

INCORPORATING E-COMMERCE TECHNOLOGIES INTO SMALL AND MEDIUM MANUFACTURING INDUSTRIES IN TANZANIA

M. A. M. Victor and S. A. Athumani

Department of Engineering Management and Entrepreneurship, University of Dar es Salaam
P.O. Box 35131, Dar es Salaam, Tanzania

***B**usinesses worldwide are making use of the new opportunities which have been brought up by the developments in Information and Communication Technologies (ICTs), particularly the Internet. Big businesses, especially those multinationals in the developed nations have invested heavily on these technologies and they are reaping their benefits. This paper reports on a study conducted to look at the key issues to be considered in order for small and medium enterprises (SMEs) in Tanzania be able to position themselves technologically in what is termed as E-commerce. Cost and benefits, policy, training and infrastructure issues are looked at in this study.*

***Keywords:** SMEs, ICTs, E-Commerce, Business competition, Information systems.*

INTRODUCTION

Electronic commerce (E-commerce) practices have emerged as a result of Information and Communication Technologies (ICTs) developments. Andersen Consulting [1999] estimated that the global market (worldwide) for E-commerce exceeded US\$ 100 billion by 1999. The US Department of Commerce estimated that business-to-business E-commerce would grow from US\$ 43 billion in 1998 to US\$ 1.3 trillion in 2003, amounting to between 5% and 7.2% of the total world sales.

Commercial connection is the fastest growing component of the Internet today, as more and more companies move to establish closer links with customers, business partners, vendors and information resources via the network [Montealerge, 1996]. However, the world of E-commerce is not basically concerned with the aspect of facing the client over the Internet, but rather the integration between internetworking technologies and the core business processes.

The Tanzania small and medium enterprises contribute a reasonable share in the national income and they are divided into two categories, namely the formal and the informal enterprises. Calcopietro and Massawe [1999]

noted that SMEs are estimated to contribute 30-35% of the gross domestic product (GDP). The sector consists of more than one million business activities engaging 3-4 million persons, that is, about 20-30% of the labour force. They further stressed that the manufacturing sector is small, accounting for 8% of GDP in 1997. However, its contribution has been gradually improving since then.

Barriers that are facing SMEs in Tanzania are innumerable and are touching almost every corner of the sectors. Calcopietro and Massawe [1999] stressed that the constraints that hamper the development of a vibrant SME sector in Tanzania can be summarized in five main categories: the macro-economic and policy environment; physical and technological infrastructure; the banking and finance structure; the legal and regulatory framework; and the marketing capabilities and associated linkages.

Small businesses are different from large businesses in several ways. They have a small number of employees and a small balance sheet total. Exact figures will often depend on the location of the enterprise, as what could be a small enterprise in say the USA may be a medium or bigger firm in Tanzania. However,

for the case of the manufacturing sector in Tanzania, Verspreet and Berlage [1998], defined small enterprise as enterprise with six to twenty employees and medium enterprise as those enterprise with more than twenty and less than one hundred employees. Small firms are often less structured and less formal, with fewer fixed procedures. Fewer fixed procedures in SMEs, in turn means less opportunity to automate and introduce IT. Closely related to this, the smaller the company, the less likely it is to have its own IT department, with resident expertise. However, successful introduction of E-commerce technologies into a business is never that much easy, and the history of such IT projects has shown that systems development methodology and analysis is important [Coccia, 1997]. But the introduction of such technology into SMEs' business processes is not the same as previous generations of IT, and it surely needs a new approach to systems analysis.

The advent of Internet-based E-commerce offers considerable opportunities for firms to expand their customer base, enter new products and markets, and rationalize their businesses [Mason et. al 1996]. But problems of definition and measurement of E-commerce have made it difficult to gauge the real situation of perceived opportunities and how to adopt the technology. However, adoption of information and communication technologies is one side of the story. Of greater importance is the use made of them.

