates competitive advantage by giving companies new ways to out perform their rivals.
- It spawns whole new business.

Purpose and organization of the Study

This study aims to evaluate the strategic significance of information and communication technologies on the development

of small- and medium-scale enterprises. The study also aims at identifying measures that would assist entrepreneurs establish small- and medium-scale enterprises and respond to the challenges of the information revolution, how advances in information technology affect competition and what strategies to pursue to exploit the technology. The reason why information technology has acquired such strategic significance and how it is affecting all businesses shall also be discussed.

The study is structured into five sections. Section one above consists of introduction; and section two consists of the conceptual framework of ICTs significance in some selected African countries. Section three deals with the analysis and interpretation of data collected from some selected African countries. Section four discusses various measures to increase technological diffusion capabilities of small- and medium-scale enterprises and the strategic significance of information technology. Section five concludes and recommends the way forward.

This study, therefore, intends to reveal the strong link between the levels of investments made by the SMEs with respect to the adoption of information and communication technologies in some selected African countries.

Conceptual framework

Various national as well as international conferences and seminars have been conducted and many definitions and categorization of small and medium scale enterprises (SMEs) have been attempted and quite a lot of literature abounds (Brautigam, 1977; Altborg, 1977; Ariyo, 2000; OECD, 2004). According to Brautigam (1997), the small and medium industries and equality investment scheme (SMIES) define small and medium enterprise as any enterprise with a maximum asset base of at least \$200 million excluding land and working capital and with the number of staff employed not less than 10 or more than 300. SMEs are also defined along a broad continuum of size and type. In terms of size, measures used to classify SMEs include employment, assets and revenue. Ariyo (2000) noted SMEs to be the engine room for the development of any economy, because they form the bulk of business activities in a growing economy.

According to Ariyo (ibid), this is manifested in the following ways:

Employment generation:

- 30% contribution to global GDP
- Employment generation capacity of about 58 per cent of global working population
- Play the role of principal safety-net for the bulk of the population in the developing economies.
- Their labor intensity structure accounts for their recognition as a job creation avenue.

Rural development:

- SMEs constitute major avenues for income generation and participation in economic activities in the lower income and rural brackets of developing societies.
- Employment opportunities offered apparently reduce rural-urban migration and allow even development.

Economic growth and industrialization:

- National economic development hinges on entrepreneurial energy of vibrant SMEs as most big business concerns grew from small scale to become big icons.

Better utilization of indigenous resources:

- Considerable low capital outlay required for setting up SMEs enables them to convert minimal resources into productive ventures.
- Offer veritable outlets for technological advancement especially in business with rudimentary technology requirements.

It is widely acknowledged that the development of a country's industrial capabilities requires investments in human capital. With the pace of technological change, the spread of information technologies and intensifying competitive pressures, the need for specific skills have become even more demanding. While general industrial development in the past required simply improving the

basic educational system and encouraging in-firm training, the emerging competitive setting calls for greater emphasis on high-level specialized training to meet industry's needs. One central area in this regard is information and communication.

Information and communication technologies are viewed as near-magic solutions to problems (Tasseey, 1992; Faye, 2000; UNCTAD, 2002). According to these authors, ICTs are extremely powerful tools that have proven useful in many African countries. Traditional media and new ICTs have played a major role in diffusing information to rural communities. Although little empirical evidences of the benefits of ICTs are found in the literature, there are great potentials of ICTs as tools for enhancing people's daily lives by increasing access to information relevant to their economic livelihood.

ICTs are also found as tools that open new opportunities, have a far more enabling role in building the capacity of the intermediary institutions, assist in creating employment opportunities in rural areas by engaging telecaster managers and information technology technicians (Altenbury, 1977). Such centers have helped to bridge the gap between urban and rural communities and reduce the rural-urban migration problem. The centers also provided training and those trained have now become small scale entrepreneurs in their respective areas. In Nigeria, for example, ICTs have helped to impact on the livelihood strategies of small scale enterprises and local entrepreneurs as well as in the enhancement of various forms of social capital (Andersan, 1999; Ajayi, 2000). The new information and communication technologies are among the driving forces of globalization, bringing people together and bringing decision makers' unprecedented new tools for development. Since the 1980s, ICT has increasingly been used to achieve economic and social goals (Mckenney and Warren, 1994).

A variety of countries, both developed and developing have made considerable progress in promoting information and fostering enabling environments for new technology. For the past few years, most countries in Africa have devoted considerable resources to information (Morales-Gomez *et al.* 1998; World Bank, 2002). It is further noted that in the wake of liberalization, many African countries have made economic management their

prime agenda. Information technology was identified as the key to the re-invention of governments. African countries are of the view that the information revolution and the extra-ordinary increases in the spread of knowledge have given birth to a new era, one of knowledge and information which affects directly economic, social, cultural and political activities. Governments worldwide have recognized the role information and communication technologies could play in socio-economic development (World Bank, 2002).

A number of countries, especially those in the developed world and some in developing countries, are putting in place policies and plans designed to transform their economies into an information and knowledge economy. Developed countries have put in place comprehensive ICT policies and plans and view ICTs and their deployment for socio-economic development as one area where they can quickly establish global dominance and reap tremendous pay off in terms of wealth creation and generation of high quality employment (Branscobe, 1993; UNCTAD, 2002). Other countries regard the development and utilization of ICTs within their economy and society as a key component of their national vision to improve the quality of life, knowledge and international competitiveness.

As Faye (2000) pointed out, ICTs are offering less developed countries a window of opportunities to leapfrog the industrialization stage and transform their economies to high value-added information economies that can compete with the advanced economies on the global market. According to Ajayi (2000), the revolution taking place in information and communication technologies have been the central and driving force for the globalization process, and that both the developed and the developing countries cannot afford to miss out on the opportunities these technologies are creating.

Stiglitz (2002) emphasizes that information and communication technology is basically an electronic based system of information transmission, reception, processing and retrieval which has drastically changed the way we think, the way we live and the environment in which we live. As Kofi Annan (1999) has put it:

The internet holds the greatest promise humanity has known for long-distance learning and universal access to quality education, that it offers the best chance for developing countries to take their rightful place in the global economy.

Information and communication technologies are increasingly playing an important role in organizations and in society's ability to produce, access, adapt and apply information, and are being heralded as the tools for the post industrial age and the foundations for knowledge economy due to their ability to facilitate the transfer and acquisition of knowledge (Morals-Gomez and Melesse, 1998). These views seem to be shared globally, irrespective of geographical location and differences in income level and wealth of the nation.

The digital revolution offers developing countries unique opportunities to actively participate in the world developmental revolution which has created new wealth and sustains one of the largest and unbroken growths in some economies notably North America and Europe (Fagerber, 1996; Lall, 2000). The biggest beneficiaries have been countries that are quick to identify the strategic relevance of information technology in the rapid transformation of national economic development. It has also contributed significantly in developing and establishing the economies of Asia in the league of newly industrialized economies. Africa is a huge market and for instance Nigeria, Cote d'Ivoire, Ethiopia, Kenya have the choice of either converting their population plus their low-wage economy into a strong IT powerhouse in global markets, or end-up as merely a large market for the consumption of IT products and services (Faye, 2000; ECA, 2005).

To reverse the above trend, there is a need for African countries to draw-up IT policy that should define what the SMEs seek to get out of this revolution and how it intends to achieve its objectives. With this in mind, there is great potential for African countries for local development of IT brain power for export to bridge the IT skills gap in North America and Europe. What is now needed is to take the technology a step further by encouraging the local manufacture of hardware components as well as local development of software through the establishment of vibrant and efficient small and medium scale enterprises and support for

partnership with the private sector. African countries should look forward prospectively and participate actively in building technological capabilities such as establishment of adequate information infrastructure and human capacity building to suit their needs (Moyo, 1996; Madon, 2000; ECA, 2005). Steps have to be taken in order to access the benefits of the new technology while minimizing destabilization, dislocation, disparities, disruption, distortions and even digital slavery associated with the current global trends. African countries must develop mechanisms and institutional arrangement for creating awareness and understanding of the nature, pace, consequences and implications of the changes resulting from the new technology.

Research methodology and findings

This study focused on the people and the information and communication technologies they use in achieving the development of small and medium scale enterprises. An understanding of the people, the ICTs they use and the social and cultural contexts within which they work is very important (Meyers, 1997). The qualitative research approach was used for the study because it aimed at evaluating the strategic significance of ICTs on the growth of SMEs. Structured interview method was adopted and primary data was captured through questionnaire.