This paper reports on a research aimed at answering the following questions:

- What are the causes of key changes that necessitate considerations in new technological-oriented business concepts in the Tanzania SMEs?
- What are the responses by SMEs toward E-commerce technologies adoption with respect to their technological profile, capital outlays and expertise as well as how does the decision making among SMEs affect the rate of diffusion of E-commerce technologies?

- How can the integration of E-commerce technologies together with business processes in SMEs be done by making sure that meaningless adoption and diffusion of such technology is avoided?

The paper starts by giving a brief on the problem statement followed by study findings and analysis, and finally a conclusion.

PROBLEM STATEMENT

Manufacturing Industry today characterises a perplexing and an ever-changing global market place. Customers have fewer resources to buy products and services. They are intolerant of performance below standards and anticipation. Budgets are somewhat rigid and are getting tighter as financial constraints force industrial companies and customers to become inclined [Hicks, 1999]. Competition is fierce. Furthermore, Hawking [1997] pointed out that, outsourcing calls for an integration of services, which is a more complex situation than when the services are dwelled within the same organization. Product delivery times must be reduced, with no loss in quality. Yet Rawlings [2000] stressed that cost has tied up with performance as a discriminator in business rivalry, the cost and time frames take into consideration the entire life cycle of a product or service.

Whilst SMEs in Tanzania are slightly aware of the increased use of technology for business, they are predominantly concerned with more immediate and fundamental issues like endeavouring to make a profit, coping with regulatory and taxation matters and vague competition. Most of these SMEs have a tendency of doing business just as it comes, with no future planned programs for their businesses.

The problems with our SMEs lie within the level of technology so far acquired and the inertia by actors in the sector to introduce and adopt new technologies without hampering their capabilities. The missing component of

the research agenda on SMEs is on the upper-scale of the sector. Very little knowledge exists in terms of opportunities for technology development, innovation, business incubation, innovative facilities to promote SMEs access to long-term investment, joint ventures with foreign firms etc. [Calcopietro and Massawe, 1999].

The level of technology for SMEs in Tanzania is low with these enterprises trying to manoeuvre through other approaches, which at the present are prone to changes and perhaps, elimination. Calcopietro and Massawe [1999], further stressed that upgrading technology in SMEs is vital for the development of the sector and the economy at large. A paper by UNDP-Africa [1994] noted that the new information technology, which is changing the nature and substance of competition, opens up vast new opportunities for African countries. It further stressed that the ability to seize these opportunities is constrained by the continent's relatively low level of technological development.

Technology has hindered the productivity levels and efficiencies in the manufacturing sector in Tanzania, which made some SMEs to collapse. The technology in the SME sector is supposed to be utilised effectively and efficiently by correctly integrating it with the business/production processes thus giving SMEs more improved productions, which in turn result into improved profits due to low costs. The profits can be used for instance, to invest in other areas with the technology capabilities that SMEs would have acquired in the first place. Vespreet and Berlage [1999] noted that the purpose of technology development and transfer is to improve the access to technology in order to increase the productivity and the quality of the product and to reduce costs. They further state that the transfer of technology has to go together with the improvement of the technological capacities of the enterprises, like ability to make the right investment decisions and operate and maintain the equipment.

E-commerce technologies are adoptable but require an expertise to adopt, diffuse and eventually implement. For instance when SMEs are becoming inter connected so that communications between businesses is improved. It will gradually be minimizing such costs, which would otherwise be incurred in another way. Vespreet and Berlage [1999] noted that the improvement of business linkages between enterprises reduces transaction costs and can be a source of demand and technology transfer.

Business attitudes and resistance to change into new business paradigms among the entrepreneurs and management, as well as limited levels of dedicated resources to implement and manage the change process, prevent SMEs in Tanzania from embracing E-commerce. Mark and Claudio, [1992] in their study results, indicated that enterprises themselves do not regard product or production technology as a major operational problem. It may be assumed, however, that the technological capability of Tanzanian manufacturing sector is generally inadequate. First, most enterprises in Tanzania supply only the domestic market without foreign competition and therefore the market pressure for technological development has been low [Mark and Claudio, 1992]. Second, SMEs are mainly focusing on their economic survival and there is limited urge and motivation to introduce technology for its own sake.

STUDY FINDINGS AND ANALYSIS

A study was conducted in Dar-Es-Salaam region to establish how SMEs in Tanzania are striving to incorporate the capabilities of E-commerce in their business. The study involved collection of both quantitative and qualitative data from the surveyed SMEs across the city whereby out of 40 SMEs contacted, 30 responded. Responses were gathered from reasonable range of SMEs' categories or sectors so as to ensure coverage of a wide range of differing business sectors across the manufacturing industry. The sectors

include industrial and textiles, pharmaceuticals, drinking water, timber processing, agriculture products, and spare parts manufacturing. Table 1 summarise the response rates by sectors.

The information sought were based on the key issues including the revolution that is being brought about by E-commerce, new business concepts and the new competitive challenges, SMEs issues and concerns, policy issues and training needs, Information Systems and E-commerce justifications, and expected

contribution of E-commerce to the SMEs. These issues originated from the benchmarking study by Coccia [1997].

In the findings, a scale of 0 (do not know) and 1 (low) to 3 (high) in support of the issues, were collected from the respondents and summarised (percentages of respondents) in Tables 2 to 6. The mean values of the responses were obtained as shown on the last column of each table. A mean value above 2.5 on average may be interpreted as strong

Table 1: Percentage of Respondents

<i>Enterprise Sectors</i>	No. of Enterprises Surveyed	Actual No. responded	%age responded	%age of total actual response
Food Processing	3	1	33.3%	3%
Spare Parts Manufacturers	2	1	50%	3%
Industrial and Textile	11	10	91%	31%
Pharmaceuticals	9	6	66.7%	21%
Agricultural Products	4	2	50%	7%
Timber Processing	6	4	66.7%	14%
Drinks (water)	7	6	85.7%	21%
TOTAL	40	30	75%	100%

Table 2: The E-commerce revolution, new business concepts and the new competitive challenges

Issue	Response in percentage (%)				Mean value
	High/Strong (3)	Moderate (2)	Low (1)	Do not know (0)	
The need to conduct pilot projects to gauge the potential benefits of E-commerce	10	13.33	56.67	20	1.13
The cost of constructing and operating E-commerce is high	42	36.4	3.6	18	2.03
Internet Technology has/ will have an impact on enterprise day-to-day activities	40	26.67	6.67	26.67	1.80
Rationale for SMEs to get connected to E-commerce services in order to identify competitors	16.67	26.67	43.33	13.33	1.47
E-commerce Technology as part of global digital economy will be strong in the near future	32	36	28	4	1.96
There shall be implications to market structures due to acceptance of E-commerce among individual enterprises	16.67	50	20	13.33	1.70
Consideration on integration and innovation between E-commerce and	13.33	33.33	43.33	10	1.50

support, while for values between 1.5 and below 2.5 the interpretation of moderate support is used, and values below 1.5 are considered in the low support category.

As summarised in table 2, there seems to be no need to conduct pilot projects in order to gauge the potential benefits of E-commerce. Perhaps SMEs are not sure and confident on whether the technology could really support their businesses. The cost of constructing and operating E-commerce is moderately high as perceived by SMEs. The factor that seems to hinder SMEs to operate such technologies

In case of challenges that SMEs are facing, almost all challenges have shown a remarkable impact on SMEs as shown in Table 3. Investment capabilities seem to be insufficient to cater for IT infrastructures by SMEs. In total, it can be deduced that investment capabilities are low among our SMEs. On the issue of awareness, SMEs seem to be moderately aware of the changing technologies that move into their business environment.