A total of thirty small and medium scale enterprises across six sectors in Nigeria were surveyed. Indicative example of the results is presented in Tables 1 and 2 below:

Table 1. Data collected on investment and growth

Year	Investment on ICT (\$)	Achieved Benefits	Achieved Target	% of Achieved target
2001	1520	4680	2680	15.5
2002	1680	4830	2760	16.1
2003	1740	4980	2840	16.4
2004	1830	5130	2920	16.9
2005	1940	5280	3000	17.4
2006	2010	5430	3080	17.8
Source: Survey data			Total = 17,280	100

Table 2. Scores for investments and growth

Year	Investments in ICT (\$)	Growth of investment	% of growth
2001	1520	10040	16.3
2002	1680	10140	16.4
2003	1740	10240	16.6
2004	1830	10340	16.7
2005	1940	10440	16.9
2006	2010	10540	17.1
		Total = 61,740	100

Source: Survey data

Table 1 shows that as the level of investment increases, there are also noticeable increases in the levels of achieved benefits as indicated in the percentage of achieved target.

In order to test the degree of correlation between investment and growth, the data in table 1 were arranged as shown above. The analysis on table 2 shows that as the levels of investment on ICTs increases, the growth levels also increase as reflected in the percentage of growth level, with the Pearson's correlation coefficient of 0.978. It is clear that a very strong relationship exists between the levels of investments made on ICT and the levels of growth. The extremely high value of Pearson correlation coefficient provided strong evidence of the relationship.

The study further demonstrates that the more an enterprise increases its investments in both its business operation and the adoption of ICTs, all other things being equal; it would record an appreciable increase on the level of its growth. After surveying wide-range of enterprises, we found that information technology is changing the rules of competition. First, advances in information technology changes the industry structure. Second, information technology is found to be an important lever that enterprises use to create competitive advantage. Third, the information revolution is found spawning completely new businesses. These three facts are critical on understanding the impact of information technology on the enterprises and in formulating effective strategic responses. We also found that as

information technology becomes more widespread, the opportunities to take advantage of a new competitive scope continue to increase.

This study has shown that the importance of the information revolution is not in dispute. The question is not whether information technology has a significant impact on the enterprises competitive position, rather, the question is when and how this impact might strike. The study has shown that enterprises that anticipate the power of information technology might be in control of events. Enterprises that do not respond might be forced to accept changes that others initiate and might find themselves at a competitive disadvantage.

There is great optimism over the potential for information and communication technologies to promote SMEs. This study has provided solid empirical evidence to support such optimism.

Measures to increase technological absorptive capabilities of small and medium scale enterprises

This section of the study elaborates on the measures to increase technological absorption capabilities of small and medium scale enterprises. As shown in this section, the vast majority of countries, developed and developing alike, rely on the dynamism, resourcefulness and risk-taking of small enterprises to trigger and sustain processes of economic growth. Many African countries do not have the legal and regulatory framework that supports the growth of SME sector. In the case of Uganda, an extensive number of outdated and cumbersome laws and regulations increased the transaction costs of SMEs, thereby hampering their economic performance and growth (UNCTAD, 2002).

Within the general context of African countries, the problem has often been the governments' inconsistency and lack of transparency in implementing policies. Take the case of Nigeria, for example. In recognition of the key role played by SMEs, the government formulated special policy measures and programs to encourage their development. It included favorable laws and regulation on contracts, leasing and corporate tax as well as fiscal and export incentives for SMEs. However, the political will for proper implementation was never there. Corrupt practices often

divert the support programs from the original beneficiaries (Faye, 2000; Ajayi, 2000).

In Senegal, entrepreneurs complained about the complex administrative procedures for trade transactions and the lack of transparency in the processing of administrative matters. However, the government of Senegal has been trying to overcome these obstacles through the promotion of "Trade Point Senegal." The latter appeared to put the country on a course towards the global trade arena by means of a telematic infrastructure which would promote external trade and help install an export push strategy (Lall, 2000). The infrastructures of "Trade Point Senegal," its export promotion mechanisms, its approach to inter-connectivity management are innovative factors in the global trade environment. In South Africa, SMEs are considered important instruments for employment generation and economic empowerment of formally disadvantaged groups (Madon, 2000).

The government of Namibia identified in its policy three intervention areas to improve the environment for SME development (UNCTAD, 2002). Emphasis has been placed on solving long delays in processing permits, licenses and approvals by introducing a one stop facility for the processing of all permits. Tunisia and Mauritius are examples of good practice in providing an appropriate and conducive regulatory environment for SME development. Fiscal incentives for SME include 15 per cent company tax and no customs duty on production equipment.