Enterprises are slightly concerned with the issue of E-commerce technologies. But how to consider the technology into their processes is

Table 3: SMEs Issues and Concerns

Issue/Concern	Response in percentage (%)				Mean value
	High/Strong (3)	Moderate (2)	Low (1)	Do not know (0)	
Investment capabilities within SMEs are low and not sufficient to cater for Information technology infrastructures	0	39.28	53.58	7.14	1.32
SMEs are aware of E-commerce technologies and so have not yet sensed its indications	36.67	26.67	20	16.67	1.83
Enterprise concern about the issues related to E-commerce technologies	16.67	54.16	8.33	20.83	1.66
Implications to be caused by E-commerce technologies will affect enterprise's business profile and disturb market shares	13.33	16.67	46.67	23.33	1.2
Decision-making affects the adoption of E-commerce technologies in the enterprise	23.33	30	33.33	13.33	1.63
Attitude towards new concepts affects adoption of E-commerce technologies	50	20	20	10	2.1
Consideration in diffusion of E-commerce technologies into enterprises	28	24	32	16	1.62

could be the comparison to be made between the initial investment costs and the expected benefits that will offset these initial costs.

The Internet technology will have impact on SMEs business processes. But the rationale to get connected to E-commerce services is still unappreciated by our SMEs. E-commerce technologies are moderately accepted by SMEs. Moreover, SMEs moderately agreed that their markets would be implicated by E-commerce technologies. Consideration on innovation and integration between E-commerce technologies and business processes is not a big issue to SMEs.

yet unanswered. SMEs seem not to believe that E-commerce technology will affect their business profiles and thus affecting their shares in the prevailing market.

Decision making process affects moderately the adoption of E-commerce technologies. But it could even be higher than this, may be because the study involved a considerable number of enterprise owners who, probably might not wish to incline to the issue knowing that they would be undermining themselves. There seems resistance to change to consider other concepts in businesses. SMEs are somewhat inflexible towards new technologies.

Yet SMEs have shown a keen interest in diffusing these technologies into their respective enterprise processes.

There seems to be no awareness on whether there is a policy focusing on technology as can be seen in Table 4. With the fact that SMEs are unaware of the technology policy, they have shown a moderately high attitude towards the policy formulation for SMEs. Enterprises have also shown their concern to the Government to fully participate in the concept of adopting E-commerce technologies. The need to undergo some form of training among employees is moderately supported.

themselves if at all this technology will offset the initial costs and at the same time become beneficial to the enterprises. Also SMEs regard the acceptance of E-commerce technology with respect to organizational and customer requirements as fairly justifiable. But it seems that it depends on the nature of the business and type of customers. Yet the technology is unappreciated when it comes to regard it as a strategy for competition in the business or even as a support to the business services.

When it comes to the expected contribution of E-commerce to the enterprise, Table 6 summarise the results, where it is seen that provision of information about products is

Table 4: Policy Issues And Training needs

Issue	Response in percentage (%)				Mean value
	High/Strong (3)	Moderate (2)	Low (1)	Do not know (0)	
Awareness of the Technology policy in Tanzania	3.33	10	76.67	10	1.07
Attitude towards the policy for SMEs	46.67	43.33	10	0	2.37
Enterprise concern about Government participation on adoption of new technologies such as E-commerce.	48.27	20.69	17.24	13.79	2.03
The need to undergo some form of training among employees prior to adoption of E-commerce	53.33	30	0	16.67	2.20

The cost of developing the system is perceived to be high as summarised in Table 5. This includes the initial costs for purchasing software, hardware and expertise in order to establish the system thus SMEs find it difficult to have the system. Return on Investments (RoI) is among the most considered justifier by SMEs while assessing E-commerce rationalities. SMEs seem to be asking

moderately supported. However, when it comes to the issue of support to automatic payments, there seem to be a lower expectation as revealed by SMEs. Furthermore, SMEs do not seem to expect the use of E-commerce technologies with respect to on-time product delivery. Through E-commerce, SMEs have a slightly moderate belief that it can somehow be used to identify market segments in order for

Table 5: Information Systems and E-commerce Justifications

Issue/Concern	Response in percentage (%)				Mean value
	High/Strong (3)	Moderate (2)	Low (1)	Do not know (0)	
Cost of developing the system	56.67	20	0	23.33	2.10
Return on Investment (RoI)	43.33	46.67	0	10	2.23
Organizational issues and customer requirements	40.74	51.85	0	7.41	2.26
Competitive advantage	20	23.33	0	56.67	0.67
Business Support services	34.48	31.03	10.34	24.14	1.76

them to experience better revenues. With respect to placement of orders by customers, SMEs moderately consider E-commerce technologies to be useful. The use of E-commerce technologies in product design is moderately low as perceived by SMEs.

their business and E-commerce plans. This should go together with ensuring that all associated partners such as government agencies, suppliers, consumers and other institutions are motivated to use E-commerce facilities.