In spite of huge investment in physical infrastructure, many African countries still have very poor and inadequate facilities for industrial development. For instance, Nigeria lacks good road network in the rural areas for proper and efficient transport of agricultural products. Only about 40 per cent of the country has pipe-borne water. The provision of electricity is inadequate and very limited in rural areas. In Cameroon and Gabon, the roads as well as railway transport that link production centers and markets are in bad condition. Such poor conditions in basic infrastructure facilities hamper industrial development in general and SMEs competitiveness in particular. Eshetu (2000) equally reports that in Ethiopia, the complexity of the custom systems and the many forms and declarations required have had a negative impact on the

general business climate, diverting entrepreneurs' efforts from more productive tasks.

Some African countries such as Mauritius and South Africa have good infrastructure facilities that have provided a competitive environment for productive activities (World Development Indicators, 2003). In the area of telecommunication, Mauritius has highly developed postal, fax and telex services as well as an extensive telephone network. South Africa's infrastructure is considered the best in Africa. It has sizeable and efficient ports, a good road network and good air links.

Tassey (1992) pointed out that solving the problems of African countries involves increasing the technological absorptive capabilities of small and medium scale enterprises. According to Tassey (*ibid*), the effective use of diffused technologies by SMEs requires organizations, workforce and follow-on technical changes. Branscombe (1993) and Mansell et al. (1998) have emphasized that technology diffusion can be contrasted with technological innovation, which deal with the development of knowledge, products or processes. In many cases, diffused technologies are neither new nor necessarily advanced, and may be acquired from variety of sources including private vendors, customers, consultants and peer firms as well as public technology centers. Garsm (2000) emphasizes that technology also diffuses through the internal 'catch-up' efforts of the SMEs, the transfer and mobility of skilled labor, the activities of professional societies and through the trade and scientific press.

To address these concerns, wide varieties of policy measures have to be pursued to promote or accelerate the diffusion of technology. Numerous typologies have been put forward to categorize these efforts. These classifications demarcate policy measures by functional types, by what problems they address and by their aim. Some typologies emphasize the operational focus of policy measures, distinguishing between supply-side instruments which seek to augment factors such as sources of information and demand-side instruments, which aim to increase the internal willingness to take-up technology through mechanisms like challenge grants, peer learning or public procurement.

Many recent technology diffusion measures have been particularly focused towards small and medium sized enterprises. Definitions differ by country as to which comprises an SME, but generally the cut-off point is those enterprises with fewer than 500 employees. Branscombe (1993) stresses that effort to enhance the technological diffusion capabilities of SMEs involve complex series of issues of information management, training and financing, and raise questions of structure, relationships, attitude, policies and best practices. Porter (1985) notes that the challenge for technology diffusion policy is mostly not to create entirely new strategies but to improve the diffusion promoting performance of current elements and make them work together more effectively.

This study identifies specific measures that African countries should pursue to increase the diffusion capabilities of SMEs, which include the following measures:

Table 3: Specific measures to increase ICT diffusion capabilities in Africa.

Measures	Description
At firm level	
1) Benchmarking	a) Increase awareness of best technology b) Use and exposure of SMEs to best practices through benchmarking services on technology demonstration
2) Strategy development	a) Aiding SMEs to develop longer term technology, up-grade paths in the context of broader business plans.
3) Information provision	a) Enriching the information resources available to SMEs, including information about technology trends and opportunities and responses to specific information needs.
4) Implementation	Assisting SMEs to implement new technologies through in-plant technical assistance and problem-solving.
5) Training	Increasing human capital and expertise to understand, absorb, operate and improve technology within SMEs
6) Teaming	Assisting the managers and workers of SMEs to work together, to find joint solutions to operational, business and technological problems
7) Marketing	Aiding SMEs to commercialize new technologies, particularly new product technologies through assistance with pilot production, marketing and procurement
8) Cost-sharing	Reducing financial barriers to the technology
Business infrastructure	
1) Qualification	Upgrading the capabilities of complementary private service providers to assist SMEs.
2) Best practices	Identifying, promoting and disseminating best practices among customers, vendors, private support services in support of SME technology diffusion
3) Networking and collaboration	Seeding industrial networks and other collaborative projects to encourage SMEs to be involved in shared efforts to understand apply and commercialize new technologies.
Social infrastructure	
1) Facilities	Improving facilities, physical infrastructure and the available new technology equipment, software and other technical resources.
2) Technical assistance	Technical assistance for program development and operations.
3) Training	Training of service personnel to work effectively with SMEs.
4) Linkages and Industry feedback	Promotion of closer linkages between technology development and SME users and incorporation of SME feedback into the process of new technology.
5) Partnership	Promotion of partnership among different service providers to co-ordinate assistance to SMEs. Also, promoting inter-regional and international partnerships and information flows beneficial to SMEs.
Policy and attitudes	
1) Leadership	Policy leadership in raising attention to SMEs and their technology needs and in focusing public and private resources.
2) Policy dialogue	Promoting forums and other exchange opportunities where SME need and opportunities can be represented.
3) Co-ordination	Develop coordinated policy frameworks to guide program measures and service delivery.