Table 6: Expected contribution of E-commerce to the Enterprise

Issue/Concern	Response in percentage (%)				Mean value
	High/Strong (3)	Moderate (2)	Low (1)	Do not know (0)	
Support automatic payments	6.67	26.67	46.67	20	1.20
On time product delivery	0	33.33	50	16.67	1.17
Provide information about your products	48	28	12	12	2.12
Use E-commerce to identify market segments	16.67	40	30	13.33	1.60
Customers placing orders automatically	30	30	13.33	26.67	1.63
Use E-commerce in product design by collaborating with customers	17.24	41.38	13.79	27.59	1.48

CONCLUSIONS

The need to adopt and harness E-commerce technologies is clear. SMEs are facing challenges that if not attended would result to the gradual decline of the manufacturing industry, if not the rest of the sectors in a developing country like Tanzania. E-commerce technologies would support enterprises in reengineering and restructuring their business processes. Furthermore, enterprises would be able to position themselves better, through acquired improved processes and intense network of information.

There are several interesting findings with regard to the current situation of E-commerce, as well as with respect to the perceived contribution of the E-commerce to SMEs. Analyses of the data have revealed possible SMEs strategies for developing E-commerce applications. However, for the enterprises to exploit the full potential of the Internet, and develop their E-commerce facilities, they need first to improve their management attitude and approaches towards the technology in order to achieve a higher degree of integration between

The study has further presented an assessment of some of the key competitive issues emerging in the new E-commerce technology approach to businesses. These are the need for better E-commerce adoption and its impact on business, the need to foster awareness, and the need to formulate a policy that would support effectively its implementation and use. As economies move into the twenty-first century the emerging role of E-commerce raises pressing issues for SMEs, policy-makers and researchers alike. If SMEs are to thrive and prosper in tomorrow's competition, these issues take on a particular dimension.

Overall, E-commerce is seen as opening new horizons, but horizons, which would only yield the most desirable outcomes if appropriate policies would be developed and implemented. It is the development, implementation and evolution of these policies, which is one of the real challenges facing SMEs and the Government in particular.

Many SMEs have limited resources and will need to out-source advice and assistance to implement E-commerce. Delivery of additional profitable business will provide momentum for

E-commerce provided implementation is cost effective. Any substantial change to business processes and practices can delay implementation of E-commerce by SMEs

To conclude, nowadays an enterprise is no longer on its own operating autonomously and in a centralised style, producing and selling to defined group of consumers. The global economy and new technologies make it possible to conduct business without physical boundaries, and demand a new approach of looking at the very fundamental elements of how business works. Important efficiency gains are associated with the use of E-commerce, arising from reduction in business costs and a rationalization of business process. McCrea *et al.*, [1996] stressed that in addition to these static gains, firms may use Internet based E-commerce to create added value by providing new products, adopting new business practices or changing the way in which they interact in the market place. Realizing these dynamic gains depends to a large extent on the way in which SMEs integrate E-commerce applications into their business functions. Internet start-ups invent new ways of creating value added, new services and new business models. SMEs may use the Internet to develop E-commerce strategies geared to expanding their business and increasing their effectiveness. In addition, groups of SMEs may enter into partnership with large firms who are their suppliers or rather with industry wide associations [Kaplan *et al.*, 1997]. The development of effective E-commerce strategies is of fundamental importance for success in domestic and international markets.

ACRONYMS:

ICTs	Information and Communication Technologies
GDP	Gross Domestic Product
SMEs	Small and Medium Enterprises
UNDP	United Nations Development Program
RoI	Return on Investments

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