Source: survey data

As shown above, the important developmental role of SMEs is beyond doubt. The fact that SMEs are critical part of the private sector and contribute greatly to economic development, both in terms of economic growth and of equity does qualify SMEs for specific treatment and more importantly for subsidization.

Small enterprise development needs to be seen as an integral element of overall economic and industrial development. As is the case with large enterprises, small enterprises can only prosper within a healthy economy and a sound policy framework (OECD, 2004). This includes the encouragement of entrepreneurship through facilitating the start-up of business ventures. In other words, a favorable operating environment for small enterprises needs to be ensured. Policies should be focused on removing constraints to SMEs development rather than on providing special privileges to them.

All in all, small enterprises, in their various manifestations, have become the target of countless policy statements, incentive packages, financial support schemes, business development services, special programs and initiatives. Many of these efforts have suffered from lack of clarity of purpose, unclear definition of objectives, failure to identify target enterprises, ineffective implementation and insufficient measurement of impact.

Conclusion and recommendations

Conclusion

This study provided the strategic framework to enhance the competitiveness of SMEs in African countries. The purpose was aimed at identifying priorities for policy makers and practitioners and to provide the building blocks for a strategic framework to help African entrepreneurs compete both in regional and global markets. The study did not intend to provide a blue print for action in African countries because of the fact that they assume different stages of development. However, a number of issues were raised and common priorities have emerged from the study.

The study identified that most African countries lack the technical skills formation and that political instability, macro-economic

turbulence and corruption and deficient infrastructure seem to have prevented the region from attracting foreign investment, limiting its ability to participate in the global economy. However, exceptions within the region were noted. Countries such as Morocco, Mauritius, South Africa and Tunisia have shown promising signs in their industrial strategies, exhibiting considerable human resources and technological capabilities.

The study revealed that the basic infrastructure for industrial development in some African countries were weak. The lack of functional and reliable basic physical and information technology infrastructure indeed weighed against the competitiveness of SMEs in Africa. Improving infrastructure should be a priority if SMEs development is to be accelerated. The importance of investing in infrastructure development is widely acknowledged and accepted. To succeed, SMEs require an appropriate policy, legal and statutory framework. Many obstacles facing SMEs stem from the general business environment. Often, policies not aimed at SMEs have a direct impact on them, sometimes putting them at a disadvantage, making it difficult for them to obtain human, technological and financial resources needed to improve their quality and productivity. On the whole, small and medium scale enterprises make-up more than 90 percent of businesses in Africa. The enterprises suffer high mortality rate as they struggle against odds. Most of them operate at the lowest rung of the cash economy, competing and surviving on the basis of low cost, low price and low quality. These constraints are partly due to the lack of management and technical skills, which limits their ability to respond effectively to business opportunities. This in turn seriously hinders their survival and growth.

Recommendations

Information technology is permeating the value chain at every point, transforming the way value activities are performed and the nature of linkages among them. Moreover, it is affecting competitive scope and reshaping the way products meet buyer needs. These basic effects explain why information technology has acquired strategic significance and is different from the many other technologies businesses use. The new technology has powerful effect on competitive scope and allows companies to coordinate value activities in far-flung geographic locations.

The paper recommends that more research be carried out to develop in depth the strategic framework of information and strategic communication technology on the development of sustainable SMEs in African countries.

There is also the need for further research in the area of the impact of ICT on not just SMEs but business enterprises in general. Such efforts might assist policy makers in both government and commerce to plan more positively for the general good of the society.

Since it has been established that ICTs assist enterprises to grow, this paper recommends that every SME should integrate the concept developed in this study into their business practices and operations.

It makes more sense to use much of the financial capabilities available than shying away from taking advantage of these emerging technologies. The future survival of every business venture rests squarely on its ability to manage its human resources with its ICT resources.

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